STRATIGRAPHY, SEDIMENTOLOGY AND PALYNOLOGY OF CRETACEOUS AND TERTIARY STRATA, SOUTHWEST BYLOT ISLAND, NORTHWEST TERRITORIES, CANADA

JAMES JOSEPH WATERFIELD, B.Sc. (Honours)

STRATIGRAPHY, SEDIMENTOLOGY AND PALYNOLOGY OF CRETACEOUS AND TERTIARY STRATA, SOUTHWEST BYLOT ISLAND, NORTHWEST TERRITORIES, CANADA

by

© James Joseph Waterfield, B.Sc. (Honours)

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ABSTRACT

Four new formations (the Bylot Island, Pond Inlet, Navy Board and Aktineq formations) are defined from the upper portion of Eclipse Group strata on the southwest coast of Bylot Island. The Bylot Island Formation represents basin plain deposition during a Late Maastrichtian transgression. The overlying Early Paleocene sandstones of the Pond Inlet Formation were deposited in basin margin fan-deltas and a shelf through submarine fan complex. This unit reflects a rejuvenation of local and distal source areas, and marks the beginning of a marine regression. The shale of the Navy Board Formation is the deeper, basin plain component of this depositional sequence. The deltaic sequence at the top of the Navy Board Formation and the fluviatile deposits of the Aktineq Formation mark the final regressive phase when a fluvial system of late Early Paleocene age prograded across the older marine units. A eustatic sea level fall is suggested as the control of sedimentation during this period.

Two informal palynomorph zones identified in these rocks support intrabasinal lithostratigraphic correlations and establish formation ages. The Late Maastrichtian Hamulatisporis amplus - Ulmipollenites sp.1 (HU) assemblage zone (dominated by long ranging species) contains specimens of Hamulatisporis amplus Stanley, Ulmipollenites sp.1., Pesavis parva Kalgutkar and Sweet and Ceratiopsis diebelii

(Alberti) Vozzhennikova. This zone is restricted to the Bylot Island Formation. The Early Paleocene Trivestibulopollenites betuloides - Triatriopollenites sp.1 (TT) assemblage zone is dominated by reworked and long ranging species. It contains specimens of Trivestibulopollenites betuloides Thomson and Pflug, Triatriopollenites sp.1, Sequoiapollenites paleocenicus and Ceratiopsis speciosa (Alberti) Lentin and Williams. This zone is further divided into two subzones (TTa and TTb) on the basis of abundance of selected species. These abundance changes reflect a change in depositional environment.

KEY WORDS: Bylot Island, Eclipse Group, Cretaceous, Tertiary, Stratigraphy, Sedimentology, Palynology.

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DEDICATION

This thesis is dedicated to my parents, Mike and Lundy Waterfield, whose love, support and encouragement have made this possible.

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CHAPTER 1. INTRODUCTION

1.1 Purpose and Objectives

On land exposures of Cretaceous and Tertiary strata are rare in the eastern Arctic (Miall *et al*., 1980). Such outcrops provide the main basis for deciphering the Late Mesozoic - Early Cenozoic geologic history of the eastern Arctic Islands and surrounding offshore. Structural, stratigraphic, and depositional information derived from the study of these localities gives insights on regional depositional patterns, the age and extent of controlling tectonic events and their relationship to plate motions in the Baffin Bay area. Paleontology provides information on the offshore hydrocarbon potential, and contributes to the knowledge of the paleobiology and paleoclimate of the eastern Arctic. This study examines the stratigraphy, sedimentology, and palynology of strata identified as Tertiary by Miall *et al*. (1980) from the southwest coast of Bylot Island, Northwest Territories (Figure 1.1). The research was carried out concurrently with a parallel study by Sparkes (M.Sc. thesis in prep.) of underlying reported Cretaceous strata.

This investigation involves the identification and characterization of stratigraphic units, the interpretation of depositional environments through sedimentology, and the correlation and dating of units through palynology. These

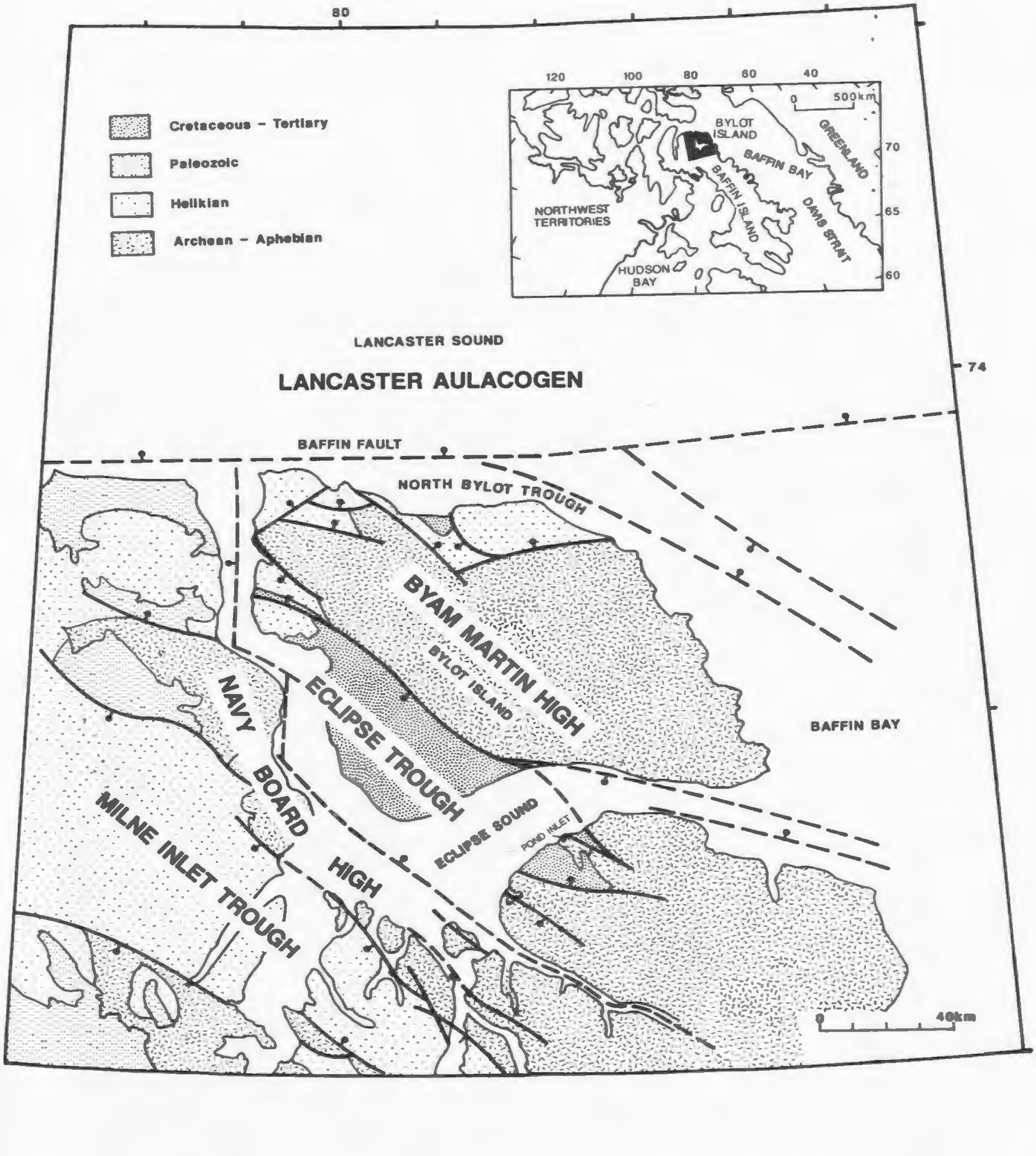

Figure 1.1. Location and regional geology of the Eclipse Trough. Inset shows the location of Bylot Island (after Kerr, 1980; Miall <u>et</u> <u>al</u>., 1980).

data are then utilized to postulate a model of sedimentary basin development. Investigative techniques utilized for each subdiscipline of this study are presented later in this chapter.

1.2 Methods

1.2.1 Field Methods

Pond Inlet, the nearest settlement to Bylot Island, may be reached by air from either Montreal or Ottawa through Iqaluit (formerly Frobisher Bay). The study area is located approximately 22 kilometres northwest of Pond Inlet, across Eclipse Sound on the southwest coast of Bylot Island (Figure 1.1). The Island is easily accessed by helicopter or, depending on ice conditions, may also be reached by snowmobile or boat.

Because of the island's status as a bird sanctuary, motor vehicles may not be used in studying the area. Without extensive helicopter support, the field area accessible is restricted by field season length, camp mobility, radio check requirements, and the ability to ford glacial rivers. For the aforementioned reasons the study was concentrated in the south coast, and Twosnout Creek areas (Figure 1.2). These localities offer a large number of exposures, and included access to all the major stratigraphic units

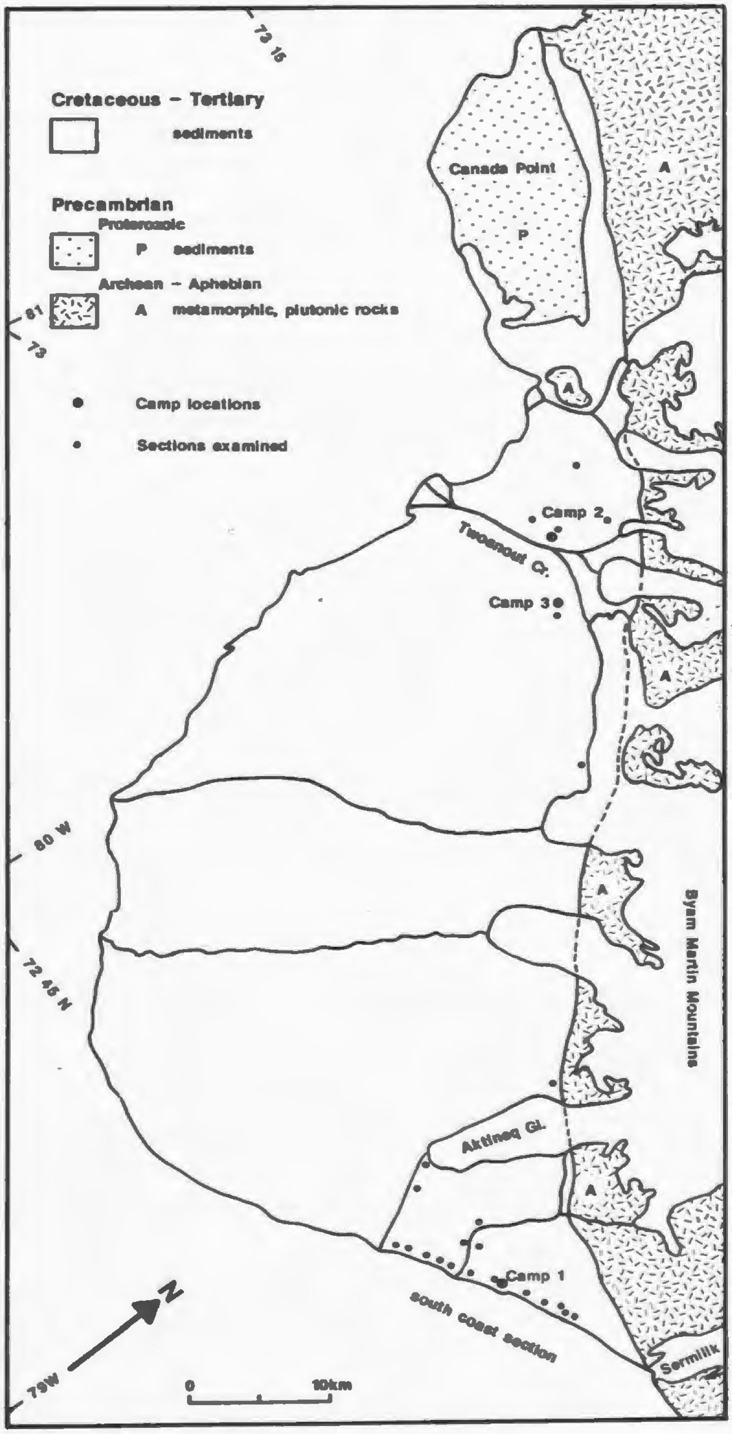

Figure 1.2. Section and camp locations on southwest Bylot Island (modified from Miall <u>et al</u>., 1980).

identified by previous studies (Jackson and Davidson, 1975; Jackson *et al*., 1975; Miall *et al*., 1980).

Mapping of the south coast section was carried out from a base camp located at a small stream, mid way between Aktineq Creek and Sermilik glacier (Figure 1.2). Access to coastal exposures west of Aktineq Creek was prevented by high river levels. The Twosnout Creek area was studied from two camps, located on either side of Twosnout Creek (Figure 1.2). In addition, a helicopter was utilized to access one exposure located inland and midway between the two base areas.

A total of 24 stratigraphic sections (Appendix B,C and G) of weakly lithified sandstone and shale have been measured from strata of Bylot Island (18 from the south coast, 6 from the Twosnout Creek area, and 1 from the central area

(Figure 1.2). Detailed records of lithology, color, grain size, bed thickness, bed contacts, sedimentary structures, and paleocurrents (where available) were made. Sections were sampled for sedimentology and palynology at an interval of approximately 5 m in the vicinity of the Cretaceous/Tertiary boundary identified by Miall *et al*. (1980), and Ioannides (1986). Elsewhere, an interval of approximately 20 m was utilized. Collections include 5 fossil collections, and 201 sedimentology/palynology samples.

1.2.2 Sediment Analysis Methods

Petrography:

Thirty eight thin sections of sand and sandstone were made (Appendix D_1, D_2); sixteen from lithified samples in which matrix, cement and porosity were examined. The remainder were made from unconsolidated sand by impregnation with epoxy. Samples were stained as follows using the technique of Quinn (1987) as modified from Norman (1974).

Standard uncovered thin sections were etched for 30 seconds in hydrofluoric acid (HF) fumes, then immersed in saturated sodium cobaltinitrite solution for 60 seconds. The slides were then rinsed in a beaker of tap water and allowed to dry. They were then re-etched in HF fumes (30 seconds), and immersed for 15 seconds in saturated barium chloride solution. Sections were then covered with a saturated solution of amaranth for 15 seconds, rinsed in a beaker of water, and rinsed again under a gentle stream of tap water. Samples were allowed to dry, and spray covered. This procedure produces a yellow staining of K feldspars; plagioclase will stain pink to red according to its calcium content.

Detrital grain composition was determined using the Glagov-Chayes point counting method. A minimum of 300 grains per thin section were examined. This number provides a compositional volume estimate with a 2.5 to 5.8% probable error at a 95.4% level of confidence (Galehouse, 1971).

Grains counted in the analysis included quartz, K feldspar, plagioclase, biotite, chlorite, glauconite, garnet, amphibole, sedimentary, igneous and metamorphic rock fragments. Estimates of matrix, cement, and porosity were also recorded.

<u>Grain size</u>:

Twenty eight samples were analyzed for grain size using a sedimentation tube (Appendix E_1 to E_{15}); twenty two were also studied for mineralogy. The settling tube utilizes a weighing sample detection method, and allows the automated grain size analysis of particles greater than 63μm (Gillespie and Rendell, 1985). Prior to analysis samples were weighed, sieved through 63μm mesh, and reweighed to provide an estimate of percentage of fines.

Because all samples examined contain less than 15% matrix, the sandstone classification of McBride (1963) has been employed. This classification system allows best representation of samples whose dominant constituents are quartz, feldspar, and granitic/metamorphic rock fragments.

1.2.3 Palynologic Methods

A suite of 37 samples representative of the formations and lithologies were processed and examined for palynomorphs (Appendix F).

Processing:

Prior to processing, all samples were assigned a laboratory preparation number (Appendix A). The surface of consolidated samples were cleaned with distilled water to remove contaminants, and then air dried overnight. Dry samples were then wrapped in aluminum foil and crushed to millimetre size. Weakly lithified samples were crushed without washing. Samples are weighed (15 grams for shales and siltstones, 30 grams for sandstones), and placed in labelled 250 millilitre beakers. Four tablets, each containing 12000 ± 400 Lycopodium (Stockmarr, 1971) grains were added to each sample to provide an estimate of palynomorph concentration and a check for processing error.

To each sample 150ml of 20% hydrochloric (HCl) acid was added to remove carbonate. They were allowed to stand for 8 to 12 hours to ensure complete reaction. Samples were then centrifuged, and the acid decanted; residual acid was removed by a process of adding distilled water, centrifuging the sample, and decanting the liquid. This procedure was repeated three times.

To remove silicate minerals, 150 ml of hydrofluoric (HF) acid was added. Samples were left for 8 to 12 hours, then decanted. The residual material was washed with distilled water, centrifuged and decanted three times. If excessive silicate material remains, the hydrofluoric acid treatment was repeated. A slide (1 of 5) was made of the residual unoxidized, unsieved organic and mineral material.

The technique described by Cwynar et al (1979) was used to sieve the samples through a 10 μm screen. Following sieving two slides (2 and 3 of 5) of the unoxidized, sieved residue was prepared. Some of the residue (5 ml) was also placed in a labelled vial. The remaining sample material was washed into labelled 50 ml test tubes.

A process of oxidation was utilized to break-up the remaining organic material. Approximately 50 ml of "Schulze" solution (the oxidant) was added to each sample and allowed to react for approximately two minutes (samples rich in organic matter were allowed to react slightly longer). Samples were then washed, centrifuged, and decanted three times.

The residue was again sieved through a 10μm mesh. Samples rich in organic matter were treated with 10% potassium carbonate during sieving to aid in the break-up of the organics. The residual material was then washed back into the test tubes, and stained. Three drops of Alizarin Red dye were added to each sample. Samples were allowed to stand for three minutes, then repeatedly washed, centrifuged, and decanted until the washings were clear. Two final slides of the oxidized, sieved and stained material were prepared; the remainder of sample was placed in a labelled vial.

To produce a strew slide one drop of sample was mixed with three drops of polyvinyl alcohol on a glass coverslip and spread evenly with a toothpick. After drying, the coverslip was mounted by placing two drops of Elvacite (Dupont) on a glass slide, and then turning the coverslip over onto it. The coverslip was allowed to settle on the glue, and dry overnight.

Identification:

A Zeiss photomicroscope III (serial number 047633) is used for strew slide examination, palynomorph identification and photography. Photographs are taken using Kodak Technical Pan ISO 25 black and white film, with the microscope optics set for interference contrast.

Slides are scanned at 0.5mm intervals at 400X magnification. Total counts of palynomorphs were taken to 200 grains not including the *Lycopodium* tracer; where necessary, additional strew slides from the same sample were examined up to a total of five slides. If insufficient grains were found, the sample was not utilized. The abundance, type and condition of grains and organic material were also noted.

1.3 Previous Studies

The earliest recorded geologic study of the sedimentary sequences of Bylot Island took place in the early part of this century. In 1910 the government steamer Arctic was sent to patrol the Arctic Islands, and attempt a crossing of the Northwest Passage. During the two year cruise a number of localities, including Bylot Island, were prospected for minerals. Coal was discovered on Bylot Island, and buried fossil trees "in a perfect state of preservation" (Bernier, 1912) were also reported.

The first systematic investigation of Bylot Island was carried out as part of a larger reconnaissance study by the Geological Survey of Canada (Jackson, 1969). The resulting reports and maps (Jackson and Davidson, 1975; Jackson et al., 1975) assigned a Cretaceous - Tertiary age to the strata exposed on the southwest coast of Bylot Island. The Eclipse Group was established to encompass these strata, and 4 map units were identified within it (Table 1.1).

Miall et al. (1980) carried out a detailed sedimentologic study of the area. Seven sedimentary units were identified and their environments interpreted (Table 1.2). The stratigraphy proposed by Miall et al. identified 3 depositional cycles (Figure 1.3). The first consists of unit Kh and represents terrestrial fluvial deposition. This unit was assigned to the Cretaceous Hassel Formation. Cycle 2 was placed unconformably on cycle 1, and

TABLE 1.1

MAP UNITS OF
Jackson and Davidson (1975) and Jackson *et al*. (1975)

MAP UNIT	AGE	LITHOLOGY
T	Paleocene to Eocene	Grey to black fissile shale, minor dark grey siltstone and sandstone.
KT^{2}	Upper Cretaceous to Eocene	Buff to olive green poorly sorted arkosic sandstone, minor shale, carbonaceous siltstone and coal lenses.
KT^{1}	Upper Cretaceous to Eocene	Buff to olive green thin bedded subgreywacke, quartzwacke, siltstone and mudstone.
K	Cretaceous	White to reddish brown poorly sorted orthoquartzite and arkosic sandstone, minor pebble conglomerate, siltstone, shale and coal.

TABLE 1.2

MAP UNITS AND FORMATIONS OF BYLOT ISLAND

(units mapped by Miall *et al*., 1980.)

UNIT	LITHOLOGY	ENVIRONMENT	Miall *et al*. (1980)	Miall (1986)	Ricketts (1986)
Te^4	Mudstone Minor Sandstone	Open Marine	Eureka Sound Formation	Mokka Fiord Formation	Iceberg Bay Formation
Te^3	Immature Sandstone	Braided Alluvial Fan	Eureka Sound Formation	Mokka Fiord Formation	Iceberg Bay Formation
Te^2	Mudstone	Open Marine	Eureka Sound Formation	Mount Lawson Formation	Strand Bay Formation
Te^1	Sandstone	Shoreline Sand	Eureka Sound Formation	Mount Lawson Formation	Strand Bay Formation
Kk^2	Immature Sandstone	Braided Stream	Kanguk Formation	Kanguk Formation	Expedition Formation
Kk^1	Mudstone	Open Marine	Kanguk Formation	Kanguk Formation	Kanguk Formation
K	Sandstone	Braided Stream	Hassel Formation	Hassel Formation	Hassel Formation

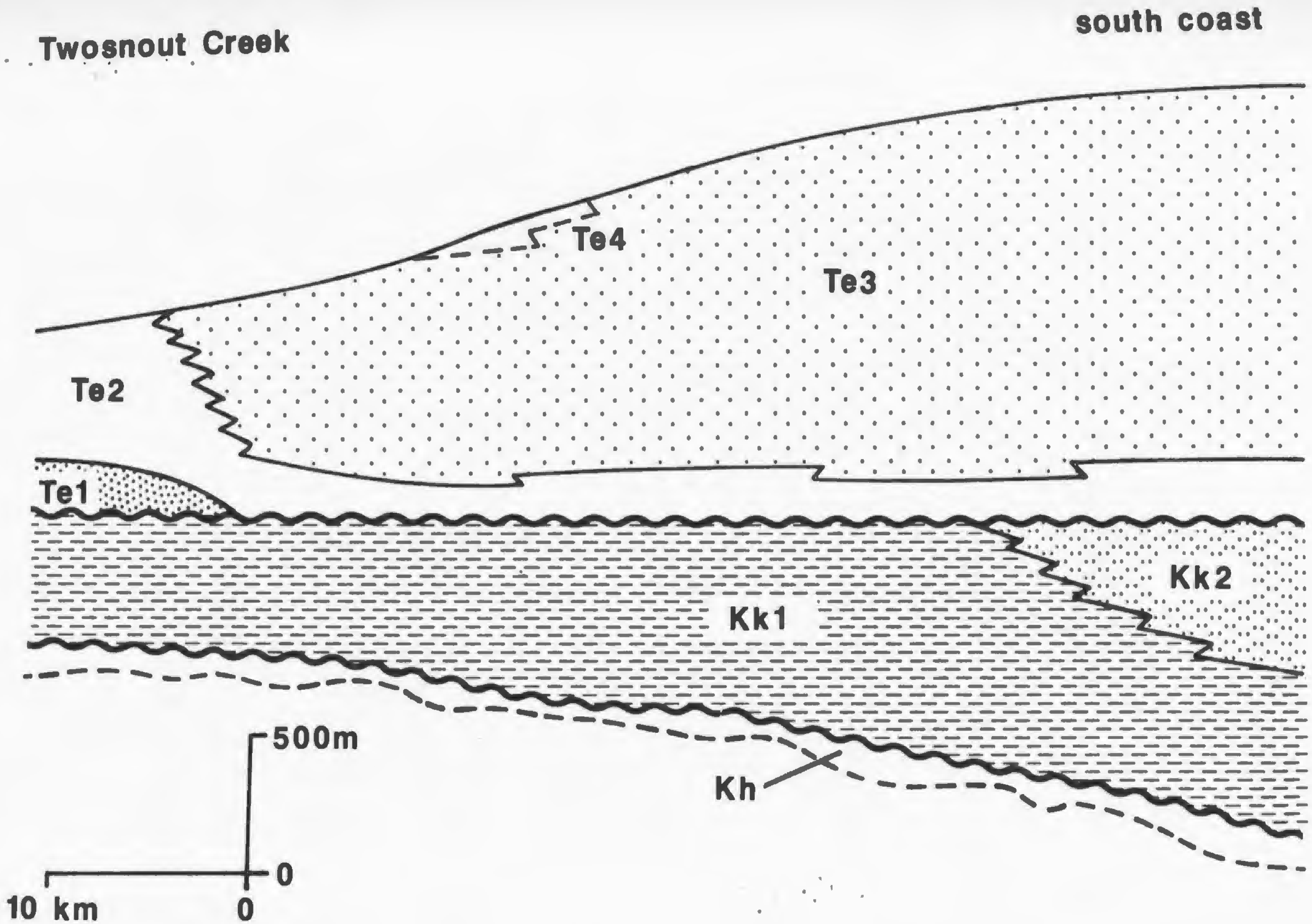

Figure 1.3. Stratigraphic scheme of Miall <u>et al</u>., 1980 (from Miall <u>et al</u>., 1980).

includes units Kk^1 and Kk^2. This cycle was interpreted as a marine cycle with a local delta - alluvial fan complex and was assigned to the Cretaceous Kanguk Formation.

The final cycle was unconformably placed on the second, and consists of units Te^1, Te^2, Te^3 and Te^4. It is these units which are reexamined in this study. This cycle was interpreted as a shoreface deposit (Te^1) which was drowned (Te^2), and subsequently covered by a prograding fluvial - deltaic complex (Te^3), which was in turn drowned (Te^4). These units were initially assigned to the Tertiary Eureka Sound Formation, but a subsequent revision of the nomenclature (Miall, 1986) placed units Te^1 and Te^2 in the Tertiary Mount Lawson Formation, and units Te^3 and Te^4 in the Mokka Fiord Formation. Ricketts (1986) proposed an alternate nomenclature, which transferred unit Kk^2 to the Expedition Fiord Formation, units Te^1 and Te^2 to the Strand Bay Formation and units Te^3 and Te^4 in the Iceberg Bay Formation (Table 1.2). The remaining names were not changed.

Ioannides (1986) carried out a study of dinoflagellate cysts utilizing the stratigraphic model and samples of Miall et al. (1980). Although primarily concerned with taxonomy, biostratigraphic correlations made in the study did not entirely concur with the lithostratigraphic correlations of Miall et al. (1980). These discrepancies clearly indicate that a revision of the stratigraphy is required.

The most recent publication (Jackson and Sangster, 1987) is a summary of the geology and resource potential of Bylot and Northwest Baffin Island. It was produced as part of a proposal for a National Park and contains no new data.

1.4 Tectonic and Structural Framework

The Eclipse Trough (Figure 1.1) is one of a series of northwest trending horst and graben structures which form the North Baffin Rift Zone (Jackson et al., 1978). These features developed along Huronian structural trends in the crystalline basement in response to extensional tectonism in the Davis Strait - Baffin Bay region (Kerr, 1980; McWhae, 1981). This event, known as the Eurekan rifting episode, began in the Aptian - Late Albian (Langille, 1987) and continued until the Miocene or Pliocene (Clark and Upton, 1971; Keen et al, 1972, 1974; Srivastava, 1978; Jackson et al., 1979; Kerr, 1980; Menzies, 1982; Rice and Shade, 1982).

The nature of this tectonism is a contested issue. Many believe Baffin Bay and Davis Strait developed through seafloor spreading resulting from the northwest propagation of the western arm of the North Atlantic Ridge (Clarke and Upton, 1971; Keen et al., 1972, 1974; Srivastava, 1978; Jackson et al., 1979; Menzies, 1982; Rice and Shade, 1982). Others contend that this seaway represents floundered attenuated continental crust (Grant, 1975, 1980; Umpleby, 1979; Kerr, 1980). Crustal attenuation has been proposed as a precursor to rifting, thus this controversy may simply be over how far a single complex process has proceeded (Miall et al., 1980).

Prior to the onset of rifting or attenuation, much of the eastern Canadian Arctic is thought to have been unbroken continental crust on which thin marine units were deposited (Kerr, 1980). Initiation of extensional tectonism generated the major bounding faults of the Lancaster Aulacogen (Figure 1.1). Branching secondary faults emanating southeast from Lancaster Sound subsequently produced the Eclipse Trough (Kerr, 1980) into which sediments from the surrounding uplands (Byam Martin and Navy Board Highs) were shed. The episodic movements of the bounding faults and/or eustatic sea level changes produced a cyclic terrestrial and marine basin fill. Over 1500m of this strata is preserved on southwest Bylot Island.

CHAPTER 2. STRATIGRAPHY

2.1 Introduction

A variety of names have been applied to the Cretaceous and Tertiary strata of Bylot Island. Jackson and Davidson (1975) and Jackson et al. (1975) informally erected a group status lithostratigraphic unit, the Eclipse Group, to encompass these beds. Four mapping units were defined within the group, but no formations were established (Table 1.1).

Miall et al. (1980) reexamined the area and proposed a stratigraphy comprised of seven map units (Figure 1.3). These units have been assigned to a variety of formations by different authors (Miall et al., 1980; Miall, 1986; Ricketts, 1986; Table 1.2). In all cases the strata of Bylot Island were placed in formations defined within the Sverdrup Basin located 500 km to the northwest.

During the Late Cretaceous and Early Tertiary, the Eclipse Trough was separated from Sverdrup Basin by the Arctic Platform (Miall, 1981; 1986)(Figure 2.1). This broad mildly positive structure isolated the two basins (the nearest strata equivalent to that of Bylot Island are located 500 km northwest on west central Devon Island (Miall, 1986; Jackson and Sangster, 1987)). During this period sedimentation in the Sverdrup Basin was controlled by the compressive tectonic forces of the Eurekan orogeny. The complimentary extensional deformation of the Eurekan rifting

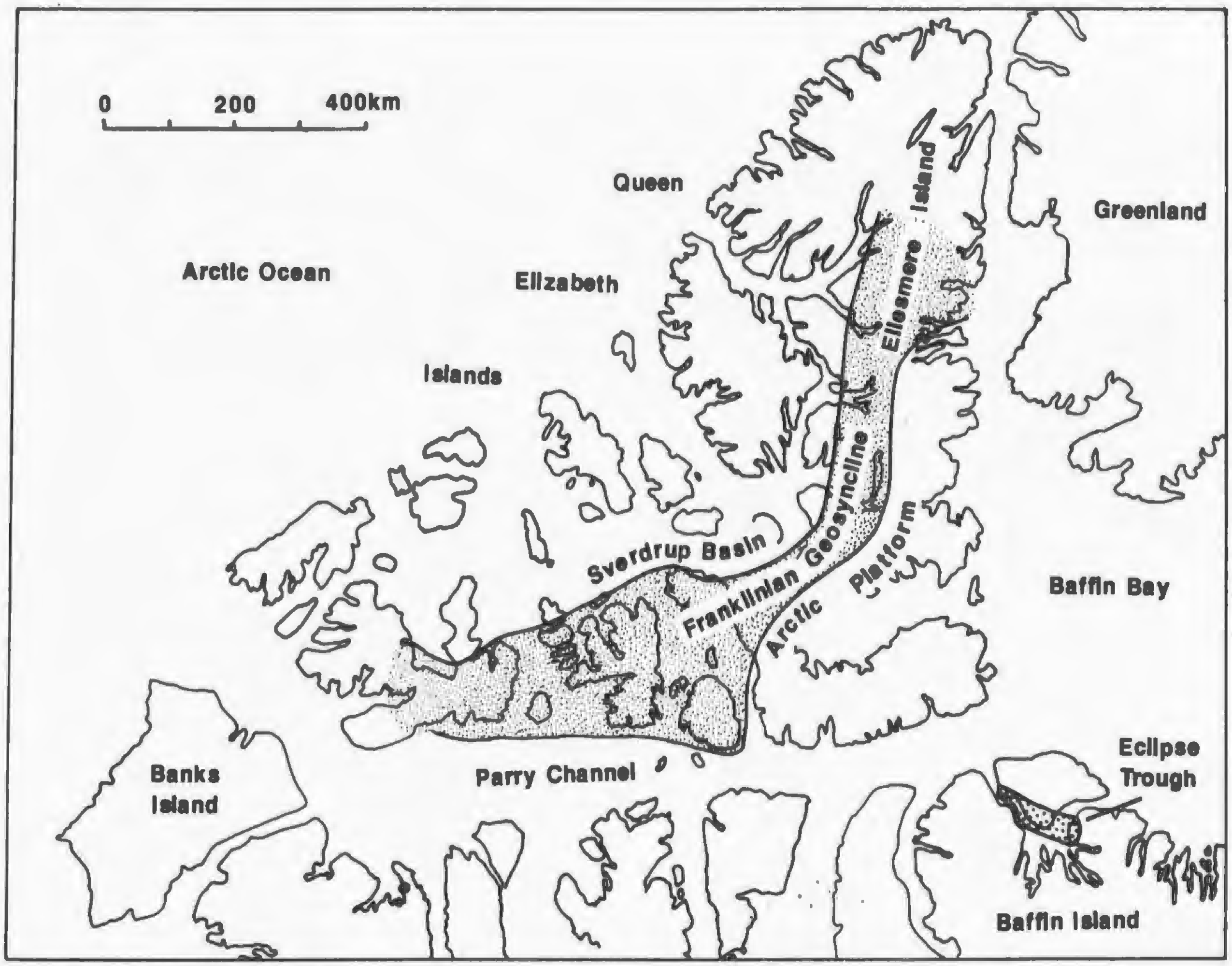

Figure 2.1. Location of Sverdrup Basin and Arctic Platform (From Kerr, 1980).

event created the Eclipse Trough and subsequently influenced sedimentation into it. Clearly the Upper Cretaceous and Tertiary strata of Bylot Island were deposited under a different tectonic regime, in a basin entirely isolated from the Sverdrup Basin. For these reasons the direct relationship implied by the use of Sverdrup Basin stratigraphic units is far from certain. In this circumstance it is advisable and appropriate to abandon the use of these stratigraphic units (Jackson and Sangster, 1987). A new nomenclature is proposed for the units identified in this study.

In keeping with the International and North American codes of stratigraphic nomenclature the reconnaissance term Eclipse Group (Jackson and Davidson, 1975; Jackson *et al.*, 1975) is herein reinstated to encompass the Upper Cretaceous and Tertiary strata of Eclipse Trough. The strata examined in this study have been divided into 4 lithologically distinct formation rank units; The Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

The formations are presented in ascending stratigraphic order. Corrleations between south coast and Twosnout Creek exposures are based on biostratigraphic and sedimentologic data. Partially correlative units, representing periods when more than one depositional system was active in the area, are indicated where present. In some instances previous workers have placed in separate formations south coast and

Twosnout Creek exposures herein considered laterally equivalent. For this reason separate synonymys are presented for these two localities.

2.2 Bylot Island Formation

Definition:

The Bylot Island formation is the lowest unit examined in this study (Figure 2.2). The formation is composed of massive black mudstone and muddy siltstone with thin sandstone stringers. The preserved thickness of this unit at the type section is 155m (Figure 2.3; Appendix B). Thicker sections are found at Twosnout Creek where 300m of the formation are exposed (Sparks, pers. comm. 1989). The type section for the Bylot Island Formation is located on the south coast 4 km southwest of Sermilik Glacier at latitude 72° 53' N and longitude 79° 41' W (Appendix C).

Synonyms:

Bylot Island Formation strata on the south coast were formerly included in unit Kt^2 (Jackson et al., 1975) (Table 1.1), the Te^2 lower mudstone member of the Eureka Sound Formation (Miall et al.,1980), the Te^2 member of Mount Lawson Formation (Miall, 1986) and the Strand Bay Formation (Ricketts, 1986) (Table 1.2).

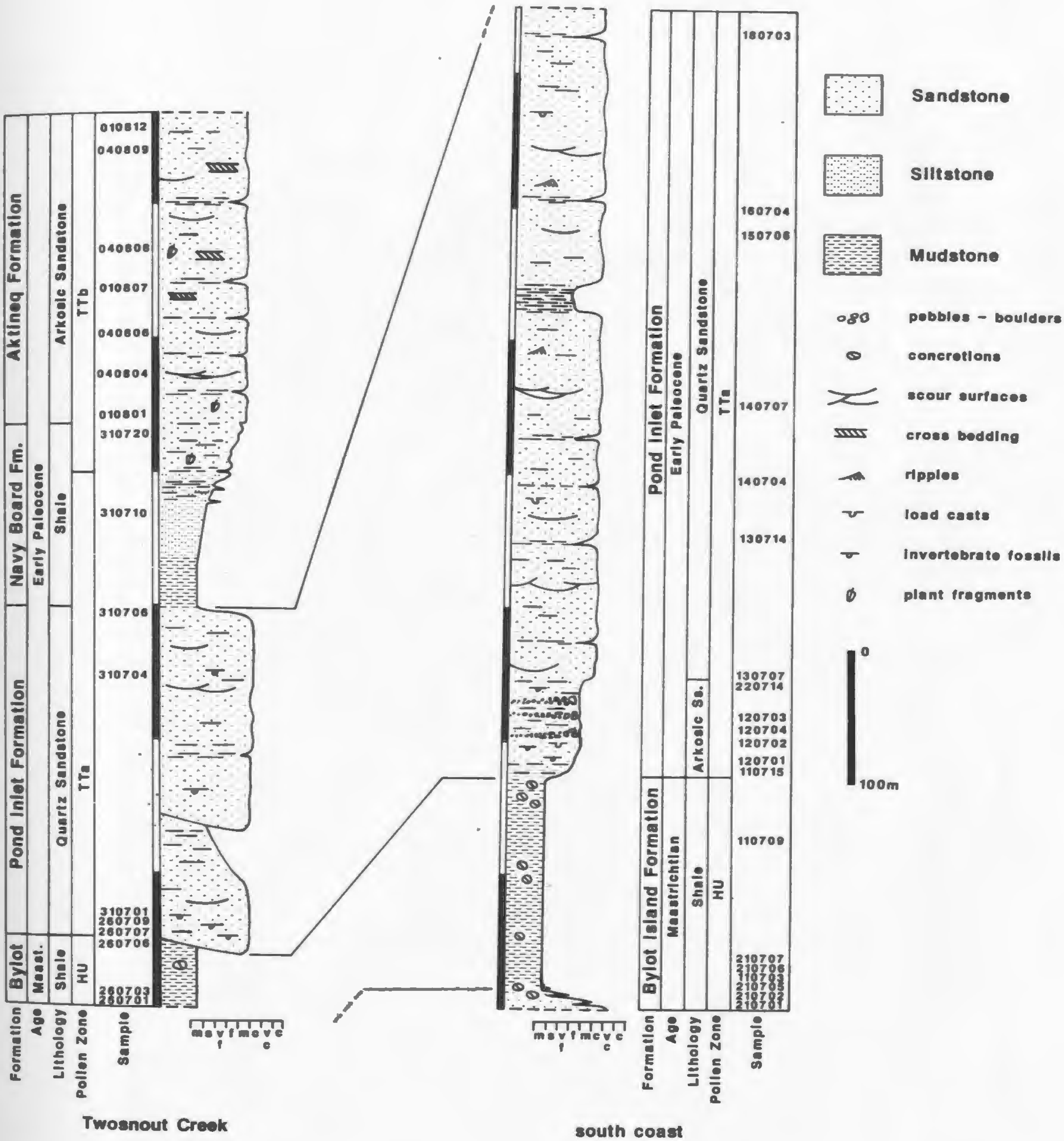

Figure 2.2 Composite stratigraphic sections of the south coast and Twosnout Creek areas of Bylot Island. Grain size scale: m = mudstone, s = siltstone, sandstone: vf = very fine, f = fine, m = medium, c = coarse, vc = very coarse, c = conglomerate.

Figure 2.3. Type section of the Bylot Island Formation. Note Pond Inlet Formation sandstones in background.

Exposures of the Bylot Island Formation at Twosnout Creek include strata previously identified as unit K by Jackson and Davidson (1975) (Table 1.1), the Kk[1] mudstone member of the Kanguk formation by Miall _et al_. (1980) and Miall (1986), and simply as the Kanguk Formation by Ricketts (1986) (Table 1.2).

Contacts:

On the south coast the basal contact with the underlying sand of the Sermilik Formation (Sparkes, pers. comm., 1989) is gradational over 10m and consists of interbeds of medium to fine arkosic sandstones and muddy siltstones. The contact is defined as the point at which the proportion of muddy beds exceeds that of the sandstones. At Twosnout Creek the contact with the underlying Byam Martin Formation is sharp, conformable and marked by a change from cemented grey mudstone to poorly consolidated black mudstone (Sparks, pers. comm., 1989). The basal contact is defined as the point at which this change occurs.

Sedimentology:

The Bylot Island Formation is composed of structureless or laminated black muddy siltstone and mudstone. Thin (2-50cm thick) medium to fine sandstone stringers occur sporadically. These sandstones are laterally continuous, have a flat erosional base, and fine upward into the overlying shale. Sedimentary structures are rare, but partial to complete sequences consisting of a massive base, a rippled zone and a laminated top do occur. Other sedimentary structures include flame structures and rip-up clasts. Nodule bands occur sporadically throughout the upper half of the formation at the type locality. Individual nodules range in size from a few centimetres to 1.5 metres.

Age:

Palynological analysis suggests a Maastrichtian age for the Bylot Island Formation (see discussion chapter). This is in agreement with the age proposed by Ioannides (1986).

2.3 Pond Inlet Formation

Definition:

The Pond Inlet Formation overlies (Figure 2.2), and is partially correlative with the Bylot Island Formation. This formation is dominantly sandstone, with minor conglomerate and muddy siltstone. Two sandstone lithotypes are recognized; a white quartzose sandstone, and a red arkosic sandstone. The two lithotypes are distinct, but the arkosic sandstone lithotype is of insufficient areal extent to be assigned a separate formation. It has been placed in the

Pond Inlet Formation as it is most closely associated with it in outcrop.

At the type section (Figure 2.4; Appendix B) 200m of strata are preserved. A composite thickness of over 600m was measured from the formation base to Aktineq Creek along the south coast (Figure 1.2). Data from Miall et al. (1980) and Burden (pers. comm., 1989) indicate the total thickness exposed along the entire south coast is approximately 950m. At Twosnout Creek the formation varies considerably in thickness, ranging from 3 to 270 metres.

The Type section for the Pond Inlet Formation is located 2km inland on a small creek, 9km northeast of the mouth of Aktineq Creek (latitude 72° 52' N longitude 79° 24' W) (Appendix C). This section is composed entirely of the white quartz sandstone lithotype. A reference section (Figure 2.5) located on the south coast at latitude 72° 53' N and longitude 79° 41' W (Appendix C), provides a good exposure of the arkosic sand lithotype. This Formation is named for Pond Inlet, the channel which connects Eclipse Sound with Baffin Bay (Figure 1.1).

Synonyms:

The south coast exposures of the Pond Inlet Formation includes unit Kt^2 of Jackson et al. (1975) (Table 1.1), the Te^3 upper sandstone member of the Eureka Sound Formation (Miall et al.,1980), the Te^3 member of the Mokka Fiord

Figure 2.4. Aerial view of Pond Inlet Formation type section. Approximately 1.5km of lateral exposure shown.

Figure 2.5. Pond Inlet Formation reference section (arkosic sandstone lithotype). Note the longitudinal geometry of the conglomerate bed and the complex cross-cutting relationships of the sandstone sequences (person for scale).

Formation (Miall, 1986) and the Iceberg Bay Formation (Ricketts, 1986) (Table 1.2).

The Twosnout Creek outcrops include unit K (Jackson and Davidson, 1975) (Table 1.1), the Te^1 lower sandstone member of the Eureka Sound Formation (Miall <u>et</u> <u>al</u>., 1980), the Te^1 member of the Mount Lawson Formation (Miall, 1986) and the Strand Bay Formation (Ricketts, 1986) (Table 1.2).

<u>Contacts</u>:

On the south coast, the contact with the underlying Bylot Island Formation is conformable and gradational over 5m. The transition consists of a coarsening upward sequence of interbedded sandstones and silty shales. The contact is defined as the point at which the sandstone beds comprise greater than 50% of the strata. At Twosnout Creek, the contact is sharp and erosional. The transition from black shale to sandstone defines the boundary at this location. The lateral transition from the Bylot Island to the Pond Inlet Formation was observed both on the south coast and Twosnout Creek. It consists of a gradational change from fine sandstone to shale over several tens of metres. The boundary in such locations is defined as the point at which sand is the dominant constituent of the rock.

Sedimentology:

The Pond Inlet Formation consists of weakly consolidated sandstone composed of two distinct lithotypes; (1) a white quartzose sandstone, (2) and an arkosic sandstone. The white sandstone lithotype is by far the dominant sediment type, making up more than 90% of the formation on the south coast and 100% at Twosnout Creek. This lithotype consists of laterally continuous sheets of white sandstone separated by relatively thin muddy siltstone partings (Figure 2.4). Individual sandstone beds range in thickness from a few centimetres to several tens of metres. These beds have an erosional base and commonly fine upward. The lack of lithologic contrasts due to the very clean nature of the sandstones makes recognition of sedimentary structures and bed boundaries difficult. Rip-up clasts, centimetre to metre scale scours and trough cross-bedding are common, but other sedimentary structures are rare.

Siltstone partings range from less than 1 centimetre to several metres in thickness; they are almost never thicker than the surrounding sandstone beds. Partings are in gradational contact with the underlying sandstone bed, may be massive, laminated or rippled (ripples < 3cm high) and occasionally contain coaly fragments. They are commonly discontinuous due to scouring. Macrofossils are rare, and commonly corroded. They include a variety of bivalves (including Ostrea Linné and Nucula Lamarck; Haggart pers.

comm., 1988), gastropods, scaphopods, corals (*Faksephyllia faxoensis* Beck and Lyell; Cairns, pers. comm., 1988) and the trace fossil *Thalassinoides*.

The large scale depositional style of the white sandstone lithotype differs considerably between the south coast and Twosnout Creek. On the south coast the sandstones occur as large sheets, with individual cycles or beds laterally continuous over several kilometres (Figure 2.4). At Twosnout Creek, this lithotype forms at least two very large (one or more kilometre wide), overlapping lensoid bodies (Figure 2.6). These have a concave up erosional base, and a relatively flat top. Internally the lobes are composed of stacked sandstone sheets which are identical to those of the south coast.

The arkosic sandstone lithotype is restricted to the south coast where it underlies and interfingers with the white sandstone lithotype. The arkosic unit fingers progressively thin and eventually disappear up section. This lithotype consists of stacked fining upward beds of arkosic sandstone to muddy siltstone with occasional conglomerate beds (Figure 2.5). Individual beds have an undulatory erosional base, and fine-upward from pebbly sandstone or sandstone through to silty mudstone. The finer material is commonly missing due to scouring. Beds range from a few centimetres to several metres in thickness. A wide variety of sedimentary structures are present, including flame

Figure 2.6. Part of a Pond Inlet Formation sandstone lens between Bylot Island Formation shales (lower) and Navy Board Formation shales (upper). Section located at Twosnout Creek.

structures, rip up clasts, planar bedding, trough and planar tangential cross stratification, climbing ripples, water escape structures and soft sediment deformation.

The conglomeratic units are lensoid or sheetlike in cross-section, having an erosional base, and a flat top. In longitudinal section the conglomerates thicken and coarsen in the direction of flow, reaching a maximum very near the point of furthest propagation (Figure 2.5). These units range in thickness from a few tens of centimetres to 2 metres. Clasts are dominantly igneous and range up to 2 metres in diameter.

Transported macrofossils are common in some pebble beds, but no *in situ* organisms were recognised. Bivalves and gastropods are the most common forms, corals (*Faksephyllia faxoensis* Beck and Lyell; Cairns, pers. comm., 1988) and sharks teeth less so. Coaly material is common in the muddy siltstones, but no recognizable plant remains occur. The depositional pattern of this lithotype is complex; both fining up and coarsening upward cycles are present at a metre to tens of metre scale. Cycles commonly cross cut one another due to scouring (Figure 2.5).

Petrography:

The two lithotypes which comprise the Pond Inlet Formation have distinct petrographic characteristics. The white sandstone lithotype is very mature; quartz comprises between 78 - 96% of the detrital grains (Appendix D). Quartz grains consisting of a well rounded epitaxial overgrowth on a rounded core are abundant (up to 30% of the total quartz). The main secondary components are granitic rock fragments, K-feldspar and plagioclase. Trace quantities of zircon, garnet, amphibole, biotite and chlorite are also present. Glauconite is ubiquitous in samples from Twosnout Creek, and occurs in many of the south coast samples. This lithotype falls in the subarkose, sublitharenite and quartz arenite fields (Figure 2.7).

All of the white sands examined have less than 10% fines (<63μm), and most less than 2% (Appendix E). All samples are very weakly lithified, and none remained intact for thin sectioning. Trace calcite on some of disaggregated material probably represents the cement. Grain size ranges from granule to fine sand with an average of 1.9ϕ (medium - coarse sand)(Appendix E). Grains are well rounded; sorting is poor (0.71).

The red arkosic sandstone lithotype is considerably less mature, both mineralogically and texturally. The dominant components are quartz (19-52%), K feldspar (3-33%), plagioclase (8-31%) and granitic rock fragments (3-31%), (Appendix D). Granitic rock fragments most commonly consist of polycrystalline quartz with minor feldspar and/or biotite. Secondary components include foliated metamorphic rock fragments, biotite, chlorite and opaque grains.

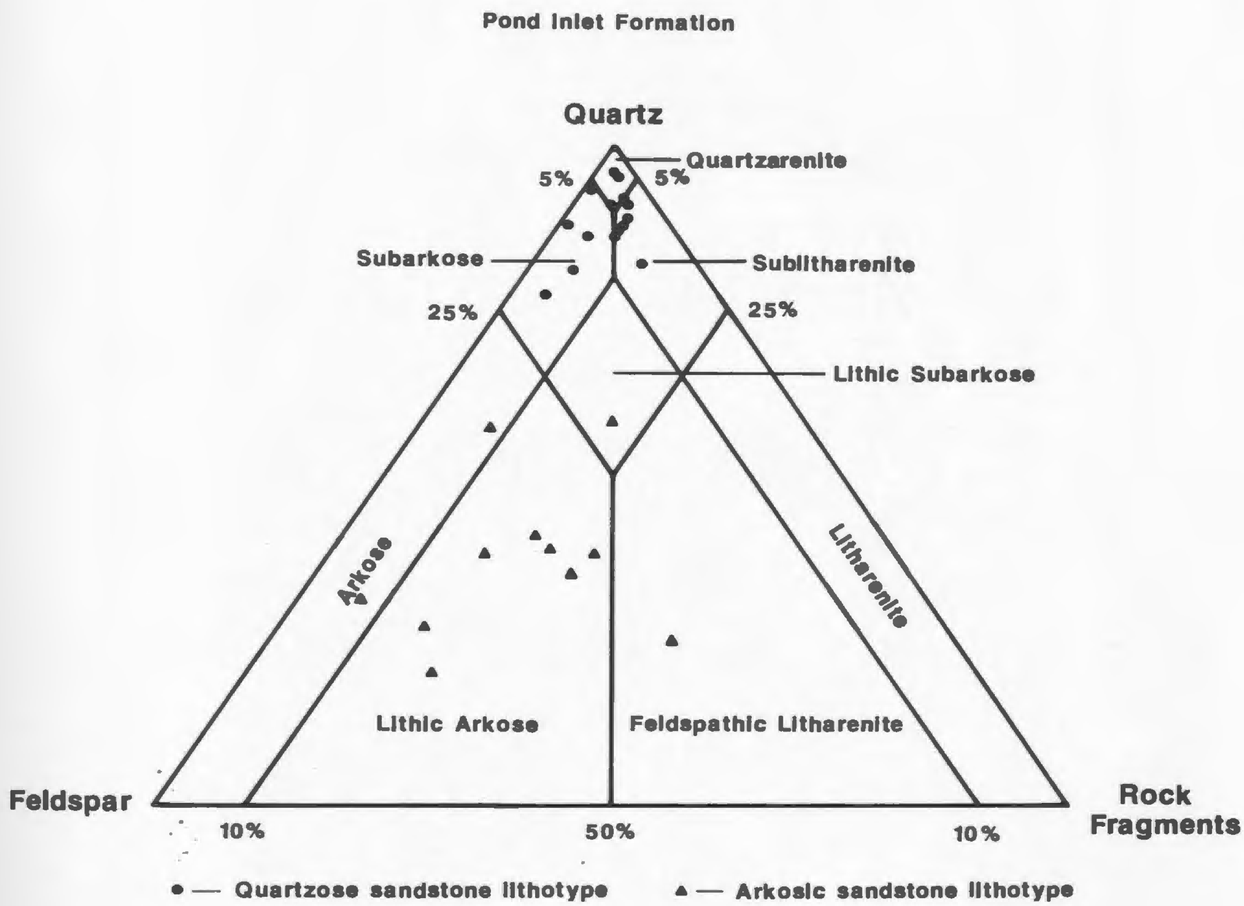

Figure 2.7. Detrital grain plot for Pond Inlet Formation sandstones.

Glauconite, pyroxene, zircon garnet and amphibole occur in trace quantities in some samples. Most samples plot in the lithic arkose field however, examples of arkose, lithic subarkose and feldspathic litharenite occur (Figure 2.7).

As with the white sandstones the percentage of matrix (<63μm) is low; most have less than 5% fines and none exceed 10% (Appendix E). This lithotype is generally weakly lithified, however, well cemented beds occur locally and several were examined in thin section. The cement is dominantly clay minerals, though minor calcite does occur. Porosity in lithified samples range from 2 to 15%, with the lowest porosities due to calcite occlusion of pore space. The average grain size of the samples studied is 1.9ϕ (medium sand) (Appendix E), similar to the white sandstone lithotype. Sorting is very poor (average 0.82) and grains are subrounded to angular.

Age

Palynomorph assemblages indicate an Early Paleocene age for the Pond Inlet Formation. This age is supported by the occurrence of the Danian coral Faksephyllia faxoensis Beck and Lyell (Cairns, pers. comm., 1988) and the findings of Ioannides (1986).

2.4 Navy Board Formation

Definition:

The Navy Board Formation overlies (Figure 2.2) and is partially correlative with the Pond Inlet Formation. The strata range in composition from black shale to black muddy sandstone. Measured outcrops are up to 365m thick. At the type section 150m of Navy Board shales overlie a sand lobe of the Pond Inlet Formation (Figure 2.8). This section is located in a large gully on a hill found between Twosnout Creek and a parallel braided stream 10 km to the northeast. The gully is 4km inland along the second braided stream (latitude 73° 14' N, longitude 79° 59' W) (Appendix C). A 265m reference section located 13 km inland on the southeastern side of Twosnout Creek (latitude 73° 10' N, longitude 79° 45' W) (Appendix C) provides a good example of the coarser rocks located near the transition to the overlying Aktineq Formation. The lateral transition from the Navy Board to the Pond Inlet Formation was not observed, but is inferred to be gradational on the basis of stratigraphic and depositional reconstructions (see discussion chapter).

Contacts:

The basal contact with the underlying Pond Inlet Formation is gradational to sharp, flat lying and conformable (Figure 2.8). Where the boundary is gradational,

Figure 2.8. Navy Board Formation type section over Pond Inlet Formation sandstone lobe at Twosnout Creek.

it consists of stacked decimetre scale fining up beds of white sandstone to black shale. The transition occurs over 20m with the boundary defined as the point at which the last decimetre scale white sand bed occurs. Based on sedimentologic reconstruction (see discussion chapter) this formation is thought to also conformably overlie the Bylot Island Formation, however, this contact was not observed.

Synonyms:

The Navy Board Formation includes parts of unit KT[1] (Jackson and Davidson, 1975) (Table 1.1), and is synonymous with the Te[2] lower mudstone member of the Eureka Sound Formation (Miall et al. , 1980), the Te[2] member of the Mount Lawson Formation (Miall, 1986) and part of the Strand Bay Formation (Ricketts, 1986) (Table 1.2).

Sedimentology:

The sedimentology of the Navy Board Formation varies in relation to the proximity of the boundary with the overlying Aktineq formation. The majority of the formation is composed of massive structureless to laminated black shale with minor grey sandstone stringers. The sandstones have an erosional base and commonly fine upward. They are often massive but some display partial to complete sequences consisting of a massive base, a rippled zone and a laminated or massive fine sandstone top. The stringers range in thickness from less than 1 to 50cm, and may occur as frequently as several per metre.

Near the boundary with the overlying Aktineq Formation, the Navy Board strata become considerably coarser. At such localities the strata consist of stacked fining upward beds of dark grey sandstone to muddy siltstone or shale (Figure 2.9). Beds have an erosional base, and range in thickness from a few centimetres to approximately 1m. Sedimentary structures are common, and include planar lamination, small scale trough cross stratification (10-50cm wide), planar tangential cross stratification and climbing ripples. Imprints of plant fragments occur in the shaley portion of beds nearest the boundary. These beds form large scale cycles (several tens of metres thick) which show a upward coarsening pattern. In addition, the formation shows an overall grain size increases towards the boundary with the overlying Aktineq strata (Appendix B).

Age

Analysis of the palynomorph assemblage of this formation indicates an Early Paleocene Age. This is in keeping with the findings of Ioannides (1986).

Figure 2.9. Aktineq - Navy Board Formation boundary at Twosnout Creek. Boundary is marked by the color change from grey-black of the Navy Board Fm. to the red of the Aktineq Fm.

2.5 Aktineq Formation

Definition:

The Aktineq Formation is the uppermost unit examined in this study (Figure 2.2). It overlies the Pond Inlet Formation, and overlies and is partially laterally equivalent to Navy Board Formation. This formation is dominantly composed of reddish-brown sandstone and black muddy siltstone. Outcrop is restricted to the area adjacent the Byam Martin mountains between the Aktineq Glacier, and Twosnout Creek (Figure 1.2). The type section (Figure 2.10)(Appendix B) is located 10km southeast of camp 3, adjacent the glacier which flows parallel to the Byam Martin Mountains, and which feeds Twosnout Creek (latitude 73° 08' N, longitude 79° 27' W) (Appendix C).

Synonyms:

The Aktineq Formation includes part of unit Kt^1 of Jackson and Davidson (1975) and Jackson et al. (1975) (Table 1.1), part of the Te^3 upper sandstone member of the Eureka Sound Formation (Miall et al., 1980), a portion of the Te^3 unit of the Mokka Fiord Formation (Miall, 1986) and part of the Iceberg Bay Formation (Ricketts, 1986) (Table 1.2).

Figure 2.10. Aktineq Formation type section near Twosnout Creek.

Contacts:

The basal contact of the Aktineq Formation with the underlying Navy Board Formation is conformable and sharp. The boundary is defined by a change from coarsening-up to fining-up depositional cycles. This transition is also marked by a change in color from the dark grey and black of the Navy Board strata, to the reddish brown of the Aktineq formation (Figure 2.9).

The basal contact with the underlying Pond Inlet Formation was not observed in outcrop, but is inferred to be gradational on the basis of stratigraphy and depositional environments (see discussion chapter). The top of the Aktineq Formation has been removed by erosion.

Sedimentology:

Aktineq Formation strata consist of large scale (several metres to several tens of metres) fining and thinning upward cycles composed of stacked laterally continuous sandstone beds (Figure 2.10). Individual beds fine upward from sandstone to muddy siltstone. Basal contacts are erosional and commonly show small scale scouring; large scale scours (>50 cm) are rare. Beds range in thickness from a few centimetres, to several metres. They are dominantly sandstone but pebbles, cobbles and boulders do occur at the base of some beds. Clasts up to 70cm in diameter were observed; Miall _et_ _al_., 1980 report clasts up to 1m.

Sedimentary structures are common, and include trough cross stratification (10cm - 2m wide), ripples (5 - 25 cm long, 1 - 5cm high), planar laminations, flame and load structures. These are most frequently observed in the thinner beds, and in the upper portions of thick (>1m) beds. Plant impressions and coaly fragments were observed in the siltstone portion of some units.

Petrography:

Conglomerate clasts examined during routine mapping are dominantly foliated gneisses; granitic clasts occur less frequently. They are generally subrounded and poorly sorted. The sandstones of the Aktineq Formation are texturally and mineralogically immature. As with the Pond Inlet Formation, the rocks are weakly lithified and most samples were disaggregated. The dominant components include quartz (15-29%), plagioclase (20-30%) and K feldspar (14-35%) (Appendix D). Metamorphic, and to a lesser degree igneous rock fragments are also major constituents, comprising between 3 and 24% of the detrital grains. Other grains identified include zircon, garnet, pyroxene and tourmaline?. The sandstones of this formation plot in the lithic arkose field (Figure 2.11).

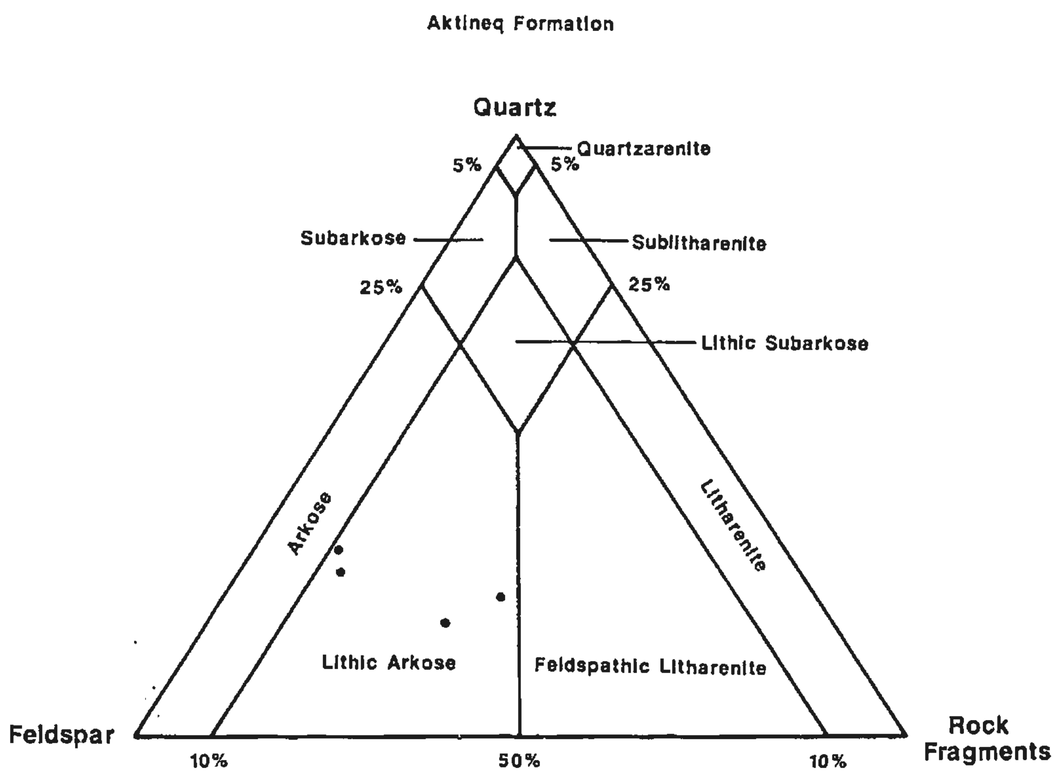

Figure 2.11. Detrital grain plot for Aktineq Formation sandstones.

The percentage by weight of the fines (<63μm) in these sandstones ranges from 8 to 10% (Appendix E), somewhat greater than those of the Pond Inlet Formation. One lithified sample was examined and was found to have a clay cement, with very minor calcite; porosity in this sample is low (2%). The average grain size recorded was 2.2ϕ (fine sand) (Appendix E) but ranges from granule to fine sand in outcrop. Sorting of the samples is moderate (avg 0.7), and grains are subangular to subrounded.

Age

Palynological analysis of this formation indicates an Early Paleocene age (see discussion chapter). This is consistent with the findings of Ioannides (1986).

CHAPTER 3. PALYNOLOGY

3.1 Introduction

Terrestrial palynology has been employed for age determination of strata on the southern coast and Twosnout Creek areas of Bylot Island. Marine palynomorphs are not examined in detail; however age diagnostic species are utilized. Unpublished studies reported by Jackson and Davidson (1975; terrestrial palynomorphs) and Miall et al. (1980; dinoflagellates, foraminifera, silicoflagellates, diatoms, radiolarians, sponge spicules and palynomorphs) show a Cretaceous - Tertiary age. Ioannides' (1986) study of dinoflagellate cysts also indicates an age of Cretaceous - Tertiary for these strata.

3.2 Systematics

Two main classification systems are currently applied to fossil palynomorphs. "Natural" systems utilize the comparison of fossil and recent spores and pollen to assign fossil species to recent genera (Pocock, 1962). Such systems are commonly used in Quaternary and Tertiary studies, but are rarely used on older material where the degree of interpretation, and the genetic variation within a species make implied phylogenetic relationships suspect (Burden and Hills, in prep.).

Morphologic classification systems were derived to overcome these problems. In such systems nomenclature is based upon the degree of similarity in morphologic character, independent of any phylogenetic relationships (Burden and Hills, in prep.; Boland, 1986). Such systems are artificial, but are extremely useful for microfloral analysis (Pocock, 1962). The classification system used in this study is the morphologic scheme of Burden (1982) and Burden and Hills (in prep.).

Palynomorphs identified are assigned to the following groups and subgroups:

TERRESTRIAL PALYNOMORPHS:

- Trilete Spores
- Monolete Spores
- Bisaccate Pollen
- Inaperturate Pollen
- Monosulcate Pollen
- Tricolpate Pollen
- Stephanocolpate Pollen
- Tricolporate Pollen
- Monoporate Pollen
- Triporate Pollen
- Stephanoporate Pollen
- Binigeminate Pollen

FUNGAL REMAINS:

MARINE MICROPLANKTON:

Proximate Dinoflagellates

Each taxon entry includes a photograph, synonymy, worldwide range, specific variations identified and occurrence in this study. A detailed description is provided for specimens not identified to a generic and/or specific level. Stated abundances are as shown on the palynomorph range chart (Appendix F).

TERRESTRIAL PALYNOMORPHS

Trilete Spores

Genus Cingutriletes Pierce emend. Dettmann, 1963.

Type Species: Cingutriletes congruens Pierce, 1961.

Cingutriletes clavus (Balme) Dettmann, 1963.

Plate 1, Figure 1

Selected Synonymy:

1963 Cingutriletes clavus (Balme) Dettmann, p. 69, pl. XIV, figs. 5-8.

1964 Sphagnumsporites psilatus (Ross) Couper; Singh, p. 39, pl. 1, fig. 2.

1966 Cingutriletes clavus (Balme) Dettmann; Srivastava, pl. I, figs. 6, 7.

1967 Cingutriletes clavus (Balme) Dettmann; Norris, p. 97, pl. 13, figs. 19-22.

1971 Cingutriletes clavus (Balme) Dettmann; Singh, p. 32, pl. 1, figs. 1-3.

1975 Cingutriletes clavus (Balme) Dettmann; Norris et al., pl. I, fig. 16.

1975 Cingutriletes clavus Dettmann; Brideaux and McIntyre, p. 16, pl. 2, fig. 34.

1986 Cingutriletes clavus Dettmann; Ashraf and Erben, p. 135, pl. 7, fig. 2.

Distribution: Jurassic to Tertiary.

Remarks: The five specimens of this spore were recovered from the Pond Inlet Formation.

Genus Densoisporites Weyland and Krieger emend. Dettmann, 1963.

Type Species: Densoisporites velatus Weyland and Krieger, 1953.

Densoisporites microrugulatus Brenner, 1963.

Plate 1, Figure 2

Selected Synonymy:

1966 Densoisporites microrugulatus Brenner; Burger, p. 253, pl. 22, figs. 1, 2; pl. 23, fig. 1.

1971 Densoisporites microrugulatus Brenner; Singh, p. 46, pl. 3, figs. 11, 12.

1975 Densoisporites microrugulatus Brenner; Brideaux and McIntyre, p. 16, pl. 3, fig. 4.

1980 Densoisporites microrugulatus Brenner; Wingate, p. 11, pl. 2, fig. 9.

1982 Densoisporites microrugulatus Brenner; Burden, p. 306, pl. 24, figs. 12, 13.

1987 Densoisporites microrugulatus Brenner; Langille, p. 76, pl. 2, fig. 4.

Distribution: Barremian to Albian.

Remarks: The single specimen of D. microrugulatus was recovered from the Pond Inlet Formation. The spore is badly corroded and is probably reworked.

Genus Antulsporites Archangelsky and Gamerro, 1966.

Type Species: Antulsporites baculatus (Archangelsky and Gamerro) Archangelsky and Gamerro, 1966.

Antulsporites sp.1

Plate 1, Figures 3, 4

Description: Trilete spore with a triangular amb and straight to slightly convex sides; apices rounded. Laesurae slightly raised, extending across the main body, but not onto the cingulum. Commissures enclosed in narrow (1μm), low (0.5μm) lips. Cingulum 4 to 5μm wide and indistinctly striped radially. Proximal surface foveolate with a band of large verrucae on the equator adjacent the cingulum. Distal surface is verrucate, with large radial crassitudes. Crassitudes rounded, extending 5μm beyond the main body and having an outline which parallels the cingulum at the apices. The verrucae on proximal and distal surface are 5μm high, 6μm in diameter. Exine is 2μm thick.
Size: Equatorial diameter 39 to 48μm (4 specimens).

Remarks: Specimens were recovered from the Pond Inlet, Navy Board, and Aktineq formations.

Genus Murospora Somers, 1952.

Type Species: Murospora kosankei Somers, 1952.

Murospora sp.1

Plate 1, Figure 5

Description: Trilete spore with a triangular central body, slightly concave sides and rounded apices. Laesurae simple slits extending the full radius of the central body. The body has a 2μm wide band of thickened exine along its margin, which is broken by narrow gaps (0.5μm wide) where the laesurae cross it. The proximal face is psilate; the distal face is enveloped by a psilate patella 4-5μm thick. The equatorial outline of the patella parallels that of the central body.

Size: Equatorial diameter: 31μm (1 specimen)

Central body diameter: 21μm

Remarks: M. sp.1 differs from M. mesozoica Pocock in having a thickened band of exine near the edge of the central body. This exinal thickening also differentiates M. sp.1 from M. laevigata Staplin, M. florida Pocock and M. kosankei Somers. The single specimen recovered from the Bylot Island Formation is very well preserved.

Genus Impardecispora Venkatachala, Kar and Raza, 1968.

Type Species: Impardecispora apiverrucata (Couper) Venkatachala, Kar and Raza, 1968.

Impardecispora sp.1

Plate 1, Figure 6

Description: Trilete spore with a triangular amb, concave sides and broadly rounded apices. Laesurae simple slits extending across 3/4 of spore radius. Spore apices covered with low broad hemispherical verrucae (1.5μm high, 3μm wide) which decrease in size in the interradial region. Exine 1μm thick.

Size: Equatorial diameter 28μm (1 specimen).

Remarks: I. sp.1 is characterized by the very low verrucae which make up its ornament. Because of the subtle nature of the ornament, poorly preserved specimens could be confused with Deltoidospora hallii Miner or Cyathidites minor Couper which are psilate. The single specimen was recovered from the base of the Aktineq Formation.

Genus Gleicheniidites Ross 1949 ex Delcourt and Sprumont emend. Dettmann, 1963.

Type Species: Gleicheniidites senonicus Ross, 1949.

Gleicheniidites senonicus Ross, 1949.

Plate 1, Figure 7

Selected Synonymy:

1958 Gleicheniidites senonicus Ross; Couper, p. 138, pl. 19, figs. 13-15.

1962 Gleicheniidites senonicus Ross; Groot and Groot, p. 147, pl. 2, figs. 6, 7.

1962 Gleicheniidites senonicus Ross; Pocock, p. 42, pl. 3, figs. 55, 56.

1964 Gleicheniidites senonicus Ross; Singh, p. 69, pl. 8, figs. 10, 11.

1965 *Gleicheniidites senonicus* Ross; McGregor, p. 30, pl. X, fig. 6.

1966 *Gleicheniidites senonicus* Ross; Burger, p. 239, pl. 3, fig. 5.

1967 *Gleicheniidites senonicus* Ross; Norris, p. 95, pl. 13, figs. 6, 7.

1968 *Gleicheniidites senonicus* Ross; Hedlund and Norris, p. 138, pl. III, fig. 6.

1969 *Gleicheniidites senonicus* Ross; Norris, pl. 107, figs. 16, 17.

1969 *Gleicheniidites senonicus* Ross; Norton and Hall, p. 17, pl. 1, fig. 13.

1969 *Gleicheniidites senonicus* (Ross) Skarby; Oltz, p. 121, pl. 39, fig. 25.

1969 *Gleicheniidites senonicus* Ross; Vagvolgyi and Hills, pl. 2, fig. 26.

1970 *Gleicheniidites senonicus* Ross; Habib, p. 353, pl. 2, fig. 2.

1970 *Gleicheniidites senonicus* Ross; Kemp, p. 103, pl. 18, figs. 3-7.

1970 *Gleicheniidites senonicus* Ross; Norris, pl. 1, fig. 6.

1971 *Gleicheniidites senonicus* Ross; Azéma and Ters, p. 270, pl. I, fig. G.

1971 *Gleicheniidites senonicus* Ross; Hopkins, p. 116, pl. 20, figs. 20-22.

1971 _Gleicheniidites_ _senonicus_ Ross; Singh, p. 97, pl. 14, fig. 1.

1973 _Gleicheniidites_ _senonicus_ Ross; Hopkins and Balkwill, p. 14, pl. 1, fig. 23.

1973 _Gleicheniidites_ _senonicus_ Ross; Stone, p. 65, pl. 10, fig. 54.

1974 _Gleicheniidites_ _senonicus_ Ross; Hopkins, p. 12, pl. 2, fig. 22.

1974 _Gleicheniidites_ _senonicus_ Ross; McIntyre, pl. 14, figs. 4, 5.

1975 _Gleicheniidites_ _senonicus_ Ross; Brideaux and McIntyre, p. 15, pl. 2, fig. 28.

1975a _Gleicheniidites_ _senonicus_ Ross; Srivastava, p. 41, pl. 18, figs. 7-15.

1980 _Gleicheniidites_ _senonicus_ Ross; Wingate, p. 21, pl. 8, fig. 10.

1981 _Gleicheniidites_ _senonicus_ Bebout, pl. 2, fig. 4.

1981 _Gleicheniidites_ _senonicus_ Ross; Herngreen and Chlonova, pl. III, fig. 10.

1981 _Gleicheniidites_ _senonicus_ Ross; Srivastava, pl. 12, fig. 12.

1982 _Gleicheniidites_ _senonicus_ Ross; Burden, p. 223, pl. 13, fig. 20.

1983 _Gleicheniidites_ _senonicus_ Wingate, pl. 1, fig. 18.

1986 _Gleicheniidites_ _senonicus_ Ross; Ashraf and Erben, p. 138, pl. 7, fig. 16.

1986 *Gleicheniidites senonicus* Ross; Farabee and Canright, p. 19, pl. 3, figs. 5-7.

1986 *Gleicheniidites senonicus* Ross; Ricketts and Sweet, p. 20, pl. 1, fig 21.

1987 *Gleicheniidites senonicus* Ross; Langille, p. 64, pl. 2, fig 11.

1988 *Gleicheniidites senonicus* Ross; Sweet and McIntyre, fig. 6, no. 17.

Distribution: Jurassic and Cretaceous.

Remarks: *G. senonicus* is found in nearly all samples, but is generally low in abundance.

Genus *Lycopodiacidites* Couper emend. Potonié, 1966.

Type Species: *Lycopodiacidites bullerensis* Couper, 1953.

Lycopodiacidites canaliculatus Singh, 1971.

Plate 1, Figure 8

Selected Synonymy:

1971 *Lycopodiacidites canaliculatus* Singh, p. 38, pl. 1, fig. 15.

1987 *Lycopodiacidites canaliculatus* Singh; Langille, p. 66, pl. 2, fig. 13.

Distribution: Middle to late Albian.

Remarks: This spore occurs in the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Genus *Hamulatisporis* Krutzsch emend. Srivastava, 1972.

Type Species: *Hamulatisporis hamulatis* Krutzsch, 1959.

Hamulatisporis amplus Stanley, 1965.

Plate 1, Figure 9

Selected Synonymy:

1965 *Hamulatisporis amplus* Stanley, p. 242, pl. 29, figs. 1-6.

1968a Cf. *Hamulatisporis amplus* Stanley; Elsik, p. 306, pl. 11, figs. 4-7.

1969 *Hamulatisporis amplus* Stanley; Oltz, p. 119, pl. 39, fig. 18.

1974 *Hamulatisporis amplus* Stanley; McIntyre, pl. 14, figs. 24, 25.

1986 *Hamulatisporis amplus* Stanley; Farabee and Canright, p. 19, pl. 4, fig. 1, 2.

Distribution: Campanian to Maastrichtian.

Remarks: Five specimens were recovered from three samples of the Pond Inlet Formation.

Genus Cicatricosisporites Potonié and Gelletich, 1933.

Type Species: Cicatricosisporites dorogensis Potonié and Gelletich, 1933.

Cicatricosisporites augustus Singh, 1971.

Plate 1, Figures 10, 11

Selected Synonymy:

1971 Cicatricosisporites augustus Singh, p. 68, pl. 7, figs. 3-11.

1975 Cicatricosisporites augustus Singh; Brideaux and McIntyre, pl. 1, fig. 36.

1975 Cicatricosisporites augustus Singh; Norris et al., pl. 1, fig. 14.

1982 Cicatricosisporites augustus Singh; Burden, p. 238, pl. 14, figs. 19-20.

Distribution: Berriasian to late Albian.

Remarks: Cicatricosisporites augustus can be distinguished from other species of this genus by its very narrow ribs (<1μm). Four specimens were recovered from the Bylot Island and Pond Inlet formations.

Cicatricosisporites _hallei_ Delcourt and Sprumont, 1955.

Plate 1, Figures 12, 13

Selected Synonymy:

1964 _Cicatricosisporites_ _mediostriatus_ (Bolkhovitina) Pocock; Singh, p. 59, pl. 6, fig. 8.

1966 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Burger, p. 244, pl. 9, fig. 2.

1967 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Norris, p. 92, pl. 11, figs. 15-20.

1971 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Hopkins, p. 115, pl. 20, fig. 14.

1975 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Brideaux and McIntyre, pl. 1, fig. 38.

1975 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Norris _et_ _al_., pl. 1, fig. 13.

1980 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Wingate, p. 17, pl. 5, fig. 12.

1981 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Bebout, pl. 7, fig. 5.

1982 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Burden, p. 239, pl. 14, figs. 25, 26.

1986 _Cicatricosisporites_ _hallei_ Delcourt and Sprumont; Langille, p. 68, fig. 2.

Distribution: Kimmeridgian to Santonian.

Remarks: Cicatricosisporites hallei can be distinguished from C. augustus Singh by it's wider ribs (≈2μm wide) and the rib pattern (Singh, 1971). This species is the most common of the genus, and occurs sporadically through the Bylot Island, Pond Inlet, Navy Board and Aktineq formations. The corroded condition of most specimens suggests that they are reworked.

Cicatricosisporites sp.1

Plate 1, Figures 14, 15

Description: Trilete spore with a rounded triangular amb. Laesurae slightly raised, bordered by 1.5μm wide lips and reaching or almost reaching the equator. Three to four proximal ribs in each interradial region running parallel to one another and their side of the spore forming a triangular pattern centered on the proximal pole. The distal ribs begin parallel to one side, and become increasingly curved across the face until sub-parallel the second and third side. All ribs are connected to outermost curved rib by one or both ends. The ribs are 3 to 5μm wide, separated by 1.5μm to 2μm wide canals. Ribs narrow sharply where joined to outermost rib. Exine is 2μm thick.

Size: Equatorial diameter 38-45μm (4 specimen).

Remarks: This species can be distinguished from C. augustus Singh and C. hallei Delcourt and Sprumont by it's wide ribs (3-5μm) and rib pattern. C. sp.1 differs from C. subrotundus Brenner in having a triangular proximal, and an arced distal rib pattern. This species is rare; four well preserved specimens were recovered from the Bylot Island and Pond Inlet formations of the south coast.

Genus Radialisporis Krutzsch, 1967.

Type Species: Radialisporis radiatus (Krutzsch) Krutzsch, 1967.

Radialisporis radiatus (Krutzsch) Krutzsch, 1967.

Plate 1, Figures 16, 17

Selected Synonymy:

1965 Anemia radiata (Krutzsch) Stanley, p. 258, pl. 33, figs. 6, 7.

1972 Radialisporis radiatus (Krutzsch) Krutzsch; Rouse and Srivastava, figs. 54, 55.

1972a Radialisporis radiatus (Krutzsch) Krutzsch; Srivastava, p. 29, pl. 24, figs. 8-13; pl. 25, figs. 1, 2.

1973 Cicatricosisporites radiatus Krutzsch; B.D. Tschudy, p. 8, pl. 1, figs. 15, 16.

1974 Radialsporis radiatus (Krutzsch) Krutzsch; McIntyre, pl. 14, fig. 15, 16.

1989 Cicatricosisporites cicatricosoides McIntyre, pl. 1, fig. 2.

Distribution: Campanian to Oligocene.

Remarks: This species was recovered in small numbers (1-5/sample) from samples of the Bylot Island and Pond Inlet formations.

Genus Tigrisporites Klaus, 1960, emend. Singh, 1971.

Type Species: Tigrisporites halleinis Klaus, 1960.

Tigrisporites scurrandus Norris, 1967.

Plate 1, Figure 18

Selected Synonymy:

1967 Tigrisporites scurrandus Norris, p. 91, pl. 11, figs. 3-7.

1971 Tigrisporites scurrandus Norris; Playford, pl. 103, fig 18.

1971 Tigrisporites scurrandus Norris; Singh, p. 42, pl. 19, figs. 1-4.

1975 Tigrisporites scurrandus Norris; Brideaux and McIntyre, pl. 1, fig. 31.

1975 Tigrisporites scurrandus Norris; Norris et al., pl. 1, fig. 17.

1980 Tigrisporites scurrandus Norris; Wingate, p. 30, pl. 11, fig. 10.

1982 Tigrisporites scurrandus Norris; Burden, p. 231, pl. 14, figs. 4-7.

Distribution: Early Cretaceous.

Remarks: The polar boss of the single specimen recovered is poorly developed. The specimen is also corroded and is probably reworked. This spore was found in the Bylot Island Formation.

Genus Retitriletes Pierce emend. Doring, Krutzsch, Mai and Schultz, 1963.

Type Species: Retitriletes globosus Pierce, 1961.

Retitriletes austroclavatidites (Cookson) Doring, Krutzsch, Mai and Schultz, 1963.

Plate 2, Figure 1

Selected Synonymy:

1962 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Pocock, p. 33, pl. 1, figs. 5, 6.

1963 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Dettmann, p. 44, pl. VI, figs. 18-21.

1964 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Singh, p. 39, pl. 1, fig. 3, 4.

1965 Lycopodiumsporites austroclavatidites (Cookson) Potonié; McGregor, pl. III, figs. 47, 48; pl. V, figs. 16, 17; pl. VII, fig. 11; pl. X, figs. 13-15.

1966 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Burger, p. 247, pl. 15, fig. 2.

1967 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Norris, p. 89, pl. 10, fig. 21.

1967 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Drugg, p. 40, pl. 6, fig. 33.

1969 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Oltz, p. 120, pl. 39. fig. 20.

1969 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Vagvolgyi and Hills, pl. 1, figs. 3, 4.

1970 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Norris, pl. 1, fig. 5.

1970 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Habib, p. 352, pl. 3, fig. 3.

1971 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Singh, p. 40, pl. 2, fig. 1.

1972a Lycopodiumsporites austroclavatidites (Cookson) Potonié; Srivastava, p. 30, pl. 25, figs. 5-9; pl. 26, figs. 1-3.

1972b Retitriletes austroclavatidites (Cookson) Krutzsch; Srivastava, p. 236, pl. VI, figs. 5-7.

1973 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Hopkins and Balkwill, p. 11, pl. 1, fig. 9.

1973 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Stone, p. 71, pl. 11, fig. 66.

1974 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Hopkins, p. 10, pl. 2, fig. 14.

1974 Lycopodiumsporites austroclavatidites (Cookson) Potonié; McIntyre, pl. 14, fig. 12.

1975 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Filatoff, p. 53, pl. 7, figs. 6-8.

1975 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Kimyai, pl. 1, fig. 6.

1975 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Brideaux and McIntyre, pl. 1, fig. 21.

1977 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Dörhöfer and Norris, pl. 1, fig. 24.

1978 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Wilson, p. 114, pl. 2, figs. 10, 13.

1982 Retitriletes austroclavatidites (Cookson) Doring et al.; Burden, p. 249, pl. 16, figs. 10-12.

1983 Retitriletes austroclavatidites (Cookson) Doring et al.; Fensome, p. 173, pl. 5, figs. 11-15.

1986 Lycopodiumsporites austroclavatidites (Cookson) Potonié; Ashraf and Erben, pl. 4, fig. 17; pl. 5, fig. 1, 2.

Distribution: Jurassic and Cretaceous.

Remarks: R. austroclavatidites was found in all of the formations in low abundances. Many are poorly preserved suggesting some proportion of the spores are reworked.

<u>Retitriletes</u> <u>eminulus</u> (Dettmann) n. comb.

Plate 2, Figure 2

Selected Synonymy:

1963 <u>Lycopodiumsporites</u> <u>eminulus</u> Dettmann, p. 45, pl. VII, fig. 8-12.

Distribution: Cretaceous

Remarks: The lower muri (1-2μm) and the smaller lumina (2-5μm) of <u>Retitriletes</u> <u>eminulus</u> distinguish it from <u>R.</u> <u>austroclavatidites</u> (Cookson) Doring <u>et</u> <u>al</u>. which has 2-3μm high muri and 7-12μm wide lumina. This species was recovered from the Bylot Island, Pond Inlet, Navy Board, and Aktineq formations.

<u>Retitriletes</u> sp.1

Plate 2, Figure 3

Description: Trilete spore with a circular amb. Laesurae almost reach the equator and are enclosed in thin (0.5μm), slightly raised lips. The distal face is broadly reticulate with thin (0.5μm), low (1.5μm) muri forming pentagonal or hexagonal lumina 6 to 8μm wide. These raised muri form a low membranous margin on spore body. The sculpture is reduced on proximal face (<0.5μm high and wide) and the lumina are more irregular and generally smaller. The exine 1.5μm thick.

Size: Equatorial diameter 29 to 33μm (7 specimens).

Remarks: *Retitriletes* sp.1 can be distinguished from *R. eminulus* Dettmann and *R. austroclavatidites* (Rouse) Dettmann by its large lumina (7-8μm wide) and low muri (1.5μm high). The seven well preserved specimens were observed in the Pond Inlet, Navy Board and Aktineq formations.

Genus *Scopusporis* Wingate, 1980.

Type Species: *Scopusporis latus* Wingate, 1980.

Scopusporis sp.1

Plate 2, Figures 4, 5

Description: Trilete spore with a rounded triangular amb, straight to convex sides, and rounded apices. Laesurae extend across 3/4 spore radius and are enclosed in wide (3-4μm wide) elevated (1.5μm high) gaping lips. The distal ornament consists of a polar boss surrounded by foveolate sculpture (4-6μm wide) with round lumina (about 9-10μm in diameter). On the proximal face, each facet has 2-4 verrucae (6-8μm wide, 4-6μm high) bordering the lips. Exine is about 4-5μm thick.

Size: Equatorial diameter 45 to 60μm (3 specimens).

Remarks: Wingate (1980) established the genus *Scopusporis* to accommodate trilete spores with a distal sculpture consisting of a polar boss surrounded by either a thickened ring or foveolate sculpture. Wingate (1980) assigned specimens which appear identical to those of this study to the species Scopusporis notabilis (Srivastava) Wingate. His specimens however do not appear to have the proximal sculpture described by Srivastava and thus should be assigned to another species. Three well preserved specimens were recovered from a Pond Inlet Formation sample.

Genus Todisporites Couper, 1958.

Type Species: Todisporites major Couper, 1958.

Todisporites minor Couper, 1958.

Plate 2, Figure 6

Selected Synonymy:

1958 Todisporites minor Couper, p. 135, pl. 16, figs. 9-10.

1962 Todisporites minor Couper; Pocock, p. 36, pl. 1, fig. 16.

1964 Todisporites minor Couper; Singh, p. 45, pl. 1, fig. 22.

1966 Todisporites minor Couper; Srivastava, p. 504, pl. I, fig. 10.

1967 Todisporites minor Couper; Srivastava, pl. I, fig. H.

1969 Todisporites minor Couper; Habib, pl. 1, fig. 1.

1971 Todisporites minor Couper; Paden Phillips and Felix, p. 288, pl. 1, fig. 10.

1971 Todisporites minor Couper; Singh, p. 50, pl. 4, fig. 2.

1973 *Todisporites* cf. *T. minor* Couper; Stone, p. 64, pl. 10, fig. 51.

1975 *Todisporites minor* Couper; Brideaux and McIntyre, pl. 1, fig. 13.

1975 *Todisporites minor* Couper; Kimyai, pl. 1, fig. 13.

1975 *Todisporites minor* Couper; Filatoff, p. 57, pl. 9, fig. 1.

1978 *Todisporites minor* Couper; Wilson, p. 110, pl. 1, fig. 12.

1980 *Todisporites minor* Couper; Wingate, p. 14, pl. 3, fig. 8.

1982 *Todisporites minor* Couper; Burden, p. 265, pl. 18, fig. 1, 2.

1986 *Todisporites minor* Couper; Ashraf and Erben, p. 128, pl. 2, fig. 10.

Distribution: Jurassic to Paleocene.

Remarks: *T. minor* is present in small numbers (1-2/sample) throughout the study area. Preservation is generally poor, many may be reworked.

Genus Stereisporites Pflug, 1953.

Type Species: Stereisporites stereoides (Potonié and Venitz) Pflug, 1953.

Stereisporites antiquasporites (Wilson and Webster) Dettmann, 1963.

Plate 2, Figure 7

Selected Synonymy:

1957 Sphagnum antiquasporites Wilson and Webster; Rouse, p. 361, pl. I, figs. 32, 33; pl. II, figs. 40, 41.

1962 Sphagnumsporites antiquasporites (Wilson and Webster) Pocock, p. 32, pl. 1, figs. 1-3.

1963 Stereisporites antiquasporites (Wilson and Webster) Dettmann, p. 25, pl. I, figs. 20, 21.

1964 Sphagnumsporites antiquasporites (Wilson and Webster) Singh, p. 38, pl. 1, fig. 1.

1964 Sphagnumsporites psilatus (Ross) Singh, p. 39, pl. 1, fig. 2.

1965 Stereisporites antiquasporites (Wilson and Webster) McGregor, pl. III, fig. 40.

1965 Sphagnumsporites psilatus (Ross) McGregor, pl. VI, fig. 1; pl. VII, fig. 6; pl. X, fig. 1.

1965 Sphagnum antiquasporites (Wilson and Webster) Stanley, p. 236, pl. 27, figs. 1-5.

1966 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Srivastava, p. 501, pl. I, figs. 1-3.

1967 Stereisporites antiquasporites (Wilson and Webster) Drugg, p. 37, pl. 6, fig. 19.

1967 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Norris, p. 87, pl. 10, figs, 10, 11.

1967 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Srivastava, pl. I, fig. B.

1968a Sphagnum antiquasporites Wilson and Webster; Elsik, p. 298, pl. 10, fig. 7.

1968 Stereisporites psilatus (Ross) Hedlund and Norris, pl. I, fig. 1.

1969 Stereisporites antiquasporites (Wilson and Webster) Norris, pl. 102, figs. 13, 14.

1969 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Norton and Hall, p. 11, pl. 1, fig. 1.

1969 Stereisporites antiquasporites (Wilson and Webster) Oltz, p. 119, pl. 39, fig. 16.

1969 Stereisporites antiquasporites (Wilson and Webster) Vagvolgyi and Hills, pl. 1, fig. 1.

1970 Stereisporites antiquasporites (Wilson and Webster) Habib, p. 352, pl. 1, fig. 1.

1971 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Azéma and Ters, p. 270, pl. I, fig. D.

1971 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Playford, pl. 103, fig. 2.

1971 Sphagnum antiquasporites Wilson and Webster; Hopkins, pl. 20, fig. 1.

1971 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Singh, p. 33, pl. 1, figs. 4, 5.

1973 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Stone, p. 66, pl. 10, fig. 55.

1973 Sphagnum antiquasporites Wilson and Webster; Hopkins and Balkwill, p. 10, pl. 1, fig. 2.

1973 Sphagnum cf. S. australe (Cookson) Hopkins and Balkwill, p. 10, pl. 1, figs. 3, 5.

1974 Stereisporites antiquasporites (Wilson and Webster) Dettmann; McIntyre, pl. 14, fig. 1.

1975 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Brideaux and McIntyre, p. 14, pl. 1, fig. 6.

1975 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Filatoff, p. 37, pl. 1, figs. 2, 3.

1975 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Norris et al., pl. 1, fig. 8.

1978 Stereisporites antiquasporites (Wilson and Webster) Dettmann, Wilson, p. 108, pl. 1, fig. 7-11.

1982 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Burden, p. 266, pl. 18, figs. 3, 4.

1983 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Truswell, p. 142, pl. 1, figs. 1, 2.

1987 Stereisporites antiquasporites (Wilson and Webster) Dettmann; Langille, p. 75, pl. 3, fig. 15.

Distribution: Jurassic to Tertiary.

Remarks: Considerable variation in morphology exists in the specimens examined, particularly in the degree of polar thickening. S. antiquasporites is present in nearly all of the samples studied, and is common to abundant in most.

Stereisporites regium (Drozhastchich) Drugg, 1967.

Plate 2, Figures 8, 9

Selected Synonymy:

1965 Sphagnum regium Drozhastchich; Stanley, p. 238, pl. 27, figs. 12-17.

1967 Stereisporites regium (Drozhastchich) Drugg, p. 37, pl. 6, fig. 20.

1973 Sphagnum cf. S. regium Drozhastchich; Hopkins and Balkwill, p. 10, pl. 1, fig. 4.

1974 Sphagnum regium Drozhastchich; Hopkins, p. 9, pl. 1, fig. 5.

1974 Stereisporites regium (Drozhastchich) Drugg; McIntyre, pl. 14, figs. 2, 3.

1978 Stereisporites regium (Drozhastchich) Wilson, p. 109, pl. 1, fig. 4.

Distribution: Albian to Paleocene.

Remarks: This species can be distinguished from S. antiquasporites (Wilson and Webster) Dettmann by the presence of hemispherical verrucae which are more pronounced on the distal surface. S. regium was recovered from the majority of the samples examined. It occurs in the Bylot Island, Pond Inlet, Navy Board, and Aktineq formations.

Genus Cingulatisporites Pflug, emend. Potonié, 1956.

Type Species: Cingulatisporites levispeciosus Pflug, 1953.

Cingulatisporites dakotaensis Stanley, 1965.

Plate 2, Figure 10

Selected Synonymy:

1965 Cingulatisporites dakotaensis Stanley, p. 243, pl. 30. figs. 1-8.

1969 Cingulatisporites dakotaensis Stanley; Norton and Hall, p. 15, pl. 2, fig. 6.

1969 Cingulatisporites dakotaensis Stanley; Oltz, p. 120, pl. 39, fig. 22.

1973 Cingulatisporites dakotaensis Stanley; Stone, p. 66, pl. 10, fig. 56.

1986 Cingulatisporites dakotaensis Stanley; Farabee and Canright, p. 15, pl. 2, fig. 1.

Distribution: Upper Campanian to Paleocene.

Remarks: Cingulatisporites dakotaensis is characterized by a Y-shaped polar thickening rotated 60° to the trilete mark. It can be distinguished from C. radiatus by the absence of a radially striated cingulum present in the latter. The single specimen was recovered from the Pond Inlet Formation.

Genus Deltoidospora Miner, 1935.

Type Species: Deltoidospora hallii Miner, 1935.

Deltoidospora hallii Miner, 1935.

Plate 2, Figure 11

Selected Synonymy:

1964 Deltoidospora hallii Miner; Singh, p. 80, pl. 9, figs. 13, 14.

1967 Deltoidospora hallii Miner; Norris, p. 86, pl. 10, fig. 3.

1971 Deltoidospora hallii Miner; Hopkins, p. 119, pl. 21, fig. 13.

1971 Deltoidospora hallii Miner; Singh, p. 118, pl. 16, fig. 8.

1973 Deltoidospora hallii Miner; May and Traverse, pl. 1, fig. 11.

1975 Deltoidospora hallii Miner; Cornet and Traverse, pl. 3, fig. 6.

1980 Deltoidospora hallii Miner; Wingate, p. 24, pl. 9, fig. 14.

1982 Deltoidospora hallii Miner; Burden, p. 261, pl. 17, fig. 23.

1986 Deltoidospora hallii Miner; Boland, p. 106, pl. 1, fig. 11.

1987 Deltoidospora hallii Miner; Langille, p. 76, pl. 3, fig. 16.

Distribution: Jurassic and Cretaceous.

Remarks: The straight to convex sides distinguish Deltoidospora hallii from Cyathidites minor Couper which has concave sides. The smaller size of D. hallii (20-35μm) distinguishes it from D. diaphana Wilson and Webster (42-46μm) and D. psilostoma Rouse (50-70μm) The average size of the specimens is 25μm, somewhat less than the size range (30-40μm) given by Singh (1964). This species is common to abundant in all samples.

Deltoidospora diaphana Wilson and Webster, 1946.

Plate 2, Figure 12

Selected Synonymy:

1957 Deltoidospora diaphana Wilson and Webster; Rouse, p. 364, pl. II, figs. 42, 43.

1969 Deltoidospora diaphana Wilson and Webster; Norton and Hall, p. 18, pl. 1, fig. 17.

1971 Deltoidospora diaphana Wilson and Webster; Singh, p. 119, pl. 16, figs. 10, 11.

1973 Deltoidospora diaphana Wilson and Webster; Stone, p. 64, pl. 10, fig. 52.

1982 Deltoidospora diaphana Wilson and Webster; Burden, p. 261, pl. 17, fig. 24.

Distribution: Late Jurassic to Tertiary.

Remarks: This species occurs in low numbers (1-3/sample) sporadically through the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Deltoidospora psilostoma Rouse, 1959.

Plate 2, Figure 13

Selected Synonymy:

1959 Deltoidospora psilostoma Rouse, p. 311, pl. 2, figs. 7, 8.

1962 Deltoidospora psilostoma Rouse; Pocock, p. 48, pl. 5, figs. 82, 83.

1964 Deltoidospora psilostoma Rouse; Singh, p. 80, pl. 9, fig. 15.

1971 Deltoidospora psilostoma Rouse; Singh, p. 120, pl. 16, fig. 12.

1982 Deltoidospora psilostoma Rouse; Burden, p. 262, pl. 17, fig. 28, 29.

Distribution: Late Jurassic and Cretaceous.

Remarks: Deltoidospora psilostoma is distinguished from D. diaphana Wilson and Webster by its larger size (50-70μm) and thicker weakly punctate exine. This spore occurs in the Bylot Island, Pond Inlet and Aktineq formations.

Genus Cibotiumspora Chang, 1965.

Type Species: Cibotiumspora paradoxa (Malyavkina) Chang, 1965.

Cibotiumspora juncta (Kara-Murza) Singh, 1983.

Plate 2, Figure 14

Selected Synonymy:

1959 Concavisporites sinuatus Couper; Krutzsch, p. 122.

1964 Deltoidospora juncta (Kara-Murza) Singh, p. 81, pl. 9, fig. 16.

1966 Concavisporites jurienensis Balme; Burger, p. 237, pl. 4, fig. 6.

1967 Deltoidospora juncta (Kara-Murza) Baltes, pl. 1, fig. 14.

1969 Concavisporites jurienensis Balme; Norton and Hall, p. 18, pl. 1, fig. 14.

1969 Deltoidospora junctum (Kara-Murza) Vagvolgyi and Hills, pl. 4, fig. 5.

1971 Deltoidospora junctum (Kara-Murza) Hopkins, p. 119, pl. 21, fig. 12.

1971 _Concavisporites jurienensis_ Balme; Singh, p. 112, pl. 15, fig. 16, 17.

1971 _Deltoidospora juncta_ (Kara-Murza) Singh, p. 119, pl. 16, fig. 10, 11.

1973 _Deltoidospora juncta_ (Kara-Murza) Hopkins and Balkwill, p. 15, pl. 2, fig. 28.

1974 _Deltoidospora juncta_ (Kara-Murza) Hopkins, p. 18, pl. 4, fig. 49.

1975 _Cibotiumspora jurienensis_ Balme; Filatoff, p. 60, pl. 10, figs. 8-13.

1975b _Obtusisporis junctus_ (Kara-Murza) Pocock; Srivastava, p. 131, pl. 1, figs. 9, 10.

1976 _Concavisporites jurienensis_ Balme; Scott, p. 570, pl. 2, fig. 3.

1980 _Concavisporites jurienensis_ Balme; Wingate, p. 25, pl. 9, fig. 12.

1981 _Deltoidospora juncta_ Bebout, pl. 2, fig. 2.

1982 _Deltoidospora juncta_ (Kara-Murza) Singh; Burden, p. 261, pl. 17, figs. 25, 26.

1983 _Cibotiumspora sinuata_ (Couper) Fensome, p. 404, pl. 15, figs. 7-14, 16, 18.

Distribution: Late Jurassic to Tertiary.

Remarks: This spore is rare in the Bylot Island and Pond Inlet formations.

Genus Cyathidites Couper, 1953.

Type Species: Cyathidites australis Couper, 1953.

Cyathidites australis Couper, 1953.

Plate 2, Figure 15

Selected Synonymy:

1958 Cyathidites australis Couper; Couper, p. 138, pl. 20, fig. 8.

1963 Cyathidites australis Couper; Dettmann, p. 22, pl. I, figs. 1-3.

1964 Cyathidites australis Couper; Singh, p. 70, pl. 8, fig. 12.

1965 Cyathidites australis Couper; McGregor, pl. II, fig. 6; pl. V, fig. 1, 2; pl. VIII, fig. 3, 4.

1966 Cyathidites australis Couper; Burger, p. 237, pl. 5, fig. 2.

1967 Cyathidites cf. C. australis Couper; Drugg, p. 36, pl. 6, fig. 16.

1967 Cyathidites australis Couper; Norris, p. 86, pl. 10, fig. 1.

1968 Cyathidites australis Couper; Hedlund and Norris, p. 134, pl. I, fig. 3.

1969 Cyathidites australis Couper; Norris, pl. 102, fig. 1.

1969 Cyathidites australis Couper; Habib, pl. 1, fig. 7.

1969 Cyathidites australis Couper; Hughes, pl. 15-1, figs. 1, 2.

1969 *Cyathidites australis* Couper; Vagvolgyi and Hills, pl. 3, fig. 1.

1970 *Cyathidites australis* Couper; Habib, p. 353, pl. 1, fig. 5.

1970 *Cyathidites australis* Couper; Kemp, p. 84, pl. 10, fig. 1.

1970 *Cyathidites australis* Couper; Norris, pl. 2, fig. 1.

1971 *Cyathidites australis* Couper; Hopkins, p. 116, pl. 20, fig. 23.

1971 *Cyathidites australis* Couper; Singh, p. 101, pl. 14, fig. 8.

1973 *Cyathidites australis* Couper; Hopkins and Balkwill, p. 15, pl. 2, fig. 27.

1974 *Cyathidites australis* Couper; Hopkins, p. 12, pl. 2, figs. 19, 20.

1975 *Cyathidites australis* Couper; Brideaux and McIntyre, pl. 1, fig. 2.

1975 *Cyathidites australis* Couper; Kimyai, p. 1, fig. 1.

1975 *Cyathidites australis* Couper; Norris *et al*., pl. 1, fig. 9.

1982 *Cyathidites australis* Couper; Burden, p. 267, pl. 18, fig. 5.

1983 *Deltoidospora australis* (Couper) Pocock; Fensome, p. 423, pl. 15, fig. 5, 20.

1986 Cyathidites australis Couper; Ashraf and Erben, p. 126, pl. 1, figs. 4-6.

Distribution: Jurassic and Cretaceous.

Remarks: The genus Cyathidites is distinguished from Deltoidospora Miner by its concave sides (Singh, 1964). Only three examples of this spore were recovered, all from the Pond Inlet Formation.

Cyathidites minor Couper, 1953.

Plate 2, Figure 16

Selected Synonymy:

1958 Cyathidites minor Couper; Couper, p. 139, pl. 20, figs. 9, 10.

1961 Cyathidites minor Couper; Groot et al., p. 128, pl. 24, fig. 9.

1962 Cyathidites minor Couper; Pocock, p. 43, pl. 4, figs. 57, 58.

1963 Cyathidites minor Couper; Dettmann, p. 22, pl. I, figs. 4, 5.

1964 Cyathidites minor Couper; Singh, p. 71, pl. 8, fig. 13.

1965 Cyathidites minor Couper; McGregor, pl. VII, figs. 3, 4.

1966 Cyathidites minor Couper; Burger, p. 237, pl. 4, fig. 1.

1966 Cyathidites minor Couper; Srivastava, p. 507, pl. I, figs. 8, 16.

1967 Cyathidites minor Couper; Norris, p. 86, pl. 10, fig. 2.

1967 Cyathidites minor Couper; Srivastava, pl. I, fig. M.

1968 Cyathidites minor Couper; Brenner, p. 349, pl. I, fig. 3.

1968 Cyathidites minor Couper; Hedlund and Norris, p. 134, pl. I, fig. 3.

1969 Cyathidites minor Couper; Norris, pl. 102, figs. 2, 3.

1969 Cyathidites minor Couper; Habib, pl. 1, fig. 3.

1969 Cyathidites minor Couper; Norton and Hall, p. 22, pl. 1, fig. 20.

1969 Cyathidites minor Couper; Vagvolgyi and Hills, pl. 2, fig. 27.

1970 Cyathidites minor Couper; Habib, p. 353, pl. 1, figs. 2, 4.

1970 Cyathidites minor Couper; Kemp, p. 84, pl. 10, figs. 2, 3.

1971 Cyathidites minor Couper; Azéma and Ters, p. 270, pl. 1, fig. A.

1971 Cyathidites minor Couper; Hopkins, p. 116, pl. 20, fig. 24.

1971 *Cyathidites minor* Couper; Singh, p. 101, pl. 14, fig. 9.

1972a *Cyathidites minor* Couper; Srivastava, p. 11, pl. 7, figs. 2, 3.

1972b *Cyathidites minor* Couper; Srivastava, p. 227, pl. V, fig 1.

1973 *Cyathidites minor* Couper; Hopkins and Balkwill, p. 15, pl. 2, fig. 27.

1973 *Cyathidites minor* Couper; B.D. Tschudy, p. 6, pl. 1, fig. 1.

1974 *Cyathidites minor* Couper; Hopkins, p. 12, pl. 2, fig. 20.

1974 *Cyathidites minor* Couper; McIntyre, pl. 14, fig. 8.

1975 *Cyathidites minor* Couper; Brideaux and McIntyre, pl. 1, fig. 3.

1975 *Cyathidites minor* Couper; Kimyai, pl. 1, fig. 10.

1975 *Cyathidites minor* Couper; Norris *et al*., pl. 1, fig. 12.

1975b *Cyathidites minor* Couper; Srivastava, p. 130, pl. 1, figs. 6, 7.

1981 *Cyathidites minor* Couper; Herngreen and Chlonova, pl. III, fig. 12.

1982 *Cyathidites minor* Couper; Burden, p. 267, pl. 18, fig. 6.

1983 *Deltoidospora australis* (Couper) Pocock; Fensome, p. 423, pl. 15, fig. 6.

1986 Cyathidites minor Couper; Farabee and Canright, p. 16, pl. 2, figs. 4-6.

1986 Cyathidites minor Couper; Norris, p. 30, pl. 2, fig. 13.

1987 Cyathidites minor Couper; Langille, p. 76, pl. 4, fig. 1.

Distribution: Jurassic and Cretaceous.

Remarks: Cyathidites minor (25-40μm) is distinguished from C. australis Couper (50-65μm) by its small size. This spore is common to abundant in the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Genus Neoraistrickia Potonié, 1956.

Type Species: Neoraistrickia truncata (Cookson) Potonié, 1956.

Neoraistrickia truncata (Cookson) Potonié, 1956.

Plate 2, Figure 17

Selected Synonymy:

1963 Neoraistrickia truncata (Cookson) Dettmann, p. 36, pl. V, figs. 4, 5.

1967 Neoraistrickia truncata (Cookson) Potonié; Norris, p. 89, pl. 10, fig. 20.

1971 Neoraistrickia truncata (Cookson) Potonié; Singh, p. 47, pl. 3, fig. 13.

1972a *Neoraistrickia truncata* (Cookson) Potonié; Srivastava, p. 25, pl. 22, figs. 5-7.

1975 *Neoraistrickia truncata* (Cookson) Potonié; Filatoff, p. 52, pl. 5, figs. 16, 17.

1982 *Neoraistrickia truncata* (Cookson) Potonié; Burden, p. 268, pl. 18, figs. 11-13.

1986 *Neoraistrickia truncata* (Cookson) Potonié; Farabee and Canright, p. 25, pl. 6, figs. 4, 5.

1987 *Neoraistrickia truncata* (Cookson) Potonié; Langille, p. 79, pl. 4, fig. 5.

Distribution: Jurassic and Cretaceous.

Remarks: This species occurs sporadically throughout the sections studied, and is rare to common in abundance.

Genus *Osmundacidites* Couper, 1953.

Type Species: *Osmundacidites wellmanii* Couper, 1953.

Osmundacidites wellmanii Couper, 1953.

Plate 2, Figure 18

Selected Synonymy:

1962 *Osmundacidites wellmanii* Couper; Pocock, p. 35, pl. 1, fig. 15.

1963 *Osmundacidites wellmanii* Couper; Dettmann, p. 32, pl. III, figs. 19-21.

1964 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Singh, p. 44, pl. 1, fig. 20.

1965 <u>Osmundacidites</u> <u>wellmanii</u> Couper; McGregor, pl. II, fig. 12.

1966 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Burger, p. 251, pl. 20, fig. 3.

1966 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Srivastava, p. 504, pl. 1, figs. 14, 20; pl. 2, figs. 1-3.

1967 <u>Osmundacidites</u> cf. <u>O.</u> <u>wellmanii</u> Couper; Drugg, p. 38, pl. 6, fig. 26.

1967 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Norris, p. 88, pl. 10, fig. 14.

1967 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Srivastava, pl. I, fig. G.

1969 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Norton and Hall, p. 15, pl. 1, fig 9.

1971 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Singh, p. 50, pl. 4, fig. 1.

1972a <u>Osmundacidites</u> <u>wellmanii</u> Couper; Srivastava, p. 27, pl. 23, figs. 1-3.

1973 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Hopkins and Balkwill, p. 12, pl. 1, figs. 15, 16.

1974 <u>Osmundacidites</u> <u>wellmanii</u> Couper; Hopkins, p. 13, pl. 2, fig. 24.

1974 <u>Osmundacidites</u> <u>wellmanii</u> Couper; McIntyre, pl. 14, figs. 9, 10.

1975 Osmundacidites wellmanii Couper; Brideaux and McIntyre, pl. 1, fig. 11.

1978 Osmundacidites wellmanii Couper; Wilson, p. 112, pl. 1, figs. 9, 15.

1982 Osmundacidites wellmanii Couper; Burden, p. 268, pl. 18, figs. 14, 15.

1986 Osmundacidites wellmanii Couper; Boland, p. 118, pl. 2, fig. 7.

1986 Osmundacidites wellmanii Couper; Farabee and Canright, p. 26, pl. 6, fig. 9.

1987 Osmundacidites wellmanii Couper; Langille, p. 80, pl. 4, fig. 6.

Distribution: Jurassic and Cretaceous.

Remarks: O. wellmanii occurs occasionally through all of the sections. Where present, it is very rare to common (1-9 specimens/sample).

Genus Baculatisporites Pflug and Thomson, 1953.

Type Species: Baculatisporites primarius (Wolff) Thomson and Pflug, 1953.

Baculatisporites comaumensis (Cookson) Potonié, 1956.

Plate 3, Figure 1

Selected Synonymy:

1963 Baculatisporites comaumensis (Cookson) Potonié; Dettmann, p. 35, pl. III, figs. 22, 23.

1965 Baculatisporites comaumensis (Cookson) Potonié; McGregor, pl. II, figs. 13, 25, 17; pl. IV, fig. 4; pl. V, fig. 21; pl. VII, fig. 10.

1965 Baculatisporites comaumensis (Cookson) Harris, p. 80, pl. 25, fig. 1.

1965 Osmunda comaumensis (Cookson) Stanley, p. 250, pl. 31. figs. 6-9.

1966 Baculatisporites comaumensis (Cookson) Potonié; Srivastava, p. 504, pl. II, fig. 13.

1968 Baculatisporites comaumensis (Cookson) Potonié; Hedlund and Norris, p. 136, pl. I, fig. 11.

1969 Osmundacidites comaumensis (Cookson) Cookson and Dettmann; Oltz, p. 121, pl. 39, fig. 26.

1971 Baculatisporites comaumensis (Cookson) Potonié; Hopkins, p. 114, pl. 20, figs. 10, 11.

1971 Baculatisporites comaumensis (Cookson) Potonié; Singh, p. 48, pl. 3, fig. 14.

1972a Baculatisporites comaumensis (Cookson) Potonié; Srivastava, p. 5, pl. 3, figs. 7-9.

1973 Baculatisporites comaumensis (Cookson) Potonié; Hopkins and Balkwill, p. 12, pl. 1, fig. 17.

1974 Baculatisporites comaumensis (Cookson) Potonié; Hopkins, p. 13, pl. 2, fig. 25.

1974 Baculatisporites comaumensis (Cookson) Potonié; McIntyre, pl. 14, fig. 9.

1978 Baculatisporites comaumensis (Cookson) Potonié; Wilson, p. 110, pl. 2, fig. 12.

1980 Baculatisporites comaumensis (Cookson) Potonié; Pederson and Lund, pl. V, fig. 23.

1982 Baculatisporites comaumensis (Cookson) Potonié; Burden, p. 269, pl. 18, figs. 16-18.

1983 Baculatisporites comaumensis (Cookson) Potonié; Fensome, p. 318, pl. 11, figs. 1-3, 6.

1983 Baculatisporites comaumensis (Cookson) Potonié; Truswell, p. 141, pl. 1, fig. 3, 4.

1984 Baculatisporites comaumensis (Cookson) Potonié; Gaponoff, p. 79, pl. 1, fig. 13.

1986 Baculatisporites comaumensis (Cookson) Potonié; Norris, p. 32, pl. 7, fig. 15.

1987 Baculatisporites comaumensis (Cookson) Potonié; Langille, p. 80, pl. 4, fig. 7.

Distribution: Late Triassic to Cretaceous.

Remarks: Baculatisporites comaumensis can be distinguished from Osmundacidites Couper by it's baculate sculpture; Osmundacidites is granulate (Burden, 1982). This spore is rare, only 3 poorly preserved specimens were recovered from the Pond Inlet Formation. Their condition suggests reworking.

Genus *Foraminisporis* Krutzsch, 1959.

Type Species: *Foraminisporis foraminis* Krutzsch, 1959.

Foraminisporis wonthaggiensis (Cookson and Dettmann) Dettmann, 1963.

Plate 3, Figure 2

Selected Synonymy:

1962 *Lycospora cretacea* Pocock, p. 34, pl. 1, figs. 12-13.

1963 *Foraminisporis wonthaggiensis* (Cookson and Dettmann) Dettmann, p. 71, pl. XIV, figs. 19-23; fig. 46.

1967 *Foraminisporis wonthaggiensis* (Cookson and Dettmann) Dettmann; Norris, p. 98, pl. 13, fig. 23.

1973 *Foraminisporis wonthaggiensis* (Cookson and Dettmann) Dettmann; B.D. Tschudy, p. 8, pl. 2, figs. 1, 2.

1975 *Foraminisporis wonthaggiensis* (Cookson and Dettmann) Dettmann; Brideaux and McIntyre, pl. 2, figs. 32, 33.

1975 *Foraminisporis wonthaggiensis* (Cookson and Dettmann) Dörhöfer and Norris, pl. 1, fig. 23.

1982 *Foraminisporis wonthaggiensis* (Cookson and Dettmann) Dettmann; Burden, p. 270, pl. 18, figs. 27-31.

Distribution: Berriasian to Turonian.

Remarks: A single well preserved specimen of *Foraminisporis wonthaggiensis* was recovered from the top of the Aktineq Formation.

Genus Lophotriletes brevipapillosus Naumova ex Potonié and Kremp, 1954.

Type Species: Lophotriletes gibbosus (Ibrahim) Potonié and Kremp, 1954.

Lophotriletes brevipapillosus (Couper) Wingate, 1980.

Plate 3, Figure 3

Selected Synonymy:

1980 Lophotriletes brevipapillosus (Couper); Wingate, p. 27, pl. 10, fig. 10.

Distribution: Albian.

Remarks: Five poorly preserved specimens of L. brevipapillosus were recovered from the Bylot Island Formation on the south coast. The poor condition of these spores suggests reworking.

Genus Echinatisporis Krutsch, 1959.

Type Species: Echinatisporis varispinosus (Pocock) Srivastava, 1975a.

Echinatisporis varispinosus (Pocock) Srivastava, 1975a.

Plate 3, Figure 4

Selected Synonymy:

1962 Acanthotriletes varispinosus Pocock, p. 36, pl. 1, fig. 18-20.

1967 Acanthotriletes varispinosus Pocock; Srivastava, pl. I, fig. E.

1971 Acanthotriletes varispinosus Pocock; Hopkins, p. 114, pl. 20, fig. 6.

1971 Acanthotriletes varispinosus Pocock; Singh, p. 45, pl. 3, fig. 8.

1972a Ceratosporites pocockii Srivastava, p. 8, pl. 4, fig. 7.

1975 Acanthotriletes varispinosus Pocock; Brideaux and McIntyre, pl. 1, fig. 13.

1975a Echinatisporis varispinosus (Pocock) Srivastava, p. 39, pl. 18, figs. 1-2.

1977 Acanthotriletes varispinosus Pocock; Dörhöfer and Norris, p. 88, pl. 1, fig. 16.

1980 Ceratosporites pocockii Srivastava; Wingate, p. 11, pl. 2, fig. 8.

1981 Echinatisporis varispinosus (Pocock) Srivastava; Srivastava, pl. 5, fig. 11.

1982 Ceratosporites pocockii Srivastava; Burden, p. 272, pl. 19, figs. 5-6.

1984 Echinatisporis varispinosus (Pocock) Srivastava; Gaponoff, p. 80, pl. 2, fig. 7.

1986 Acanthotriletes varispinosus Pocock; Ashraf and Erben, p. 130, pl. 4, figs. 3, 4.

1986 Echinatisporis varispinosus (Pocock) Srivastava; Ricketts and Sweet, p. 19, pl. 1, figs. 19-20.

1987 *Acanthotriletes varispinosus* Pocock; Langille, p. 81, pl. 4, fig. 8.

1988 *Echinatisporis varispinosus* Sweet and McIntyre, fig. 6, no. 2.

Distribution: Cretaceous.

Remarks: The echinate ornament of *Echinatisporis* distinguishes it from *Neoraistrickia* Potonié whose ornament consists of large (>2.5μm) coni or bacula. A single specimen of this spore was recovered from the Bylot Island Formation on the south coast.

Genus *Ceratosporites* Cookson and Dettmann, 1958.

Type Species: *Ceratosporites equalis* Cookson and Dettmann, 1958.

Ceratosporites equalis Cookson and Dettmann, 1958.

Plate 3, Figure 5

Selected Synonymy:

1963 *Ceratosporites equalis* Cookson and Dettmann; Dettmann, p. 36, pl. V, figs 6-8.

1972a *Ceratosporites equalis* Cookson and Dettmann; Srivastava, p. 7, pl. 4, fig. 1.

1982 Ceratosporites equalis Cookson and Dettmann; Burden, p. 272, pl. 19, fig. 1, 2.

Distribution: Late Jurassic and Cretaceous.

Remarks: The smooth proximal face of Ceratosporites distinguishes it from Echinatisporis Krutsch and Neoraistrickia Potonié, which have proximal ornamentation (Singh, 1972a). Three specimens of C. equalis were recovered from one Bylot Island Formation sample on the south coast.

Ceratosporites morrinicolus Srivastava, 1972a.

Plate 3, Figure 6

Selected Synonymy:

1972a Ceratosporites morrinicolus Srivastava, p. 7, pl. 4, figs. 2-6.

Distribution: Maastrichtian.

Remarks: Ceratosporites morrinicolus is distinguished from C. equalis Cookson and Dettmann by its much smaller and more densely packed spinules. Two specimens were recovered from the Bylot Island Formation.

Genus Gemmatriletes Pierce, 1968.

Type Species: Gemmatriletes morulus Pierce, 1961.

Gemmatriletes sp.1

Plate 3, Figure 7

Description: Trilete spore with a circular to subcircular amb. Laesurae indistinct and obscured by ornamentation; commissures simple slits, extending to the equator. Equatorial and distal face covered by large gemma 5μm high, 4μm wide. The sculpture is reduced in size on proximal face; Exine is 2μm thick.

Size: Equatorial diameter 38 to 55μm (16 specimens).

Remarks: The smaller size of G. sp.1 (38-55μm) distinguish it from G. densegemmatus Brenner (62-102μm). The larger gemma of G. sp.1 (4-5μm high) differentiate it from G. clavatus Brenner (2-3μm high). This species occurs infrequently in the Pond Inlet, Navy Board and Aktineq formations.

Genus Verrucosisporites Ibrahim emend.

Potonié and Kremp, 1954.

Type Species: Verrucosisporites verrucosus Ibrahim emend.

Potonié and Kremp, 1955.

Verrucosisporites sp.1

Plate 3, Figure 8

Description: Trilete spore with a circular to subcircular amb. Laesurae extend across 2/3 of the spore radius but are indistinct and often obscured by the ornament. Proximal and distal surfaces covered with closely spaced hemispherical verrucae, 4μm wide and 3μm high. Exine is 2μm thick.

Size: Equatorial diameter 23 to 30μm (11 specimens).

Remarks: V. sp.1 is distinguished from other forms of Verrucosisporites by it's relatively small size. Specimens are commonly folded or torn. This species is rare, with a few spores recovered from each of the Bylot Island, Pond Inlet and the Aktineq formations. No spores of this type were found in the Navy Board Formation samples.

Genus Concavissimisporites Delcourt and Sprumont emend. Singh, 1964.

Type Species: Concavissimisporites verrucosus Delcourt and Sprumont emend. Delcourt, Dettmann and Hughes, 1963.

Concavissimisporites sp.1

Plate 3, Figure 9

Description: Trilete spore with a triangular trilobate amb, straight to slightly convex sides and broadly rounded apices. Laesurae almost reach the spore margin and are enclosed in thin (0.5μm), low lips. Ornament consists of polygonal verrucae on proximal and distal faces; the verrucae are subtle, 3µm wide and less than 0.5µm high. Exine is 1 to 1.5µm thick.

Size: Equatorial diameter 28 to 39µm (33 specimens).

Remarks: *C.* sp.1 can be distinguished from other species of *Concavissimisporites* by the small, very low verrucate ornament. Because of the very subtle nature of its ornament, this species may be confused with *Cyathidites minor* Couper which is similar in shape, but has no ornament. This spore occurs in the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Monolete Spores

Genus *Laevigatosporites* Ibrahim emend. Schopf, Wilson and Bentall, 1944.

Type Species: *Laevigatosporites vulgaris* (Ibrahim) Ibrahim, 1933.

Laevigatosporites haardti (Potonié and Venitz) Thomson and Pflug, 1953.

Plate 3, Figure 10, 11

Selected Synonymy:

1957 *Laevigato-sporites ovatus* Wilson and Webster; Rouse, p. 364, pl. I, fig. 3; pl. II, figs. 19, 20.

1962 Polypodiaceaesporites haardti (Potonié and Venitz) Thiergart; Groot and Groot, p. 163, pl. 29, fig. 1.

1962 Laevigatosporites ovatus Wilson and Webster; Pocock, p. 58, pl. 8, figs. 130-133.

1963 Laevigatosporites ovatus Wilson and Webster; Dettmann, p. 86, pl. XIX, figs. 9-11.

1964 Laevigatosporites ovatus Wilson and Webster; Singh, p. 99, pl. 13, figs. 9-11.

1965 Laevigatosporites haardti (Potonié and Venitz) Thomson and Pflug; Stanley, p. 252, pl. 32, figs. 1-3.

1965 Laevigatosporites ovatus Wilson and Webster; Stanley, p. 253, pl. 32, figs. 4-6.

1966 Laevigatosporites ovatus Wilson and Webster; Srivastava, p. 514, pl. 4, figs. 3, 4.

1967 Laevigatosporites ovatus Wilson and Webster; Drugg, p. 43, pl. 7, fig. 5.

1967 Laevigatosporites ovatus Wilson and Webster; Norris, p. 100, pl. 14, figs. 13, 14.

1967 Laevigatosporites ovatus Wilson and Webster; Srivastava, pl. I, fig. U.

1968 Laevigatosporites ovatus (Potonié and Venitz) Kedves, p. 19, pl. 6, fig. 3.

1969 Laevigatosporites ovatus Wilson and Webster; Habib, pl. 1, fig. 17.

1969 Laevigatosporites gracilis Wilson and Webster; Norton and Hall, p. 19, pl. 2, fig. 12.

1969 Laevigatosporites ovatus Wilson and Webster; Norton and Hall, p. 20, pl. 2, fig. 13.

1969 Laevigatosporites gracilis Wilson and Webster; Oltz, p. 122, pl. 39, fig. 29.

1969 Laevigatosporites ovatus Wilson and Webster; Oltz, p. 122, pl. 39, fig. 30, 31.

1969 Laevigatosporites ovatus Wilson and Webster; Vagvolgyi and Hills, pl. 5, fig. 7.

1971 Laevigatosporites ovatus Wilson and Webster; Griggs, pl. 3, fig 3.

1971 Laevigatosporites ovatus Wilson and Webster; Playford, pl. 105, fig. 22.

1971 Laevigatosporites ovatus Wilson and Webster; Singh, p. 105, pl. 14, fig. 14.

1971 Laevigatosporites ovatus Wilson and Webster; Srivastava, p. 254, pl. 1, fig. 3.

1972b Laevigatosporites haardti (Potonié and Venitz) Thomson and Pflug; Srivastava, p. 232, pl. V, figs. 9, 10.

1973 Laevigatosporites ovatus Wilson and Webster; Hopkins and Balkwill, p. 15, pl. 1, fig. 25.

1973 Laevigatosporites ovatus Wilson and Webster; Stone, p. 63, pl. 10, fig. 48.

1974 Laevigatosporites ovatus Wilson and Webster; Hopkins, p. 14, pl. 3, fig. 28.

1974 Laevigatosporites ovatus Wilson and Webster; McIntyre, pl. 31, fig. 30.

1975 Laevigatosporites ovatus Wilson and Webster; Brideaux and McIntyre, p. 16, pl. 3, fig. 8.

1975b Laevigatosporites ovatus Wilson and Webster; Srivastava, p. 131, pl. 1, fig. 8.

1978 Laevigatosporites haardti Potonié and Venitz; Schumacker-Lambry, p. 24, pl. 10, fig. 7.

1978 Laevigatosporites haardti Potonié and Venitz; Wilson, p. 117, pl. 4, fig. 7, 8.

1980 Laevigatosporites ovatus Wilson and Webster; Wingate, p. 23, pl. 9, fig. 6.

1981 Laevigatosporites ovatus Wilson and Webster; Herngreen and Chlonova, pl. III, fig. 11.

1982 Laevigatosporites ovatus Wilson and Webster; Burden, p. 284, pl. 20, figs. 28, 29.

1983 Laevigatosporites ovatus Wilson and Webster; Truswell, p. 144, pl. 2, fig. 1.

1986 Laevigatosporites ovatus Wilson and Webster; Ashraf and Erben, p. 140, pl. 8, fig. 12.

1986 Laevigatosporites ovatus Wilson and Webster; Boland, p. 135, pl. 3, fig. 4.

1987 Laevigatosporites ovatus Wilson and Webster; Langille, p. 83, pl. 4, fig. 11.

Distribution: Jurassic to Tertiary.

Remarks: On the basis of size and shape L. ovatus, L. gracilis and L. haardti are indistinguishable. The size range defined for *L. haardti* Thomson and Pflug (20-70μm) covers that of both *L. gracilis* (27-30μm) and *L. ovatus* (33-39μm) Wilson and Webster. The complete size gradation of specimens observed precludes separation on this basis. The differentiation of *L. haardti* and *L. ovatus* on the basis of exine thickness and spore shape (Stanley, 1965) is also artificial, as a complete gradation exists between the forms defined. *L. ovatus* is most commonly used in the literature; however, to conform with the rules of nomenclature *L. haardti* is used here. This spore is common to very abundant in every sample examined.

Genus *Punctatosporites* Ibrahim, 1933.

Type Species: *Punctatosporites minutus* Ibrahim, 1933.

Punctatosporites scabratus (Couper) Singh, 1971.

Plate 3, Figure 12

Selected Synonymy:

1958 *Punctatosporites scabratus* Couper, p. 133, pl. 15, figs. 20-23.

1971 *Punctatosporites scabratus* (Couper) Singh, p. 106, pl. 14, fig. 15.

1980 *Punctatosporites scabratus* (Couper) Singh; Wingate, p. 13, pl. 3, fig. 2.

1982 *Punctatosporites scabratus* (Couper) Singh; Burden, p. 285, pl. 20, figs. 30, 31.

1987 Punctatosporites scabratus (Couper) Singh; Langille, p. 84, pl. 4, fig. 12.

Distribution: Triassic to Albian.

Remarks: This monolete spore is found throughout the strata studied. They are common to abundant, but most are poorly preserved and probably reworked.

Genus Hazaria Srivastava, 1971.

Type Species: Hazaria sheopiarii , Srivastava, 1971.

Hazaria sheopiarii, Srivastava, 1971.

Plate 3, Figure 13

Selected Synonymy:

1971 Hazaria sheopiarii Srivastava, p. 258, pl. 2, figs. 1-4.

1972 Hazaria sheopiarii (Srivastava) Rouse and Srivastava, figs. 15, 16.

1974 Hazaria sheopiarii (Srivastava) McIntyre, pl. 14, figs. 26, 27.

1986 Hazaria sheopiarii (Srivastava) Jerzykiewicz and Sweet, pl. 1, fig. 4.

Distribution: Lower Campanian to Eocene.

Remarks: A total of nine spores of this species were recovered from four samples from the Bylot Island and Pond Inlet formations.

Unknown specimen 1.

Plate 3, Figure 14

Description: Circular microspore with no visible trilete mark. Sculpture consists of large (4-5μm wide, 2μm high) closely spaced hemispherical verrucae, which are irregular shape. The verrucae are hollow but have no opening into the spore body, or the outside (inaperturate). Verrucae walls merge smoothly with the spore wall; no change in spore wall thickness is apparent under or between the verrucae. The spore wall is 0.5μm thick.

Size: Equatorial diameter 22μm (1 specimen).

Remarks: This spore type is distinguished from other verrucate spores by the large hollow verrucae which make up its ornament. The single well preserved specimen was recovered from Pond Inlet Formation at Twosnout Creek.

Bisaccate Pollen

Genius *Podocarpidites* Cookson ex Couper 1953.

Type Species: *Podocarpidites ellipticus* Cookson, 1947.

Podocarpidites ellipticus Cookson, 1947.

Plate 3, Figure 15

Selected Synonymy:

1963 *Podocarpidites* cf. *P. ellipticus* Cookson; Dettmann, p. 103, pl. XXV, figs. 8-12.

1964 *Podocarpidites* sp. cf. *P. ellipticus* Cookson; Singh, p. 115, pl. 15, fig. 11.

1965 *Podocarpidites* sp. cf. *P. ellipticus* Cookson; McGregor, pl. IV, figs. 34, 35, 41; pl. VI, fig. 35.

1966 *Podocarpidites ellipticus* Cookson; Srivastava, p. 522, pl. V, figs. 17-19.

1967 *Podocarpidites ellipticus* Cookson; Drugg, p. 45, pl. 7, fig. 14.

1967 *Podocarpidites ellipticus* Cookson; Srivastava, pl. II, fig. G.

1971 *Podocarpidites* sp. cf. *P. ellipticus* Cookson; Singh, p. 162, pl. 22, fig. 13.

1981 *Podocarpidites ellipticus* (Cookson) Couper; Srivastava, pl. 9, fig. 12, pl. 13, fig. 1.

1982 *Podocarpidites* sp. cf. *P. ellipticus* Cookson ex Couper; Burden, p. 310, pl. 25, figs. 1-3.

Distribution: Jurassic and Early Cretaceous.

Remarks: This spore is rare to very rare in the Pond Inlet, Navy Board, and Aktineq formations. Preservation is poor and most are probably reworked.

Podocarpidites biformis Rouse, 1957

Plate 3 Figure 16

Selected Synonymy:

1957 *Podocarpidites biformis* Rouse, p. 367, pl. II, fig. 13.

1965 *Podocarpidites biformis* Rouse; McGregor, pl. VI, fig. 32.

1969 *Podocarpidites biformis* Rouse; Norton and Hall, p. 267, pl. 2, fig. 13.

1971 *Podocarpidites biformis* Rouse; Singh, p. 162, pl. 23, figs. 1, 2.

1974 *Podocarpidites biformis* Rouse; McIntyre, pl. 15, figs. 1, 2.

1975 *Podocarpidites biformis* Rouse; Brideaux and McIntyre, p. 16, pl. 4, figs. 5, 6.

1978 *Podocarpidites biformis* Rouse; Wilson, p. 123, pl. 6, figs. 5, 6.

1982 *Podocarpidites biformis* Rouse; Burden, p. 310, pl. 25, figs. 4-6.

1986 *Podocarpidites* cf. *P. biformis* Rouse; Farabee and Canright, p. 34, pl. 9, figs. 12.

Distribution: Jurassic to Paleocene.

Remarks: This bisaccate is sporadic in distribution, and rare in abundance (1-2/sample) but is found in all of the formations of this study.

Podocarpidites miniscululus Singh, 1964.

Plate 3 Figure 17

Selected Synonymy:

1964 *Podocarpidites miniscululus* Singh, p. 117, pl. 15, figs. 15, 16.

1971 *Podocarpidites miniscululus* Singh; Singh, p. 165, pl. 24, fig. 1.

1982 *Podocarpidites miniscululus* Singh; Burden, p. 313, pl. 25, fig. 15.

1986 *Podocarpidites miniscululus* Singh; Boland, p. 162, pl. 4, fig. 7.

1987 *Podocarpidites miniscululus* Singh; Langille, p. 87, pl. 5, fig. 3.

Distribution: Neocomanian to Albian.

Remarks: This species occurs in the Bylot Island, Pond Inlet, Navy Board, and Aktineq formations. It is distributed intermittently and is very rare to rare in abundance (1-2/sample). Preservation is poor; most are probably reworked.

Podocarpidites multesimus (Bolkovitina) Pocock, 1962.

Plate 3 Figure 18

Selected Synonymy:

1962 *Podocarpidites multesimus* (Bolkovitina) Pocock, p. 67, pl. 10, figs. 161, 162; pl. 11, fig. 163.

1963 Podocarpidites cf. P. multesimus (Bolkovitina) Pocock; Dettmann, p. 103, pl. XXV, figs. 13-16.

1964 Podocarpidites multesimus (Bolkovitina) Pocock; Singh, p. 116, pl. 15, figs. 12-13.

1966 Podocarpidites multesimus (Bolkovitina) Pocock; Srivastava, p. 522, pl. VI, fig. 1.

1967 Podocarpidites multesimus (Bolkovitina) Pocock; Srivastava, pl. II, fig. H.

1971 Podocarpidites multesimus (Bolkovitina) Pocock; Singh, p. 166, pl. 24, fig. 2.

1971 Podocarpidites multesimus (Bolkovitina) Pocock; Playford, pl. 107, figs. 21.

1973 Podocarpidites multesimus (Bolkovitina) Pocock; B.D. Tschudy, p. 16, pl. 7, fig. 1, 2.

1974 Podocarpidites multesimus (Bolkovitina) Pocock; McIntyre, pl. 14, figs, 35, 36.

1975 Podocarpidites multesimus (Bolkovitina) Pocock; Brideaux and McIntyre, p. 16, pl. 4, figs. 3, 4.

1980 Podocarpidites multesimus (Bolkovitina) Pocock; Wingate, p. 38, pl. 14, figs. 7, 8.

1982 Podocarpidites multesimus (Bolkovitina) Pocock; Burden, p. 314, pl. 25, fig 16.

1986 Podocarpidites multesimus (Bolkovitina) Pocock; Boland, p. 163, pl. 4, fig. 8.

1987 *Podocarpidites multesimus* (Bolkovitina) Pocock; Langille, p. 88, pl. 5, fig. 4.

Distribution: Jurassic and Cretaceous.

Remarks: Between 1 and 5 specimens were recovered from each of the four formations studied. Preservation ranged from poor to good; some may be reworked.

Podocarpidites sp. 1.

Plate 4, Figure 1

Description: Bisaccate pollen with diamond shaped central body whose length and breadth are equal. The body is finely granulate and has a 5µm distal furrow with parallel sides. The bladders are distally pendant with the length approximately equal to that of the central body. Sacci are finely reticulate.

Size: Length of bladders: 30µm (1 specimen).

Length of central body: 30µm

Breadth of bladders: 17µm

Total breadth of grain: 37µm

Breadth of central body: 28µm

Remarks: This species differs from *P. miniscululus* Singh, *P. canadensis* Pocock, *P. multesimus* (Bolkhovitina) Pocock, and *P. ellipticus* Cookson in being smaller (all of the above are >45μm), and having a 4 sided central body. The single specimen is from the Pond Inlet Formation, and is very well preserved.

Genus Pityosporites Seward emend. Manum, 1960.

Type Species: Pityosporites antarcticus Seward, 1914.

Pityosporites alatipollenites (Rouse) Singh, 1964.

Plate 4, Figure 2

Selected Synonymy:

1964 Pityosporites alatipollenites (Rouse) Singh, p. 123, pl. 16, fig. 10.

1971 Pityosporites alatipollenites (Rouse) Singh; Singh, p. 173, pl. 25, fig. 9.

1973 Pityosporites alatipollenites (Rouse) Singh; B.D Tschudy, p. 15, pl. 6, fig. 1.

1982 Pityosporites alatipollenites (Rouse) Singh; Burden, p. 315, pl. 26, fig. 1.

1987 Pityosporites alatipollenites (Rouse) Singh; Langille, p. 89, pl. 5, fig. 5.

Distribution: Late Jurassic to Cretaceous.

Remarks: P. alatipollenites (Rouse) Singh was recovered from the Bylot Island, Pond Inlet, and Aktineq formations in very low numbers (1-2 specimens per sample where present).

Pityosporites constrictus Singh, 1964.

Plate 4, Figure 3

Selected Synonymy:

1964 *Pityosporites constrictus* Singh, p. 122, pl. 16, figs. 8, 9.

1966 *Pityosporites constrictus* Singh; Srivastava, p. 524, pl. VI, fig. 2.

1967 *Pityosporites constrictus* Singh; Srivastava, pl. II, fig. M.

1971 *Pityosporites constrictus* Singh; Singh, p. 174, pl. 26, fig. 10.

1980 *Pinuspollenites constrictus* Singh; Wingate, p. 40, pl. 15, figs. 6, 7.

1982 *Pityosporites constrictus* Singh; Burden, p. 317, pl. 26, figs. 2, 3.

1986 *Pityosporites constrictus* Singh; Boland, p. 160, pl. 4, fig. 6.

Distribution: Valanginian to Maastrichtian.

Remarks: The larger bladders and more sharply constricted roots of *P. constrictus* Singh distinguish it from *P. alatipollenites* (Rouse) Singh. This species occurs in all of the formations, and is very rare to common.

Pityosporites elongatus (Norton and Hall), Tschudy, 1973.

Plate 4, Figure 4

Selcted Synonymy:

1969 *Pinuspollenites elongatus* Norton and Hall, p. 27, pl. 4, fig. 1.

1973 *Pityosporites elongatus* B.D Tschudy, p. 15, pl. 6, figs. 2-4.

1978 *Pinuspollenites elongatus* Norton; Wilson, p. 122, pl. 5, fig. 15.

Distribution: Campanian to Paleocene.

Remarks: The large size of this species (overall length 80-100μm) distinguishes *P. elongatus* from other *Pityosporites* species. This taxon is found sporadically in the Pond Inlet, Navy Board and Aktineq formations. The abundance is generally low (1-3 grains/sample).

Pityosporites elongatus (Norton) var. *grandis*

B.D Tschudy 1973

Plate 4, Figure 5

Selected Synonymy:

1973 *Pityosporites elongatus* (Norton) var. *grandis* B.D Tschudy, p. 15, pl. 6, figs. 5, 6.

Distribution: Campanian.

Remarks: Tschudy (1973) states that P. elongatus var. grandis is similar in appearance to Pityosporites elongatus but is distinguished by its large size (100-153μm total breadth). Six of these large grains were recovered from 3 samples; two from the Pond Inlet, and one from the Aktineq Formation.

Pityosporites sp. 1

Plate 4, Figure 6

Description: Bisaccate pollen having an oval central body which is broader than long and finely granulate. Bladders are distally pendant, finely reticulate and smaller than the body. These sacci are conical in shape, being widest nearest the root, and gently narrowing to ends. A re-entrant angle is present at point of attachment due to slight narrowing of sacci at the root; attachment of sacci extends slightly beyond the equator on the proximal side; distal furrow 15 to 28μm wide.

Size: Length of bladders: 22-30μm (7 specimens).

Length of central Body: 28-40μm

Breadth of bladders: 33-45μm

Total breadth of grain: 70-97μm

Height of central body: 25-41μm

Breadth of central body: 33-46μm

Remarks: This species differs from P. alatipollenites Singh, P. constrictus Singh and P. sp. 2 (below) in having conical sacci with a nearly equatorial attachment. This species is smaller than P. elongatus (Norton and Hall) D.B. Tschudy (80-100μm). Specimens are well preserved, though many are folded. All specimens of this type were recovered from the Bylot Island and Pond Inlet formations.

Pityosporites sp. 2

Plate 4, Figure 7

Description: Bisaccate pollen with an oval central body which is much broader than long and which is finely granulate. Bladders are distally pendant, distinctly smaller than the body, semicircular to oval in shape, and finely reticulate. Sacci narrow sharply towards their roots and diverge. The distal furrow is about 17μm wide.

Size: Length of bladders: 36-39μm (14 specimens).

Length of central Body: 29-35μm

Breadth of bladders: 38-42μm

Total breadth of grain: 75-93μm

Height of cental body: 28-33μm

Breadth of central body: 63-75μm

Remarks: This species differs from P. constrictus Singh in having an almost cylindrical central body (much broader than wide or high). The sharply constricted roots of the sacci distinguish this species from P. alatipollenites Singh and P. elongatus Norton and Hall. The 14 specimens examined were moderately to strongly corroded and may be reworked. This taxon was recovered from the Bylot Island and Pond Inlet formations.

Genus Alisporites Daugherty emend. Jansonius, 1971.

Type Species: Alisporites opii Daugherty, 1941.

Alisporites bilateralis Rouse, 1959.

Plate 4 Figure 8

Selected Synonymy:

1959 Alisporites bilateralis Rouse, p. 316, pl. 1, figs. 10, 11.

1962 Alisporites thomasii Couper; Pocock, p. 62, pl. 14, figs. 143.

1964 Alisporites thomasii (Couper) Pocock; Singh, p. 109, pl. 14, figs. 11, 12.

1965 Alisporites thomasii (Couper) Nilsson; McGregor, p. 24, pl. VII, fig. 39.

1966 Alisporites thomasii (Couper) Pocock; Burger, p. 259, pl. 35, fig. 2.

1968 Alisporites bilateralis Hedlund and Norris, pl. IV, fig. 12.

1971 <u>Alisporites</u> <u>bilateralis</u> Rouse; Singh, p. 169, pl. 24, fig. 9.

1971 <u>Alisporites</u> <u>bilateralis</u> Rouse; Playford, pl. 107, fig. 1.

1973 <u>Alisporites</u> <u>thomasii</u> (Couper) Nilsson; B.D. Tschudy, p. 14, pl. 5, figs. 4, 5.

1975 <u>Alisporites</u> <u>bilateralis</u> Rouse; Brideaux and McIntyre, p. 16, pl. 3, fig. 32.

1975 <u>Alisporites</u> <u>bilateralis</u> Rouse; Norris <u>et</u> <u>al</u>., pl. 1, fig. 1.

1981 <u>Alisporites</u> <u>bilateralis</u> Rouse; Srivastava, pl. 9, fig. 4.

1982 <u>Alisporites</u> <u>bilateralis</u> Rouse; Burden, p. 318, pl. 26, figs. 5, 6.

1986 <u>Alisporites</u> <u>bilateralis</u> Rouse; Boland, p. 157, pl. 4, fig. 4.

1987 <u>Alisporites</u> <u>bilateralis</u> Rouse; Langille, p. 91, pl. 5, fig. 8.

Distribution: Jurassic to Cenomanian.

Remarks: <u>A.</u> <u>bilateralis</u> occurs throughout the formations sampled. Its distribution is sporadic, abundances are low, and preservation is often poor; most appear to be reworked.

Genus _Pristinuspollenites_, B.D Tschudy, 1973.

Type Species: _Pristinuspollenites_ _microsaccus_ (Couper) B.D Tschudy, 1973.

Pristinuspollenites _microsaccus_ (Couper) B.D Tschudy, 1973.

Plate 4, Figure 9

Selected Synonymy:

1958 _Pteruchipollenites_ _microsaccus_ Couper, p. 151, pl. 26, fig. 13, 14.

1973 _Pristinuspollenites_ _microsaccus_ (Couper) B.D. Tschudy, p. 17, pl. 7, figs. 4-6.

1982 _Pristinuspollenites_ _microsaccus_ (Couper) B.D. Tschudy; Burden, p. 319, pl. 26, figs. 10-13.

1987 _Pristinuspollenites_ _microsaccus_ (Couper) B.D. Tschudy; Langille, p. 94, pl. 5, fig. 14.

Distribution: Jurassic and Cretaceous.

Remarks: This bisaccate is rare; a total of four specimens were found in the Bylot Island and Pond Inlet Formation samples.

Pristinuspollenites _inchoatus_ (Pierce) B.D. Tschudy, 1973.

Plate 4, Figure 10

Selected Synonymy:

1961 _Bacubivesiculites_ _inchoatus_ Pierce, p. 34, pl. 2, fig. 35.

1961 Clavabivesiculites inchoatus Pierce, p. 34, pl. 2, fig. 36.

1964 Phyllocladidites sp. Singh, p. 114, pl. 15, fig. 10.

1971 Phyllocladidites sp. Singh, p. 161, pl. 22, fig. 12.

1973 Pristinuspollenites inchoatus (Pierce) B.D. Tschudy, p. 16, pl. 7, fig. 7.

1973 Pristinuspollenites crassus B.D. Tschudy, p. 16, pl. 7, figs. 8, 9.

1982 Pristinuspollenites inchoatus (Pierce) B.D. Tschudy; Burden, p. 320, pl. 16, fig. 8.

Distribution: Albian to Cenomanian.

Remarks: A single specimen of this taxon was found in the Navy Board Formation.

Genus Cedripites Wodehouse, 1933.

Type Species: Cedripites eocenicus Wodehouse, 1933.

Cedripites canadensis Pocock, 1962.

Plate 4 Figure 11

Selected Synonymy:

1962 Cedripites canadensis Pocock, p. 63, pl. 10, figs. 149, 150.

1964 Cedripites canadensis Pocock; Singh, p. 112, pl. 15, fig. 6.

1971 Cedripites canadensis Pocock; Singh, p. 171, pl. 25, figs. 4, 5.

1975 Cedripites canadensis Pocock; Brideaux and McIntyre, p. 16, pl. 3, fig. 37.

1982 Cedripites canadensis Pocock; Burden, p. 325, pl. 27, figs. 1, 2.

1987 Cedripites canadensis Pocock; Langille, p. 93, pl. 5, fig. 12.

1988 Cedripites canadensis Pocock; Sweet and McIntyre, fig. 6, no. 29.

Distribution: Barremian to Albian.

Remarks: C. canadensis is the most abundant bisaccate of this study, and is found in virtually all of the samples examined.

Inaperturate Pollen

Genus Inaperturopollenites Pflug, 1952 ex Thomson and Pflug, 1953, emend. Potonié, 1958.

Type Species: Inaperturopollenites dubius (Potonié and Venitz) Thomson and Pflug, 1953.

Inaperturopollenites sp.1

Plate 4, Figure 12

Selected Synonymy:

1969 Inaperturopollenites sp. Norris, p. 104, pl. 16, fig. 8.

1971 Inaperturopollenites sp. Norris; Singh, p. 150, pl. 21, fig. 1.

Description: Pollen small, spheroidal, inaperturate. Exine psilate, relatively thick (up to 1.5μm thick) and rigid.
Size: Equatorial diameter 6μm to 20μm.

Remarks: Inaperturopollenites is distinct from Spheripollenites Couper which has a germinal pore, and Laricoidites Potonié which is much larger (Singh, 1971). This pollen is distinctive because of its small size, and thick, rigid exine. It has a slightly greater size range (6 to 20μm vs. 6 to 14μm), but is otherwise identical in all respects to Inaperturopollenites sp. of Norton (1967, p. 104) and Singh (1971, p. 150). This taxon was recovered from the Bylot Island, Pond Inlet and Aktineq formations.

Inaperturopollenites sp.2

Plate 4, Figure 13

Selected Synonymy:

1968 Inaperturopollenites Ting, p. 596, pl. 7, figs. 12, 14.

1971 *Inaperturopollenites* sp. Azéma and Ters, p. 278, pl. III, fig. A.

1973 *Inaperturopollenites* sp. Hopkins and Balkwill, p. 20, pl. 2, fig. 45.

1974 *Inaperturopollenites* sp. Hopkins, p. 23, pl. 6, fig. 70.

Description: Pollen spheroidal, inaperturate. Exine psilate to scabrate and relatively thin (<0.5μm thick).

Size: Equatorial diameter 25 to 37μm.

Remarks: This species is distinguished from *I.* sp.1 by its thinner exine and larger size. This species is very abundant in all samples.

Genus *Taxodiaceaepollenites* Kremp, 1949 ex Potonié, 1958.

Type Species: *Taxodiaceaepollenites hiatus* Potonié ex Potonié, 1958.

Taxodiaceaepollenites hiatus (Potonié) Kremp, 1949.

Plate 4, Figure 14

Selected Synonymy:

1966 *Taxodiaceaepollenites hiatus* Kremp; Srivastava, p. 519, pl. V, figs. 8, 9.

1967 *Taxodiaceaepollenites hiatus* (Potonié) Kremp; Drugg, p. 46, pl. 7, fig. 9.

1967 Taxodiaceaepollenites hiatus (Potonié) Kremp; Srivastava, pl. II, fig. C.

1968 Taxodiaceaepollenites hiatus (Potonié) Kremp; Hedlund and Norris, p. 142, pl. V, fig. 3.

1968 Taxodiaceaepollenites hiatus (Potonié) Kremp; Kedves, p. 317, pl. 1, figs. 23-38.

1969 Taxodiaceaepollenites hiatus (Potonié) Kremp; Norton and Hall, p. 32, pl. 3, fig. 15.

1969 Taxodiaceaepollenites hiatus (Potonié) Kremp; Oltz, p. 136, pl. 41, fig. 85.

1971 Taxodiaceaepollenites hiatus (Potonié) Kremp; Singh, p. 158, pl. 22, fig. 7.

1972 Taxodiaceaepollenites hiatus (Potonié) Kremp; Rouse and Srivastava, fig. 74.

1973 Taxodiaceaepollenites hiatus (Potonié) Kremp; Stone, p. 75, pl. 15, fig. 77.

1974 Taxodiaceaepollenites hiatus (Potonié) Kremp; McIntyre, pl. 15, figs. 10, 11.

1975 Taxodiaceaepollenites hiatus (Potonié) Kremp; Brideaux and McIntyre, p. 17, pl. 4, fig. 19.

1976 Taxodiaceaepollenites hiatus (Potonié) Kremp; Doerenkamp et al., pl. 1, fig. 4.

1978 Taxodiaceaepollenites hiatus (Potonié) Kremp; Wilson, p. 126, pl. 5, fig. 12.

1980 Taxodiaceaepollenites hiatus (Potonié) Kremp; Wingate, p. 37, pl. 13, fig. 15.

1981 Taxodiaceaepollenites hiatus (Potonié) Kremp; Herngreen and Chlonova, pl. IV, fig. 14.

1982 Taxodiaceaepollenites hiatus (Potonié) Kremp; Burden, p. 302, pl. 23, fig. 16.

1986 Taxodiaceaepollenites hiatus Kremp ex Potonié; Norris, p. 35, pl. 8, fig. 23.

1987 Taxodiaceaepollenites hiatus (Potonié) Kremp; Langille, p. 85, pl. 4, fig. 14.

Distribution: Albian to Miocene.

Remarks: Taxodiaceaepollenites hiatus occurs in all samples, and is abundant to very abundant (>15) in most.

Taxodiaceaepollenites vacuipites (Wodehouse) Wingate, 1980

Plate 4, Figure 15

Selected Synonymy:

1933 Glyptostrobus vacuipites Wodehouse, p. 494.

1980 Taxodiaceaepollenites vacuipites (Wodehouse) Wingate, p. 37, pl. 13, fig. 16.

Distribution: Albian

Remarks: Taxodiaceaepollenites vacuipites is distinguished from T. hiatus (Potonié) Kremp by its fusiform shape and exinal folds adjacent to the split (Wingate, 1980). This spore is very rare to rare in the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Genus Sequoiapollenites Thiergart, 1938.

Type Species: Sequoiapollenites polyformosus Thiergart, 1938.

Sequoiapollenites paleocenicus Stanley, 1965.

Plate 4, Figure 16

Selected Synonymy:

1965 Sequoiapollenites paleocenicus Stanley, p. 282, pl. 38, figs. 8-11.

1972b Sequoiapollenites paleocenicus Stanley; Srivastava, p. 241, pl. VIII, fig. 2.

1987 Sequoiapollenites paleocenicus Stanley; Langille, p. 86, pl. 4, fig. 15.

Distribution: Paleocene.

Remarks: Small numbers (1-4/sample) of S. paleocenicus Stanley were recovered from the Bylot Island, Pond Inlet and Aktineq formations.

Monosulcate Pollen

Genus Cerebropollenites Nilsson, 1958.

Type Species: Cerebropollenites mesozoicus (Couper) Nilsson, 1958.

Cerebropollenites mesozoicus (Couper) Nilsson, 1958.

Plate 4, Figure 17

Selected Synonymy:

1962 Tsugaepollenites mesozoicus Couper; Pocock, p. 69, pl. 12, figs. 179(?), 180.

1964 Tsugaepollenites mesozoicus Couper; Singh, p. 124, pl. 17, fig. 1.

1966 Cerebropollenites mesozoicus (Couper) Nilsson; Burger, p. 261, pl. 28, fig. 1.

1967 Tsugaepollenites mesozoicus Couper, Pocock, pl. 1, fig. M.

1971 Cerebropollenites mesozoicus (Couper) Nilsson; Singh, p. 172, pl. 25, fig. 7.

1967 Cerebropollenites mesozoicus (Couper) Nilsson; Millioud, pl. 1, fig. 8.

1970 Tsugaepollenites mesozoicus Couper; Kemp, p. 113, pl. 23, figs. 9-15.

1971 Tsugaepollenites mesozoicus Couper; Hopkins, p. 122, pl. 22, figs. 8-10.

1974 Tsugaepollenites mesozoicus Couper; Hopkins, p. 22, pl. 6, fig. 69.

1975 Cerebropollenites mesozoicus (Couper) Nilsson; Brideaux and McIntyre, pl. 3, figs. 35, 36.

1977 Cerebropollenites mesozoicus (Couper) Nilsson; Dörhöfer and Norris, pl. 1, fig. 3.

1980 Cerebropollenites mesozoicus (Couper) Nilsson; Wingate, p. 40, pl. 15, fig. 5.

1981 Cerebropollenites mesozoicus Bebout, pl. 9, fig. 1.

1982 Cerebropollenites mesozoicus (Couper) Nilsson; Burden, p. 307, pl. 24, figs. 14, 15.

1983 Cerebropollenites macroverrucosus (Thiergart) Shultz; Fensome, p. 564, pl. 21, figs. 3, 18-19; pl. 22, figs. 1, 2.

1987 Cerebropollenites mesozoicus (Couper) Nilsson; Langille, p. 95, pl. 5, fig. 15.

Distribution: Jurassic and Cretaceous.

Remarks: This cosmopolitan monosulcate occurs sporadically in the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Tricolpate Pollen

Genus *Tricolpites* Cookson ex Couper emend. Potonié, 1960.

Type Species: *Tricolpites reticulatus* Cookson, 1947.

Tricolpites hians Stanley, 1965.

Plate 5, Figure 1

Selected Synonymy:

1965 *Tricolpites hians* Stanley, p. 321, pl. 47, figs. 24-27.

1968b *Tricolpopollenites hians* Stanley; Elsik, p. 622, pl. 23, figs. 13-15, 17, 19 only; pl. 24, figs. 1-7, 12 only.

1978 *Tricolpopollenites hians* (Stanley) Elsik; Schumacker-Lambry, p. 31, pl. 14, figs. 1, 4.

1978 *Tricolpites hians* Stanley; Wilson, p. 138, pl. 9, figs. 5, 6.

1984 *Tricolpopollenites hians* (Stanley) Elsik; Gaponoff, p. 86, pl. 4, figs. 12-14.

1986 *Tricolpites hians* Stanley; Farabee and Canright, p. 66, pl. 22, figs. 16-20.

Distribution: Campanian to Paleocene.

Remarks: Two specimens of *T. hians* Stanley were found; one each from the Pond Inlet and Aktineq formations.

Tricolpites parvus Stanley, 1965.

Plate 5, Figure 2, 3

Selected Synonymy:

1965 *Tricolpites parvus* Stanley, p. 322, pl. 47, figs. 28-31.

1969 *Tricolpites parvus* Stanley; Oltz, p. 149, pl. 41, fig. 133.

1971 *Tricolpites parvus* Stanley; Singh, p. 210, pl. 32, figs. 12-17.

1971 *Tricolpites parvus* Stanley; Leffingwell, p. 44, pl. 8, figs. 4a, 4b.

1972b *Tricolpites parvus* Stanley; Srivastava, p. 279, pl. XXV, figs. 5-8.

1986 *Tricolpites parvus* Stanley; Canright and Farabee, p. 67, pl. 24, figs. 2, 3.

Distribution: Middle Albian to Paleocene.

Remarks: *T. parvus* resembles *T. hians* Stanley, but can be distinguished from the latter by it's thinner exine, and smaller pila and lumen size (Farabee and Canright, 1986). Examples of this species occur in the Bylot Island, Pond Inlet, Navy Board and Aktineq formations.

Tricolpites sp.1

Plate 5, Figure 4

Description: Radiosymmetric tricolpate pollen with a rounded triangular amb. Colpi long, almost reaching pole. Endexine 0.4μm thick; ektexine pilate. The pila are 0.5μm high and closely spaced producing microreticulate sculpture with lumina 0.4μm wide.

Size: Equatorial diameter 25-28μm (10 specimens).

Maximum colpi width 8-9μm

Remarks: The larger size and rounded triangular amb distinguish *T.* sp.1 from *T. hians* and *T. parvus* Stanley. The ten tricolpate specimens of this type were badly corroded, suggesting they are reworked. A single specimen was recovered from the Aktineq Formation, the remainder were from the Pond Inlet Formation.

Tricolpites sp.2

Plate 5, Figure 5

Description: Radiosymmetric tricolpate pollen with a rounded triangular amb and colpi which reach 2/3 of way to pole. Exine is thick (0.8μm) with a psilate to scabrate surface sculpture?

Size: Equatorial diameter 23μm (1 specimen).

Maximum colpi width 6μm

Remarks: Tricolpites sp. 2 is larger and more triangular than T. hians and T. parvus Stanley. The thick exine, the lack of pila, the more rounded amb, and the deeper and wider colpi differentiate this species from T. sp.1. A single badly corroded example of this species was recovered from the top of the Pond Inlet Formation. The poor condition of the specimen precludes positive identification of the surface sculpture and suggests it is reworked.

Stephanocolpate Pollen

Unknown specimen 2

Plate 5, Figure 6

Description: Radiosymmetric pollen with 4 colpi and an amb having a rounded cross shape. The colpi extend 2/3 of the way to the pole. The exine is psilate to scabrate.

Size: Equatorial diameter 25μm (1 specimen).

Maximum colpi width 8μm

Remarks: This colpate pollen can be distinguished from other colpate grains by the presence of 4 colpi, and the rounded cross shaped amb. One specimen of this type was recovered from the uppermost Pond Inlet Formation at Twosnout Creek. Its poor condition suggests reworking.

Tricolporate Pollen

Genus Kurtzipites (Anderson) Leffingwell, 1971.

Type Species: Kurtzipites trispissatus Anderson, 1960.

Kurtzipites sp.1

Plate 5, Figure 7

Selected Synonymy:

1974 Kurtzipites sp., McIntyre, pl. 22, figs. 18, 19.

Description: Tricolporate pollen with a triangular amb, slightly convex sides and slightly protruding germinals. Germinals consist of simple "U" shaped slits 0.7μm wide and 2.5μm deep. Exine sculpture scabrate.

Size: Equatorial diameter 21 to 24μm (7 specimens)

Remarks: Kurtzipites sp.1 appears identical to Kurtzipites sp. McIntyre. This species is distinguished from other Kurtzipites by the lack of endexinous thickenings around the pores. Seven specimens were recovered from the Bylot Island and Pond Inlet formations.

Monoporate Pollen

Genus Classopollis Pflug emend. Pocock and Jansonius, 1961.

Type Species: Classopollis classoides Pflug emend. Pocock and Jansonius 1961.

Classopollis classoides Pflug emend. Pocock and Jansonius 1961.

Plate 5, Figure 8

Selected Synonymy:

1961 Classopollis classoides Pflug; Pocock and Jansonius, p. 439, pl. 1 (all).

1962 Classopollis classoides Pflug; Pocock, p. 71, pl. 11, figs. 171-175.

1964 Classopollis classoides Pflug emend. Pocock and Jansonius; Singh, p. 125, pl. 17, fig. 2.

1971 Classopollis classoides Pflug emend. Pocock and Jansonius; Singh, p. 125, pl. 26, figs. 5-7.

1975 Classopollis classoides Pflug; Brideaux and McIntyre, pl. 4, figs. 25, 26.

1978 Classopollis classoides Pflug; Williams, pl. 8, fig. 8.

1983 Classopollis classoides Pflug; Fensome, p. 523, pl. 20, figs. 1-14, 16, 17, 19, 20.

Distribution: Jurassic and Cretaceous.

Remarks: The single specimen of C. classoides was recovered from the Pond Inlet Formation at Twosnout Creek. This grain is somewhat corroded and is probably reworked.

Triporate Pollen

Genus *Carpinipites* Srivastava, 1966.

Type Species: *Carpinipites ancipites* Srivastava, 1966.

Carpinipites ancipites (Wodehouse) Srivastava, 1966.

Plate 5, Figure 9

Selected Synonymy:

1933 *Carpinus ancipites* Wodehouse, p. 510, fig. 42.

1966 *Carpinus ancipites* Wodehouse; Martin and Rouse, p. 197, pl. 8, figs. 74-76.

1966 *Carpinites ancipites* (Wodehouse) Srivastava, p. 530, pl. VII, fig. 1.

1967 *Carpinites ancipites* (Wodehouse) Srivastava; Srivastava, pl. II, fig. R.

1971 *Carpinus ancipites* Wodehouse; Rouse *et al.*, pl. 8, figs. 12, 15.

1978 *Carpinites ancipites* (Wodehouse) Srivastava; Wilson, p. 142, pl. 10, fig. 2.

Distribution: Upper Campanian to Eocene.

Remarks: These triporate grains are the most abundant porate pollen recovered. They occur in all of the formations but are less common in the Bylot Island Formation than in the overlying Pond Inlet, Navy Board and Aktineq formations.

Genus *Caryapollenites* Raatz ex Potonié

emend. Krutzsch, 1961.

Type Species: *Caryapollenites simplex* Raatz ex Potonié, 1960.

Caryapollenites sp.1

Plate 5, Figure 10

Description: Triporate pollen with a circular amb unbroken by apertures. All pores are circular and located entirely in one hemisphere. The pollen wall is two layered and of uniform thickness (1-2μm). Ektexine and endexine are of equal thickness and separate at pores to form atria. Surface sculpture absent.

Size: Equatorial diameter 24μm (1 specimen).

Remarks: *Caryapollenites* sp.1 (24μm) is similar in appearance to *C. inelegans* Nichols and Ott but is somewhat smaller in diameter (*C.* sp.1 24μm; *C. inelegans* 31μm), and lacks the granular ornamentation. The single specimen found; it was recovered from the Navy Board Formation.

Genus *Complexiopollis* Krutzsch emend. Tschudy, 1973.

Type Species: *Complexiopollis preatumescens* Krutzsch, 1959.

Complexiopollis funiculus Tschudy, 1973.

Plate 5, Figure 11

Selected Syncnymy:

1973 *Complexiopollis funiculus* R.H. Tschudy, p. 4, pl. 1, figs. 1-29.

1979 *Complexiopollis funiculus* Tschudy; Christopher, pl. 1, figs. 5, 6.

1981 *Complexiopollis funiculus* Tschudy; Bebout, pl. 12, fig. 11.

Distribution: Late Albian to Santonian.

Remarks: Only one specimen of *C. funiculus* was recovered from the Pond Inlet of Twosnout Creek. The poor condition of this specimen suggests it is reworked.

Genus *Intratriporopollenites* Thomson and Pflug, 1953.

Type Species: *Intratriporopollenites instructus* (Potonié) Thomson and Pflug, 1953.

Intratriporopollenites sp.1

Plate 5, Figure 12

Description: Triporate pollen with a circular amb and circular equatorial exogerminals. The pollen wall is two layered and of uniform thickness (1μm). Ektexine and endexine are of equal thickness, endexine slightly invaginated at germinals; vestibulum distinct. Surface sculpture granulate.

Size: Equatorial diameter 19μm (1 specimen).

Remarks: As noted by Norris (1986, p. 40) Intratriporopollenites Thomson and Pflug is the earliest valid name for fossil pollen of tiliaceous character. The genus Tiliaepollenites Potonié was based on a recent pollen grain, and is thus a junior synonym of Tilia. No generic diagnosis was provided for Tiliapollenites Raatz, therefore it is an obligate junior synonym of Intratriporopollenites. The single specimen was recovered from the Bylot Island Formation.

Genus Momipites (Wodehouse) Fredericksen and Christopher, 1978.

Type Species: Momipites coryloides Wodehouse, 1933.

Momipites sp.1

Plate 5, Figure 13

Description: Triporate pollen with a triangular amb and convex sides. Exogerminals equatorially located and consist of vertical slits 4μm long, 0.8μm wide. Exine 0.8μm thick, thinning to 0.5μm adjacent germinals; surface sculpture scabrate.

Size: Equatorial diameter 25μm (1 specimen).

Remarks: Momipites sp.1 is distinguished by exinal thinning in the germinal area. The single specimen was recovered from the lower part of the Aktineq Formation.

Genus Osculapollis R.H. Tschudy, 1975.

Type Species: Osculapollis aequalis R.H. Tschudy, 1975.

Osculapollis perspectus R.H. Tschudy, 1975.

Plate 5, Figure 14

Selected Synonymy:

1975 Osculapollis perspectus R.H. Tschudy, p. 29, pl. 18, figs. 21-27.

Distribution: Campanian.

Remarks: Three poorly preserved specimens of Osculapollis perspectus R.H. Tschudy were found in one sample of the Pond Inlet Formation. These grains are probably reworked.

Genus Semioculopollis Góczán and Paclt, 1967.

Type Species: Semioculopollis minutus Góczán and Paclt, 1967.

Semioculopollis sp.1

Plate 5, Figure 15

Description: Triporate pollen with a rounded triangular amb and slightly protruding oculi. The oculi surround the germinal apertures in one hemisphere only and consists of a psilate annulate thickenings 10μm wide. The exogerminals consist of an equatorial vertical slit (4μm deep, 0.4μm wide) with a narrow vestibulum. The pollen wall is two layered, 0.9μm thick; endexine twice ektexine thickness in interapertural areas. Ektexine increases to 1.5μm thick adjacent to exogerminals. Pollen surface scabrate.

Size: Equatorial diameter 32μm (1 specimen).

Remarks: The presence of oculi on one hemisphere differentiates Semioculopollis from Oculopollis Pflug. The single poorly preserved specimen of S. sp.1 was recovered from the Pond Inlet Formation at Twosnout Creek. The condition of the grain suggests reworking.

Genus Triatriopollenites Thomson and Pflug, 1953.

Type Species: Triatriopollenites rurensis Pflug and Thomson, 1953.

Triatriopollenites sp.1

Plate 6, Figure 1

Description: Triporate pollen with a rounded triangular amb. Germinal apertures are circular (3μm wide), equatorial and atriate. Pollen wall 0.8μm thick, two layered, ektexine and endexine of equal thickness. Ektexine thickens slightly at germinals. Surface ornament psilate.

Size: Equatorial diameter 18-21μm (27 specimens).

Remarks: Specimens of T. sp.1 were recovered from the Navy Board, Aktineq and Pond Inlet formations. Specimens in which the double wall structure is obscured by folding or corrosion may be confused with Carpinipites ancipites Srivastava.

Genus Trivestibulopollenites Potonié ex Potonié, 1960.

Type Species: Trivestibulopollenites betuloides Thomson and Pflug, 1953.

Trivestibulopollenites betuloides Thomson and Pflug, 1953.

Plate 6, Figure 2

Selected Synonymy:

1986 Trivestibulopollenites betuloides Thomson and Pflug; Norris, p. 40, pl. 10, fig. 38-42.

Distribution: Paleogene and Neogene.

Remarks: Specimens of T. betuloides occur in the Pond Inlet, Navy Board and Aktineq formations. No specimens were recovered from the underlying Bylot Island Formation.

Genus Trudopollis Pflug emend. Krutzsch, 1967.

Type Species: Trudopollis pertrudens (Pflug) Pflug, 1953.

Trudopollis sp.1

Plate 6, Figure 3

Description: Triporate pollen with a triangular amb, slightly protruding sides and rounded germinal areas. The exogerminals consist of equatorial short vertical slits (3μm long). Labra adjacent and semicircular notch below mesogerminals. Pollen wall two layered with a very narrow interloculum. Endexine and ektexine are of equal thickness (0.8μm) in interapertural areas; ektexine thickens slightly around germinal apertures. The endexine is composed of two distinct lamella, with the outer slightly thicker than inner. The outer lamella increases significantly in thickness around apertures. Surface sculpture scabrate.
Size: Equatorial diameter 25μm (2 specimens).

Remarks: Two well preserved specimen of this taxon were recovered from the Pond Inlet Formation at Twosnout Creek.

<u>Trudopollis</u> sp.2

Plate 6, Figure 4

Description: Triporate pollen with a triangular amb, straight to slightly convex sides and rounded germinal areas. Pollen wall consists of two layers, separated by narrow interloculum. The wall is 1μm thick in interapertural areas; endexine and ektexine of equal thickness. Ektexine in apertural areas is greatly thickened (4μm), annulate and structureless; endexine slightly thickened near aperture.

Exogerminals equatorial vertical slits. Mesogerminals are atriate and have a semicircular notch below them. Surface sculpture scabrate.

Size: Equatorial diameter 24μm (1 specimen).

Remarks: The thickened ektexine and relatively unthickened endexine distinguish this species from T. sp.1. A single well preserved specimen of T. sp.2 was recovered from the Pond Inlet Formation at Twosnout Creek.

Trudopollis sp.3

Plate 6, Figure 5

Description: Triporate pollen with a triangular amb, convex sides and rounded germinal areas. The pollen wall is 3μm thick and has two layers. The endexine is slightly thicker than the ektexine in interapertural area. Endexine and ektexine thicken (to 3μm each) around germinal apertures. The endexine forms a large semicircular vestibulum. The exogerminals are equatorial vertical slits, mesogerminals are absent or poorly developed? Surface ornament is scabrate.

Size: Equatorial diameter 28μm (2 specimens).

Remarks: The very thick endexine surrounding the vestibulum differentiates this species from T. sp.1 and T. sp.2. Two specimen of this type were recovered, one from the base of the Pond Inlet Formation, and one from the Aktineq Formation. The nature of the mesogerminals is not clear due to poor preservation; these grains are probably reworked.

Genus Ulmipollenites Wolff emend. Srivastava, 1969.

Type Species: Ulmipollenites undulosus Wolff, 1934.

Ulmipollenites sp.1

Plate 6, Figure 6

Description: Triporate pollen with a round amb. The pollen wall is composed of two layers of equal and uniform thickness (1μm). The ektexine is folded to form a pseudo-annulus at the germinal apertures. Germinals are equatorial vertical slits 2μm long; mesogerminals are atriate. Surface sculpture consists of very low verrucae (ulmaceous).

Size: Equatorial diameter 22μm (3 specimens).

Remarks: U. sp.1 can be distinguished from U. tricostatus (Anderson) Farabee and Canright by the nature of the pore structure and the lack of interapertural arcii. All specimens were recovered from the Pond Inlet Formation.

Stephanoporate Pollen

Genus Clanculatus Felix and Burbridge, 1973.

Type Species: Clanculatus ignotus Felix and Burbridge, 1973.

Clanculatus sp.1

Plate 6, Figure 7

Description: Six pored pollen with a hexagonal amb and straight sides. The pollen wall has 2 layers, each 2μm thick. Ektexine thickens towards apertures; endexine thickens and curves inward towards the pore. A small vestibulum is formed by a slight separation of ektexine and endexine at pore. Exogerminals and mesogerminals are narrow (0.3μm) vertical slits. The surface sculpture consists of very low verrucae (ulmaceous).

Size: Equatorial diameter 28μm (1 specimen).

Remarks: The genus Clanculatus is characterized by the sharply angular outline, and an endexine which curves inward at the pores (Batten and Christopher, 1981). C. sp.1 can be differentiated from C. ignotus Felix and Burbridge by the less pronounced endexine curvature and smaller vestibulum. This grain is badly corroded and is probably reworked.

Genus Polyatriopollenites Pflug, 1953.

Type Species: Polyatriopollenites stellatus (Potonié) Pflug, 1953.

Polyatriopollenites stellatus (Potonié) Pflug, 1953.

Plate 6, Figure 8

Selected Synonymy:

1966 Pterocarya stellatus (Potonié) Martin and Rouse, p. 196, pl. 8, figs. 79, 80.

1969 Pterocarya stellatus (Potonié) Martin and Rouse; Hopkins, p. 1121, pl. 9, figs. 122-124.

1969 Pterocaryapollenites stellatus (Potonié) Thiergart; Norton and Hall, p. 42, pl. 5, fig. 25.

1971 Pterocarya stellatus (Potonié) Martin and Rouse; Rouse, Hopkins and Piel, pl. 6 fig. 3; pl. 9, fig. 6.

1971 Pterocarya stellatus (Potonié) Martin and Rouse; Piel, p. 1910, pl. 13, figs. 113, 114.

1972 Pterocarya stellatus (Potonié) Martin and Rouse; Rouse and Srivastava, fig. 66.

1977 Pterocarya stellatus Martin and Rouse; Piel, pl. 2, figs. 1, 2.

1978 Pterocaryapollenites stellatus (Potonié) Raatz; Wilson, p. 146, pl. 9, fig. 7; pl. 10, figs. 13, 17.

1983 Polyatriopollenites stellatus Thomson and Pflug; Wingate, p. 123, pl. 6, fig. 25, 26.

1986 Polyatriopollenites stellatus (Potonié) Pflug; Norris, p. 42, pl. 11, figs. 5-7.

1987 Polyatriopollenites stellatus (Potonié) Pflug; Langille, p. 101, pl. 6, fig. 12.

Distribution: Maastrichtian to Pliocene.

Remarks: This species occurs in most samples, but occurs more frequently in the Pond Inlet, Navy Board and Aktineq formations than in the underlying Bylot Island Formation. It is very rare to common in abundance.

Genus Polyvestibulopollenites Pflug in Thomson and Pflug, 1953.

Type Species: Polyvestibulopollenites verus (Potonié) Thomson and Pflug, 1953.

Polyvestibulopollenites verus (Potonié) Thomson and Pflug, 1953.

Plate 6, Figure 9, 10

Selected Synonymy:

1933 Alnus speciipites Wodehouse, p. 508, fig. 40.

1960 Polyvestibulopollenites verus Potonié; Weyland, Pflug and Mueller, pl. 14, figs. 9, 10.

1960 Polyvestibulopollenites verus Potonié f. euversus Krutzsch; Weyland, Pflug and Mueller, p. 14, figs. 1, 2.

1960 Polyvestibulopollenites verus Potonié f. hoellingi Krutzsch; Weyland, Pflug and Mueller, pl. 14, figs. 3-7.

1962 Alnus quinquepollenites Rouse, p. 202, pl. 2, figs. 7, 8.

1962 Alnus quadrapollenites Rouse, p. 202, pl. 2, figs. 9, 36.

1965 Alnus quaternaria Stanley, p. 288, pl. 43, figs. 1-3.

1965 Alnus trina Stanley, p. 289, pl. 43, fig. 6 only.

1966 Alnus verus (Potonié) Martin and Rouse, p. 196, pl. 8, figs. 69-71.

1966 Alnipollenites quadrapollenites (Rouse) Srivastava, p. 530, pl. VII, fig. 3.

1967 Alnipollenites quadrapollenites (Rouse) Srivastava; Srivastava, pl. II, fig. E.

1968b Alnus verus (Potonié) Martin and Rouse; Elsik, p. 606, pl. 17, figs. 1-3

1969 Alnus verus (Potonié) Martin and Rouse; Hopkins, p. 1118, pl. 7, figs. 1-3.

1969 Alnipollenites verus Potonié; Norton and Hall, p. 42, pl. 5, fig. 26.

1969 Alnipollenites verus Potonié; Oltz, p. 140, pl. 41, fig. 98.

1971 *Alnus quadrapollenites* Rouse; Griggs, pl. 6, fig. 4.

1971 *Alnus quinquepollenites* Rouse; Griggs, pl. 6, fig. 7.

1971 *Alnus verus* (Potonié) Martin and Rouse; Rouse, Hopkins and Piel, pl. 6, fig. 2, pl. 9, fig. 3.

1972b *Polyvestibulopollenites verus* (Potonié) Thomson and Pflug; Srivastava, p. 266, pl. XX, fig. 6.

1973 *Alnipollenites verus* Potonié; Felix and Burbridge, p. 15, pl. 3, fig. 25.

1973 *Alnipollenites quadrapollenites* (Rouse) Srivastava; Stone, p. 97, pl. 20, fig. 147.

1975b *Polyvestibulopollenites verus* (Potonié) Thomson and Pflug; Srivastava, p. 141, pl. 9, figs. 9-15; pl. 10, figs. 1-4.

1977 *Alnus verus* (Potonié) Martin and Rouse; Piel, pl. 2, fig. 7.

1978 *Polyvestibulopollenites verus* (Potonié) Thomson and Pflug; Schumacker-Lambry, pl. 12, figs. 10, 11; pl. 13, figs. 10, 11.

1978 *Alnipollenites verus* Potonié; Wilson, p. 145, pl. 11, fig. 9, 10.

1984 *Polyvestibulopollenites verus* Gaponoff, pl. 6, fig. 10.

1986 *Polyvestibulopollenites verus* (Potonié) Thomson and Pflug; Norris, p. 41, pl. 11, figs. 3, 4.

1987 *Alnipollenites verus* (Potonié) Potonié; Pocknall, pl. 1, fig. 18.

1989 Alnus sp. McIntyre, pl. 2, fig. 4.

1989 Alnipollenites verus Potonié; Sweet et al., pl. 2, fig. 16.

Distribution: Cretaceous and Tertiary.

Remarks: This species can be distinguished from other polyporate grains by the curved arcii running between the pores (Wilson, 1978). P. verus occurs sporadically in the Bylot Island, Pond Inlet, Navy Board, and Aktineq formations. Where present, these pollen are very rare to rare (1-4 specimens/sample).

Polyvestibulopollenites trinus (Stanley) Norris, 1986.

Plate 6, Figure 11

Selected Synonymy:

1965 Alnus trina Stanley, p. 289, pl. 43, fig. 4-6.

1969 Alnipollenites trina (Stanley) Norton and Hall, p. 42, pl. 5, fig. 20.

1969 Alnipollenites trina (Stanley) Oltz, p. 140, pl. 41, fig. 97.

1978 Alnipollenites trina (Stanley) Norton; Wilson, p. 145, pl. 10, fig. 15.

1980 Alnus trina Stanley; Frederiksen, pl. 1, figs. 21, 22.

1986 Polyvestibulopollenites trinus (Stanley) Norris, p. 41, pl. 10, figs. 46, 53.

Distribution: Early Maastrichtian to late Paleocene.

Remarks: P. trinus is a triporate pollen having straight arci running between the pores. Five specimens were recovered from the Pond Inlet, Navy Board and Aktineq formations.

Binigeminate Pollen

Genus Wodehouseia Stanley, 1961.

Type Species: Wodehouseia spinata Stanley, 1961.

Wodehouseia sp.1

Plate 6, Figure 12

Description: Bilaterally symmetric isopolar pollen. Equatorial profile circumscribing longest pollen axis is sub-oblate to oblate. Apertures large, binigeminate with colpi 6-7μm long, 2μm wide. Colpi are at right angles to longest pollen axis. Pollen wall double layered; endexine forms slightly punctate flange with external spines. The spines are restricted to the flange meridia. The flange narrows to 4μm at termini of long equatorial axis. The endexine of central body is psilate.

Size:	Polar Length (1 specimen)	28μm
	Transverse equatorial projection	40μm
	Central body length	14μm
	Flange length	8μm
	Length of spines	1-1.5μm

Remarks: This species can be distinguished from other Wodehouseia species by the lack of spines on the central body. The single example of this species was recovered from shales of the Bylot Island Formation on the south coast. This species is identical to a Wodehouseia species (W. sp.1) recovered from the upper portions of the underlying Sermilik Formation (Sparkes, pers. comm., 1989).

FUNGAL REMAINS

Genus Pesavis Elsik and Jansonius, 1974.

Type Species: Pesavis tagluensis Elsik and Jansonius, 1974.

Pesavis parva Kalgutkar and Sweet, 1988.

Plate 6, Figure 13

Selected Synonymy:

1974 Pesavis tagluensis Elsik and Jansonius, p. 956, pl. 1, fig 10 only.

1976 "Pesavis parva" Jansonius, pl. 1, fig. 2

1978 Pesavis sp. Sweet, pl. 6.2, fig. 15.

1979 Pesavis tagluensis Elsik and Jansonius; Smith and Crane, figs. 2, 3.

1986 Pesavis sp. Jerzykiewicz and Sweet, pl. 1, fig. 7.

1987 Pesavis tagluensis Elsik and Jansonius; Langille, p. 102, pl. 7, fig. 1.

1988 Pesavis parva Kalgutkar and Sweet, p. 123, pl. 6.1, figs. 6-12.

Distribution: Late Maastrichtian and Early Paleocene.

Remarks: The genus Pesavis was established to accommodate fungal spores consisting of a stalk cell with two lateral arms which curve to form a central cavity, or become straight (Kalgutkar and Sweet, 1988). P. parva is characterized by its curved shape, the number of cells which form its arms (less than 5) and its overall diameter (less than 30μm). This species was recovered from the Bylot Island, Pond Inlet, and Aktineq formations, and is an important biostratigraphic marker.

MARINE MICROPLANKTON

Proximate Dinoflagellates

Genus Ceratiopsis Vozzhenikova emend. Bujak, Downie, Eaton and Williams, 1980.

Type Species: Ceratiopsis leptoderma Vozzhennikova, 1963.

Ceratiopsis diebelii (Alberti) Vozzhennikova, 1967.

Plate 6, Figure 14

Selected Synonymy:

1971 Deflandrea diebelii Alberti; Wilson, pl. 1, fig. 1.

1974 Deflandrea diebelii Alberti; McIntyre, pl. 4, figs. 4, 5.

1975 Deflandrea diebelii Alberti; Lentin and Williams, p. 40, pl. 1, fig. 3.

1975 Deflandrea diebelii Alberti; McIntyre, p. 67, pl. 4, figs. 1, 2.

1976 Deflandrea diebelii Alberti; Dorenkamp et al., p. 410, pl. 4, fig. 7.

1977 Deflandrea diebelii Alberti; Williams and Bujak, p. 46, pl. 5, fig. 1.

1978 Deflandrea diebelii Alberti; Wilson, p. 151, pl. 11, fig. 15.

1980 Deflandrea diebelii Alberti; Croxton, p. 24, pl. 4, fig. 6.

1985 Ceratiopsis diebelii (Alberti) Vozzhennikova; Williams and Bujak, fig. 23, no. 17.

1986 Deflandrea diebelii Alberti; Ioannides, p. 19, pl. 11, figs. 6, 7, 10 and 11.

1988 Ceratiopsis diebelii (Alberti) Vozzhennikova; Shaozhi and Norris, p. 28, pl. 9, fig. 6.

Distribution: Late Senonian to Early Paleocene.

Remarks: The genus Ceratiopsis is characterized by a long apical horn, two symmetrically placed antapical horns and an elongate inner body which fills most of the outer shell. This dinoflagellate was recovered from the Bylot Island, Pond Inlet and Navy Board formations.

Ceratiopsis speciosa (Alberti) Lentin and Williams, 1977.

Plate 6, Figure 15

Selected Synonymy:

1965 Deflandrea speciosa Alberti; Stanley, p. 220, pl. 19, figs. 7-9.

1967 Deflandrea speciosa Alberti; Drugg, p. 18, pl. 2, fig. 16.

1969 Deflandrea speciosa Alberti; Gocht, p. 10, pl. 6, fig. 9.

1985 Ceratiopsis speciosa (Alberti) Lentin and Williams; Williams and Bujak, fig. 23, no. 18.

1986 Deflandrea speciosa Alberti; Ioannides, p. 19, pl. 11, fig. 9.

1988 Ceratiopsis speciosa (Alberti) Lentin and Williams; Shaozhi and Norris, p. 28, pl. 9, fig. 9.

1988 Ceratiopsis speciosa (Alberti) Lentin and Williams; Soncini and Rauscher, pl. 2, fig. 4.

Distribution: late Early Paleocene to Late Paleocene.

Remarks: C. speciosa (Alberti) Lentin and Williams is distinguished from C. diebelii (Alberti) Vozzhennikova by its smaller, nearly spherical endocyst, and its shorter, wider apical and antapical horns. The single specimen was recovered from the Pond Inlet Formation.

Genus Thalassiphora Eisenack and Gocht emend. Gocht, 1968.

Type Species: Thalassiphora pelagica Eisenack and Gocht emend. Gocht, 1968.

Thalassiphora pelagica (Eisenack) Eisenack and Gocht, 1960.

Plate 6, Figure 16

Selected Synonymy:

1966 Thalassiphora pelagica Eisenack and Gocht; Morgenroth, p. 40, pl. 11, figs. 3, 4.

1968 Thalassiphora pelagica Eisenack and Gocht; Gocht, p. 149, pls. 25-27 all.

1969 Thalassiphora pelagica Eisenack and Gocht; Gocht, p. 66, pl. 5, figs. 4-10.

1975 Thalassiphora pelagica Eisenack and Gocht sensu Gocht; Williams and Brideaux, p. 96, pl. 14, fig. 2.

1985 Thalassiphora pelagica (Eisenack) Eisenack and Gocht; Williams and Bujak, fig. 38, no. 19.

1987 Thalassiphora pelagica (Klumpp) Eisenack; Firth, p. 211, pl. 3, fig. 8.

1988 Thalassiphora pelagica (Eisenack) Eisenack and Gocht; Shaozhi and Norris, p. 30, pl. 16, figs. 15, 16.

Distribution: Maastrichtian to Oligocene.

Remarks: Dinoflagellate cysts having a relatively small endocyst enclosed in a large pericyst characterize the genus Thalassiphora. T. pelagica (Eisenack) Eisenack and Gocht were found in the Pond Inlet and Navy Board formations.

CHAPTER 4. DISCUSSION

4.1 Palynomorph Biostratigraphy

Analysis of palynologic data from Bylot Island strata reveals a distinct zonation of fossil taxa. In accordance with the North American Stratigraphic Code (NASC, 1983) and the International Stratigraphic Guide (Hedburg, 1976) two informal biozones are erected, herein called the *Hamulatisporis amplus* - *Ulmipollenites* sp.1 (HU) zone, and the *Trivestibulopollenites betuloides* - *Triatriopollenites* sp.1 (TT) zone.

These biozones are defined on the basis of palynomorph assemblages and are termed assemblage zones (NASC, 1983) or cenozones (Hedburg, 1976). The TT zone is further subdivided into two subzones herein called TTa and TTb. These are defined on the basis of abundance of particular species (abundance zones NASC, 1983; acme zones, Hedburg, 1976).

For each assemblage zone a list of diagnostic and biostratigraphically important species is presented. Additionally, non diagnostic species which are abundant or common (>4/sample) are also listed. Rare and very rare non diagnostic species are presented only in the palynomorph range chart (Appendix F). Figure 4.1 indicates the known ranges of biostratigraphically significant taxa of these zones.

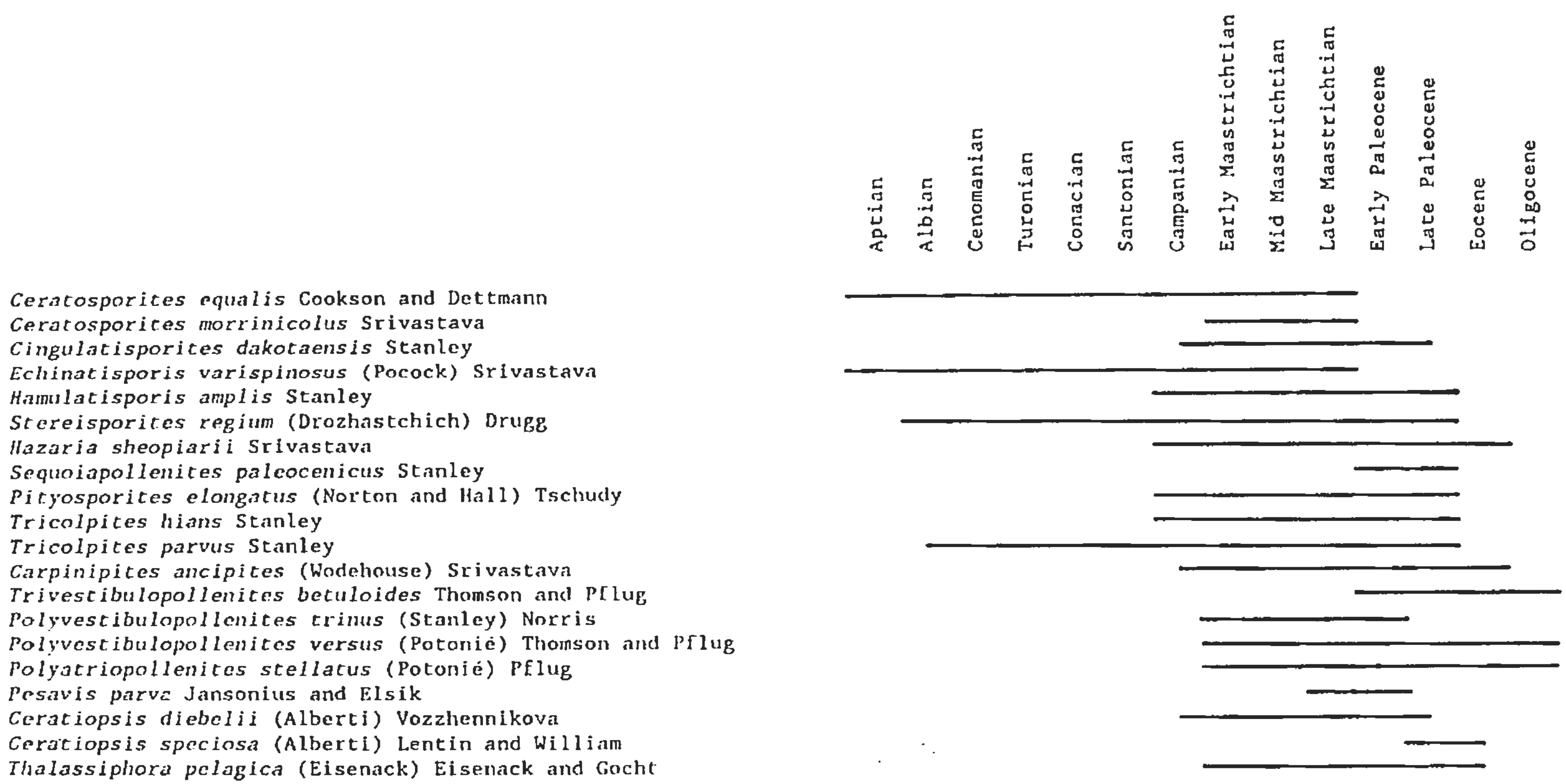

Figure 4.1. Range chart of significant taxa identified in this study (based on available literature).

4.1.1 Hamulatisporis amplus - Ulmipollenites sp.1 (HU) Zone

Taxa

The diagnostic species of this biozone include Cibotiumspora juncta (Kara-Murza) Singh, Hamulatisporis amplus Stanley, Ceratosporites morrinicolus Srivastava, Ceratosporites equalis Cookson and Dettmann, Echinatisporis varispinosus (Pocock) Srivastava, Wodehouseia sp.1, Intratriporopollenites sp.1 and Ulmipollenites sp.1.

Biostratigraphically important species which characterize this zone, but which are not restricted to it are Carpinipites ancipites (Wodehouse) Srivastava, Polyatripollenites stellatus (Potonié) Pflug, Polyvestibulopollenites verus (Potonié) Thomson and Pflug, Psavis parva Kalgutkar and Sweet, Ceratiopsis diebelii (Alberti) Vozzhennikova, and Thalassiphora pelagica (Eisenack) Eisenack and Gocht.

Abundant and common non diagnostic species of this zone are Laevigatosporites haardti (Potonié and Venitz) Thomson and Pflug, Deltoidospora hallii Miner, Gleicheniidites senonicus Ross, Stereisporites antiquasporites (Wilson and Webster) Dettmann, Osmundacidites wellmanii Couper, Cyathidites minor Couper, Inaperturopollenites sp.2, Taxodiaceaepollenites hiatus, Cedripites canadensis Pocock and Inaperturopollenites sp.1.

Distribution

The HU zone is restricted to the Bylot Island Formation of the south coast and Twosnout Creek areas (Figure 2.2; Appendix F). The stratotype for this zone is located on the south coast at section Ts1 (Appendix C), and spans samples 210701 to 110709 (34 to 121m).

Age

A Late Maastrichtian age is suggested by the taxa which occur in this biozone. The maximum age is indicated by the occurrence of Polyatriopollenites stellatus (Potonié) Pflug, Polyvestibulopollenites verus (Potonié) Thomson an Pflug, Thalassiphora pelagica (Eisenack) Eisenack and Gocht which do not occur prior to the Maastrichtian. This is further refined by the occurrence of Pesavis parva Kalgutkar and Sweet which is not known to range below the Late Maastrichtian in the Canadian Arctic (Kalgutkar and Sweet, 1988).

The age minimum is indicated by the Late Cretaceous spores Hamulatisporis amplus Stanley, Ceratosporites equalis Cookson and Dettmann, Ceratosporites morrinicolus Srivastava and Echinatisporis varispinosus (Pocock) Srivastava which are not known to occur in the Tertiary. These findings are consistent with those of Ioannides (1986) which were based on dinoflagellates.

Remarks

The HU zone contains a high percentage of reworked Lower Cretaceous palynomorphs. For this reason the use of last appearances for age determination is not reliable. It is possible therefore that this zone may be entirely Paleocene if the Cretaceous spores utilized above are reworked. The well preserved nature of the spores, and the supporting conclusions of Ioannides (1986) all argue against a Paleocene age.

The HU biozone contains many of the characteristic species of the Singularia aculeata - Pesavis parva (SP) zone defined by Sparkes (pers. comm, 1989) in the strata immediately underlying those of this study. It is probable that the HU biozone is a continuation of this underlying zone. A more distant correlation can be made with zone CVII, the Deflandrea diebelii - Palaeoperidinium pyrophorum Zone of Doerenkamp et al. (1976) from the Kanguk Formation of Banks Island. The CVII Zone is similar in age, is dominated by long ranging bisaccates and pollen, and contains Hamulatisporis amplus Stanley and Ceratiopsis diebelii (Alberti) Vozzhennikova, species characteristic of the HU biozone.

A number of other Maastrichtian palynomorph assemblages have been documented in the Canadian Arctic. These include an assemblage from the Eureka Sound Group strata of Ellef

Ringnes Island (Felix and Burbridge, 1973), the H3 division of section CR 17A N-68, Horton River (McIntyre, 1974), and the Myrtipites scabratus / Aquilapollenites delicatus var. colaris zone of the Summit Creek Formation (Sweet et al., 1989). Although the HU biozone probably correlates with these on the basis of age, the assemblages share no diagnostic species.

4.1.2 Trivestibulopollenites betuloides - Triatriopollenites sp.1 (TT) Zone

Taxa

Diagnostic species of this biozone include: Cingutriletes clavus (Balme) Dettmann, Gemmatriletes sp. 1, Retitriletes sp. 1, Impardecispora sp. 1, Pityosporites elongatus (Norton and Hall) Tschudy, Pityosporites elongatus (Norton) var. grandis B.D Tschudy, Podocarpidites sp. 1, Sequoiapollenites paleocenicus Stanley, Trivestibulopollenites betuloides Thomson and Pflug, Triatriopollenites sp.1, Trudopollis sp.1, Tricolpites hians Stanley, Trudopollis sp.2, Semioculopollis sp.1, Polyvestibulopollenites trinus (Stanley), Caryapollenites sp.1, Momipites sp.1 and Trudopollis sp.3.

Other species which characterize this zone are Carpinipites ancipites (Wodehouse) Srivastava, *Polyatriopollenites stellatus* (Potonié) Pflug, *Polyvestibulopollenites verus* (Potonié) Thomson and Pflug, *Tricolpites parvus* Stanley, *Ceratiopsis diebelii* (Alberti) Vozzhennikova, *Thalassiphora pelagica* (Eisenack) Eisenack and Gocht, *Ceratiopsis speciosa* (Alberti) Lentin and Williams and *Pesavis parva* Kalgutkar and Sweet.

Common non diagnostic taxa found in this zone include *Laevigatosporites haardti* (Potonié and Venitz) Thomson and Pflug, *Deltoidospora hallii* Miner, *Gleicheniidites senonicus* Ross, *Stereisporites antiquasporites* (Wilson and Webster) Dettmann, *Retitriletes eminulus* (Dettmann), *Osmundacidites wellmanii* Couper, *Cyathidites minor* Couper, *Stereisporites regium* (Drozhastchich) Drugg, *Inaperturopollenites* sp.2, *Inaperturopollenites* sp.1, *Taxodiaceaepollenites hiatus* (Potonié) Kremp, *Cedripites canadensis* Pocock and *Alisporites bilateralis* Rouse.

The TT biozone is further divided into two subzones (TTa and TTb) on the basis of the abundance of several species. In subzone TTa, *Carpinipites ancipites* (Wodehouse) Srivastava is common (avg. 5 to 9/sample), *Trivestibulopollenites betuloides* Thomson and Pflug is rare (avg. 2/sample) and *Triatriopollenites* sp.1 occurs sporadically in low numbers (1-2/sample). Dinoflagellate cysts are abundant in all samples from this zone.

Subzone TTb is marked by an increase in the occurrence of *Carpinipites ancipites* (Wodehouse) Srivastava (avg. 20-30/sample) and *Trivestibulopollenites betuloides* Thomson and Pflug (avg. 8 to 12/ sample). *Triatriopollenites* sp.1 continues to be sporadic in distribution, but where present are more numerous (8-11/sample). Subzone B is also characterized by a total absence of dinoflagellates.

Distribution

The TT biozone occurs throughout the Pond Inlet, Navy Board, and Aktineq formations (Figure 2.2; Appendix F). Subzone TTa encompasses the Pond Inlet Formation of the south coast and Twosnout Creek, as well as the lower 250m of the Navy Board Formation at Twosnout Creek (Figure 2.2; Appendix F). The stratotype of this subzone is located at Twosnout Creek at section Rs3 (Appendix C) and spans samples 310701 to 310710 (72 to 241m). Subzone TTb is restricted to the upper 150m of the Navy Board Formation, and the entire Aktineq Formation (Figure 2.2; Appendix F). The stratotype of this subzone is located near Twosnout Creek at section Ts4 (Appendix C) and spans samples 010801 to 010812 (0 to 202m).

Age

The palynoflora of the TT biozone suggests an Early Paleocene age. In particular, the known stratigraphic ranges of *Trivestibulopollenites betuloides* Thomson and Pflug, (Paleogene - Neogene) *Sequoiapollenites paleocenicus* Stanley (Paleocene) and *Pesavis parva* Kalgutkar and Sweet (Maastrichtian - Paleocene) are good evidence for this conclusion. The co-occurrence of *Ceratiopsis speciosa* (Alberti) Lentin and Williams (late Early Paleocene - Early Eocene) and *Ceratiopsis diebelii* (Alberti) Vozzhennikova (Late Campanian - Early Paleocene) midway through the Pond Inlet Formation suggests a late Early Paleocene age (Williams and Bujak, 1985) for the upper half of this and overlying formations. The recovery of the Danian coral *Faksephyllia faxoensis* Beck and Lyell (Cairns, pers. comm., 1988) in this zone supports a Paleocene age. This determination is also in agreement with the findings of Ioannides (1986). No age difference is apparent between subzones TTa and TTb.

Remarks

This assemblage zone is characterized by a high percentage of reworked Cretaceous taxa, a feature which is common in Tertiary basin deposits of the Arctic (Staplin, 1976; Norris and Miall, 1984). The transition from the HU to the TT biozone corresponds with the Bylot Island - Pond Inlet Formation boundary (Figure 2.2). As such this palynostratigraphic boundary is probably in part a reflection of the change in depositional processes. The appearance of many angiosperm pollen not found below the boundary however, indicates the boundary also marks a floral change in the area.

The palynostratigraphic boundary between subzone TTa and TTb is marked by a change in species abundances, not in the taxa present. It is located within the coarsening-upward sequence at the top of the Navy Board Formation (Figure 2.2). This sequence reflects changing hydrodynamic and depositional conditions (see depositional environment section). Such changes affect all sediments, including palynomorphs (R.H. Tschudy, 1969). Because no significant faunal changes occur at the boundary, it is interpreted to be the result of altered depositional processes, not floral evolution. The disappearance of all dinoflagellates at this boundary may also be explained in this manner. The interpreted depositional change is a transition from marine to terrestrial environments (see depositional environment section).

The TT biozone of Bylot Island contains many of the species which characterize the Paleocene TI (*Alnipollenites*, *Ericaceiopollenites*) Zone of Banks Island (Doerenkamp *et al.*, 1976) and is considered to be equivalent. The TI zone of Banks Island is further subdivided into an TIa and TIb subzone on the basis of the disappearance of *Hazaria sheopiarii* Srivastava. This phenomenon also occurs between subzones TTa and TTb of this study, but the species is so rare (only 9 spores in total recovered) as to make this correlation suspect. The TT assemblage is the same age (Early Tertiary) as the _Paraalnipollenites_ _alterniporus_ zone of the Summit Creek Formation (Sweet _et_ _al_., 1989). These zones however cannot be correlated by palynostratigraphy, as they have few taxa in common.

4.2 Depositional Environment

4.2.1 Bylot Island Formation

On the basis of sedimentologic and palynologic evidence, the Bylot Island Formation is interpreted to have been deposited in a basin plain setting. Black shales and muddy siltstones containing abundant marine dinocysts represent pelagic sedimentation in a marine environment (Potter _et_ _al_., 1980). Sheet sandstones exhibiting partial to complete Bouma sequences represent turbidite deposition (Bouma, 1962; Rupke, 1978; Davis, 1983; Walker, 1984). The characteristics of these deposits are consistant with the attributes of the basin plain environment described by Walker (1967; 1978), Mutti and Ricci Lucchi (1972), Shanmugam and Moiola (1988). These include a preponderance of shale (sand/shale ratio much less than 1), a lack of abrupt vertical and lateral facies changes, no distinct thinning or thickening upward cycles, and turbidite sandstones which are laterally continuous, thin (centimetre to decimetre), medium to fine grained, and which lack channelling.

4.2.2 Pond Inlet Formation

The Pond Inlet Formation is a marine sandstone with abundant dinocysts, glauconite, and locally abundant sharks teeth and invertebrate remains. The two lithotypes which comprise the formation represent different depositional environments.

The white quartz sandstone lithotype is interpreted to have been deposited as a shelf - submarine fan complex. The distinct depositional styles of the south coast and Twosnout Creek represent different components of this system. On the south coast this lithotype consists of laterally continuous stacked sheet sandstones and is interpreted to have been deposited in a storm dominated shelf environment. The presence of oyster valves (Ostrea Linné; Haggart, pers. comm., 1988) suggests a shallow marine environment. The recovery of fragile bivalves (Nucula Lamarck; Haggart pers. comm., 1988) argues against long distance transport of these invertebrates into a deeper marine setting.

Shallow marine sheet sandstones such as those of the south coast are most commonly associated with shoreline and shelf environments (Johnson, 1978). The shelf processes which formed these deposits is less clear. The extremely clean nature of the sandstones makes identification of sedimentary structures and bed boundaries difficult, however, some deductions can be made from the sedimentologic data. A relatively high energy environment is indicated by the medium to coarse grain size and erosional bases of the beds. Fining upward graded bedding is indicative of deposition in waning flow. These features in a shelf sandstone are characteristic of storm current deposition (Johnson, 1978; Davis, 1983). Prolonged reworking suggested by the very clean, well rounded and well sorted nature of the sandstones is consistant with this conclusion.

Each sandstone bed represents a single storm deposit; muddy siltstone partings represent fair weather, largely non depositional periods. (Johnson, 1978; Walker, 1985). Thicker beds (>2 metres) may represent large storm deposits, or more likely sand waves or ridges generated by storm currents (Davis, 1983; Galloway and Hobday, 1983).

At Twosnout Creek the white quartz sandstones form a number (at least 2) of broad (>1 kilometre), thick (up to 250m thick) lensoid bodies within the marine shales of the Bylot Island and Navy Board formations (Figure 2.6). This distinctive geometry is characteristic of submarine fan deposits (Mutti and Ricci Lucchi, 1972; Walker and Mutti, 1973; Walker, 1978; 1984; Shanmugam and Moiola, 1988). The sandstones which form the lobes are lithologically identical to those described above and are considered to have been sourced from the shelf. Sandstone beds in the lobes are laterally continuous, massive, lack channelling, contain water escape structures and have thin siltstone or mudstone partings. These features characterize mid suprafan lobe deposits of the classical submarine fan model (Mutti and Ricci Lucchi, 1972; Walker and Mutti, 1973; Walker, 1978; 1984; Shanmugam and Moiola, 1988) or, alternatively the proximal ramp deposits of the submarine ramp model (Heller and Dickinson, 1985). The absence of a lithologically associated deltaic sequence and the widespread shelf sandstones suggests this latter model is inappropriate as it invokes deltaic sedimentation at the shelf break with no intervening shelf deposits.

The red arkosic sandstone lithotype is dominantly composed of pebble / boulder conglomerates and physically and compositionally immature sandstone. These sediments are deposited in stacked beds which commonly exhibit soft sediment deformation and have erosional bases. Such features indicate high energy deposition on a relatively steep slope near the sediment source. This form of deposition in a marine setting is charac ristic of coarse grained deltaic systems (McPherson et al., 1987).

On the basis of sedimentologic and petrographic evidence the red arkosic sandstone lithotype is interpreted to be the marine component of a fan-delta complex. This type of coarse grained delta develops where an alluvial fan progrades directly into a standing body of water (Holmes, 1965). Such deltas are generally associated with fault bounded basin margins, and are restricted in areal extent (Ethridge and Wescott, 1984; McPherson et al., 1987). It is most easily distinguished from a braid delta (formed where a braided stream deposits directly into a standing body of water) by the subareal component (McPherson et al., 1987). Where this portion is not exposed, such as on Bylot Island, other characteristics must be used to distinguish the two (Table 4.1). The petrographic and sedimentologic characteristics of the arkosic sandstone lithotype are more consistant with the fan-delta model. Conglomeratic beds are interpreted to be gravity induced debris flows; sandstones are channelized and sheet density current deposits. Upward coarsening cycles represent fan-delta lobe progradation; upward fining cycles, progressive lobe abandonment (Gloppen and Steel, 1981).

4.2.3 Navy Board Formation

Two environments are recognized in this Early Paleocene formation, a basin plain sequence which grades up into a delta complex. Much of the Navy Board Formation consists of shales identical to those of the Bylot Island Formation. On basis of those criteria outlined above (see Bylot Island Formation), the strata are interpreted to be basin plain deposits.

Deltaic accumulations are most commonly recognized through the examination of stratigraphic associations (Davis, 1983). The presence of a thick transitional sequence between underlying marine facies and overlying terrestrial strata is the strongest evidence for a deltaic deposit (Davis, 1983; Miall, 1984). The thick coarsening upward sequence at the top of the Navy Board Formation clearly fits this criteria. Strata grade upward from a shale dominated marine unit (described above) to the sand dominated fluvial sequences of the Aktineq Formation. An environmental transition is evident in the gradual disappearance of marine dinocysts, and a corresponding increase in the abundance of terrestrial palynomorphs. The occurrence of glauconite in the sands clearly demonstrates a marine depositional environment (Phillips and Griffen, 1981; Johnson, 1978); plant impressions near the top of the sequence indicate an increasing terrestrial influence. Superimposed upward coarsening cycles are interpreted as the repeated buildup of the prodelta to distributary mouth bar.

4.2.4 Aktineq Formation

The sedimentologic characteristics of the Aktineq Formation indicate a meandering stream depositional environment. The transition from marine to terrestrial deposition is marked by a change from upward coarsening to upward fining graded bedding, a change from black and grey to red sediment coloration, and an increase in the appearance of plant fragments. A change to a terrestrial environment also explains the disappearance of marine indicators (dinocysts, marine invertebrate fossils and glauconite) common in the underlying units.

The characteristic depositional pattern of the meandering stream facies model (Collinson, 1978; Jackson, 1978; Walker and Cant, 1984; Davis, 1983) is exhibited by the strata of the Aktineq Formation. Beds have an erosional base overlain by a fining upward sandstone sequence (point bar deposits); Miall et al. (1980) report the preservation of channel cutbanks from these strata. The sandstones are capped by thick muddy siltstones containing plant imprints and coaly fragments (levee and overbank sediments). Beds are laterally continuous and locally contain a gravel or conglomeratic lag. The compositional immaturity and moderate to poor rounding of grains suggests a relatively nearby sediment source.

4.3 Geologic Model

4.3.1 Local Basin Fill

Sedimentologic and biostratigraphic data presented above provides the basis for reconstruction of the depositional history of these strata. A late Maastrichtian marine transgression resulted in the deposition of the Bylot Island Formation shales on the fluvial - deltaic sandstones of the Sermilik Formation (Sparkes, pers. comm., 1989).

At approximately the Cretaceous - Tertiary boundary basin margin fan-deltas developed in response to rejuvenation of basin margin source areas (Byam Martin High; Figure 4.2). An approximately concurrent reactivation of more distal sources resulted in the establishment of a sandy storm dominated shelf (Figure 4.3). The abundance of quartz grains with well rounded epitaxial overgrowths on rounded cores indicates the distal source consists of a previously deposited sedimentary rock. Stratigraphic reconstruction of the area (Figure 4.4) suggests the shelf prograded from the southeast. In front of this prograding system a shelf sourced submarine fan complex was deposited within the shales of the basin. Sediment input from the basin flanks probably continued throughout this period. In late Early Paleocene a basin margin sourced fluvial deltaic complex prograded across the basin (Figure 4.5). The nature of this system (meandering stream) indicates mild relative

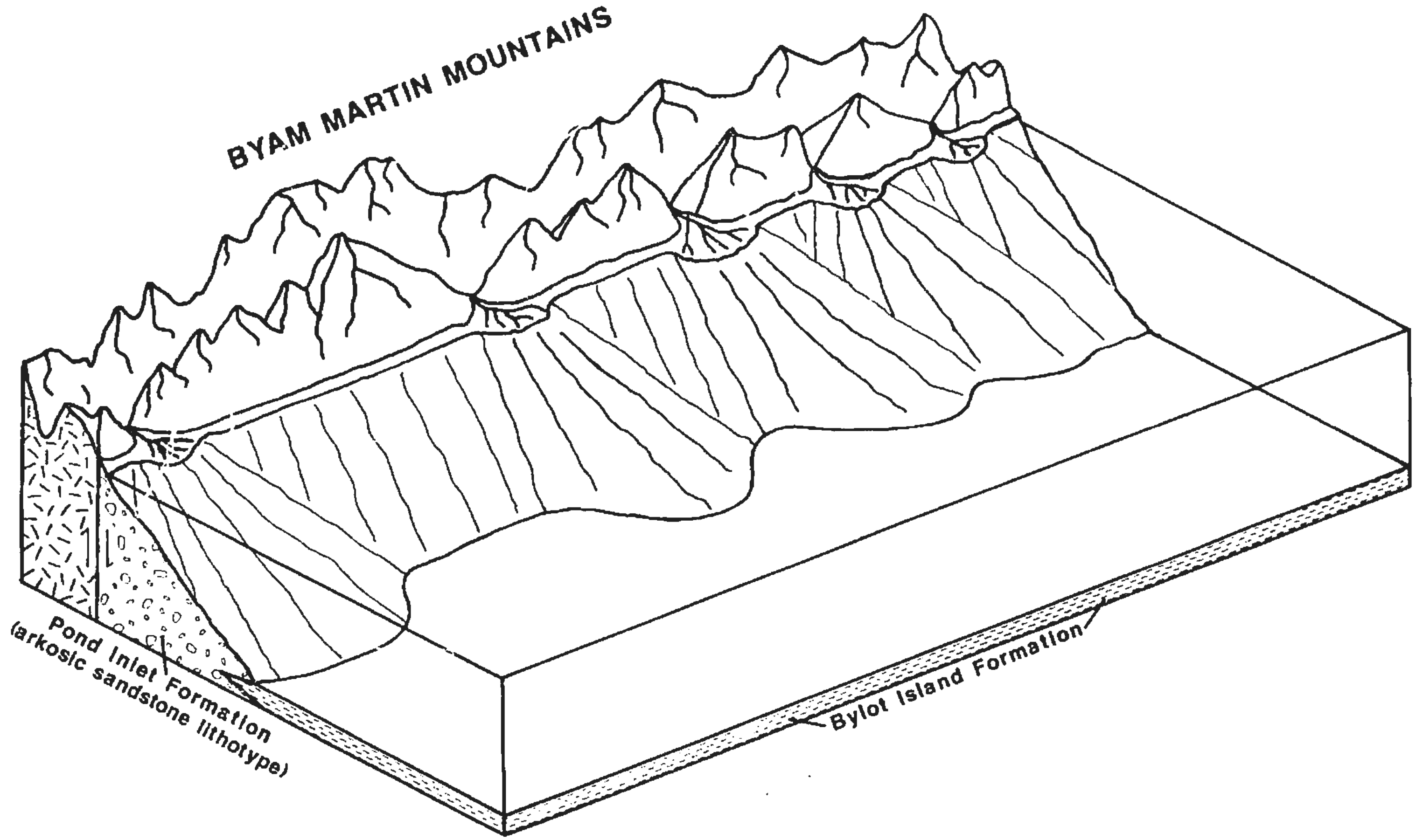

Figure 4.2. Geologic reconstruction of the Eclipse Trough during the Early Paleocene. Rejuvenation of local source area (Byam Martin High) results in the development of basin margin Fan-deltas (Pond Inlet Formation arkosic sandstone lithotype).

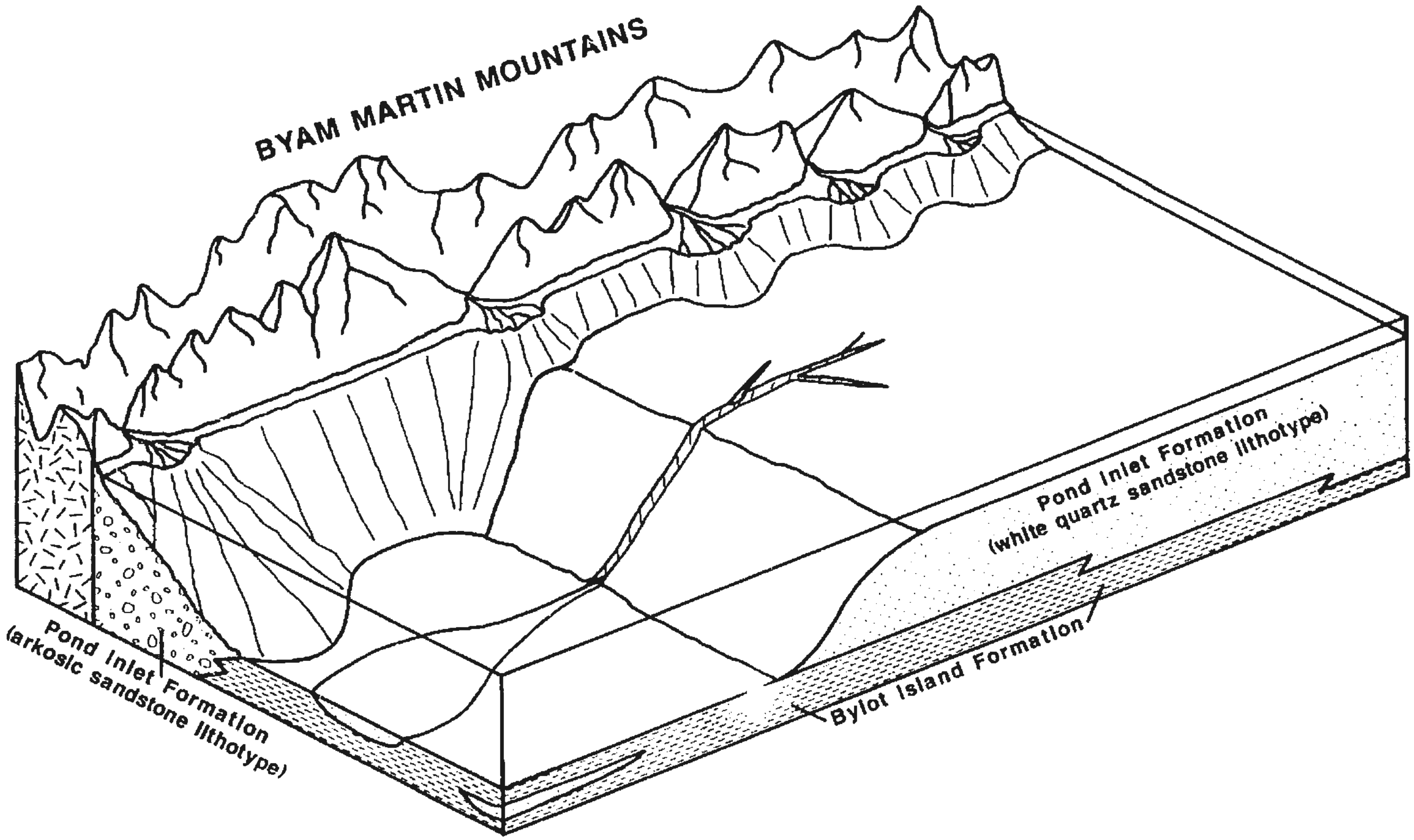

Figure 4.3. Geologic reconstruction of the Eclipse Trough during the Early Paleocene. Rejuvenation of distant sediment source results in the progradation of a sandstone shelf and associated submarine fan complex (Pond Inlet Formation white quartz sandstone lithotype) down the axis of the basin.

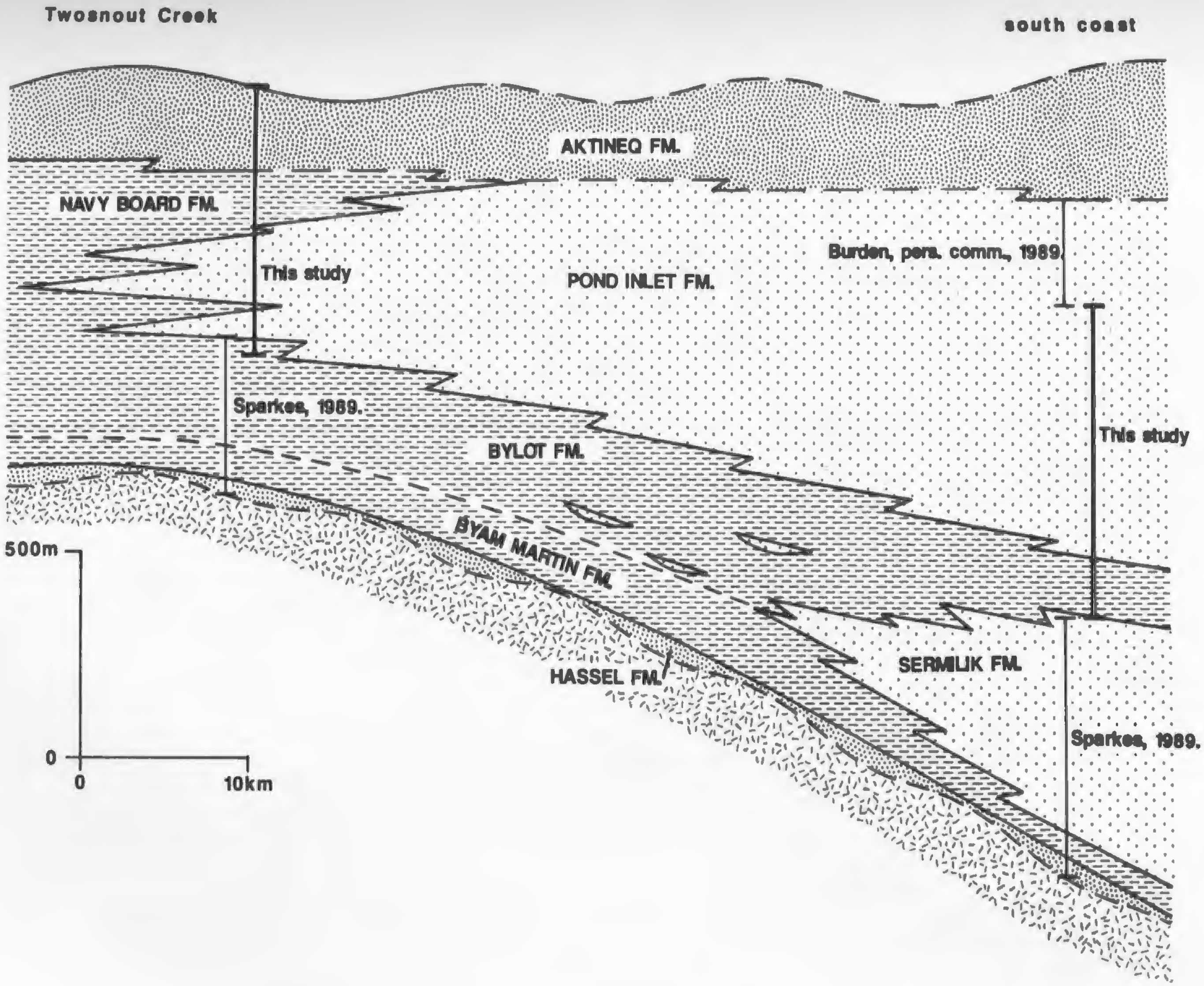

Figure 4.4. Reconstructed stratigraphic cross section across southwestern Bylot Island. Reconstruction based on data from this study, Sparkes (pers. comm. 1989) and Burden (pers. comm. 1989).

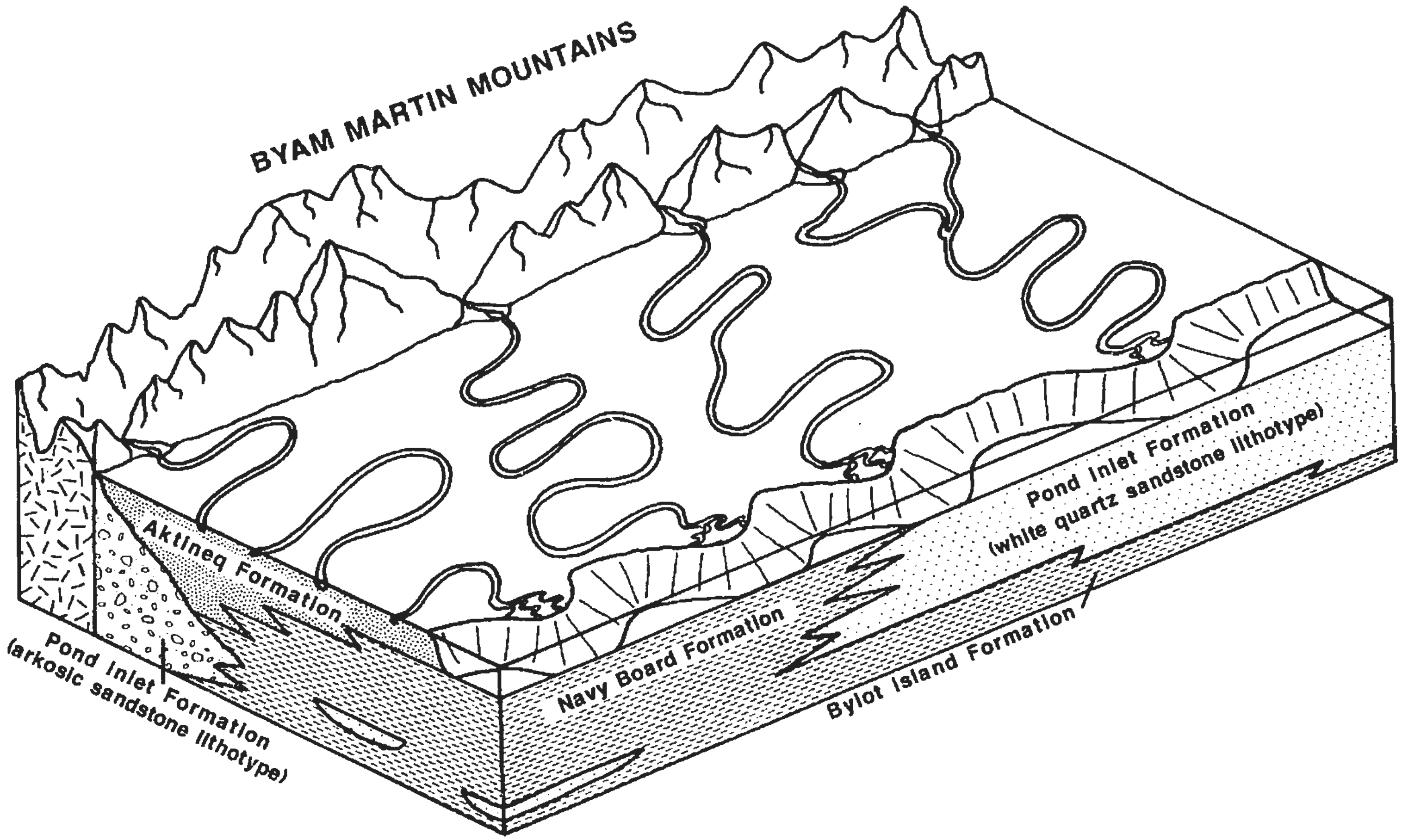

Figure 4.5. A geologic reconstruction of the Eclipse Trough during the late Early Paleocene. A basin margin sourced meandering stream fluvial - deltaic complex (Aktineq and Upper Navy Board formations) progrades across the basin.

displacement between source and basin and a low paleoslope. The record of further basin evolution on Bylot Island has been obliterated by subsequent uplift and erosion.

4.3.2 Regional Considerations

Basin formation in the Davis Strait - Baffin Bay region was controlled by extensional tectonism (sea floor spreading (Rice and Shade, 1982) or crustal attenuation (Kerr, 1980)) during the Late Mesozoic and Early Cenozoic. Eclipse Trough is but one of a series of basins (Figure 4.6) whose development reflects the northwest propagation of extensional processes through the Cretaceous and Tertiary. Sedimentary sequences within each basin contain a record of the local response to this process. The tectonic history of the region cannot however be inferred directly from the stratigraphic record as other factors also influence sedimentation, most notably global sea level fluctuations.

Vail et al. (1977) have identified a major period of global low sea level in the Early Paleocene. This event correlates not only with the regression in Eclipse Trough, but also an unconformity in the Labrador Sea (Purcell et al., 1979; McWhae, 1980). Neither feature is tectonic in origin as they do not correspond with any known plate tectonic events in the region (Miall et al., 1980). A sea level fall in Eclipse Trough would expose to erosion

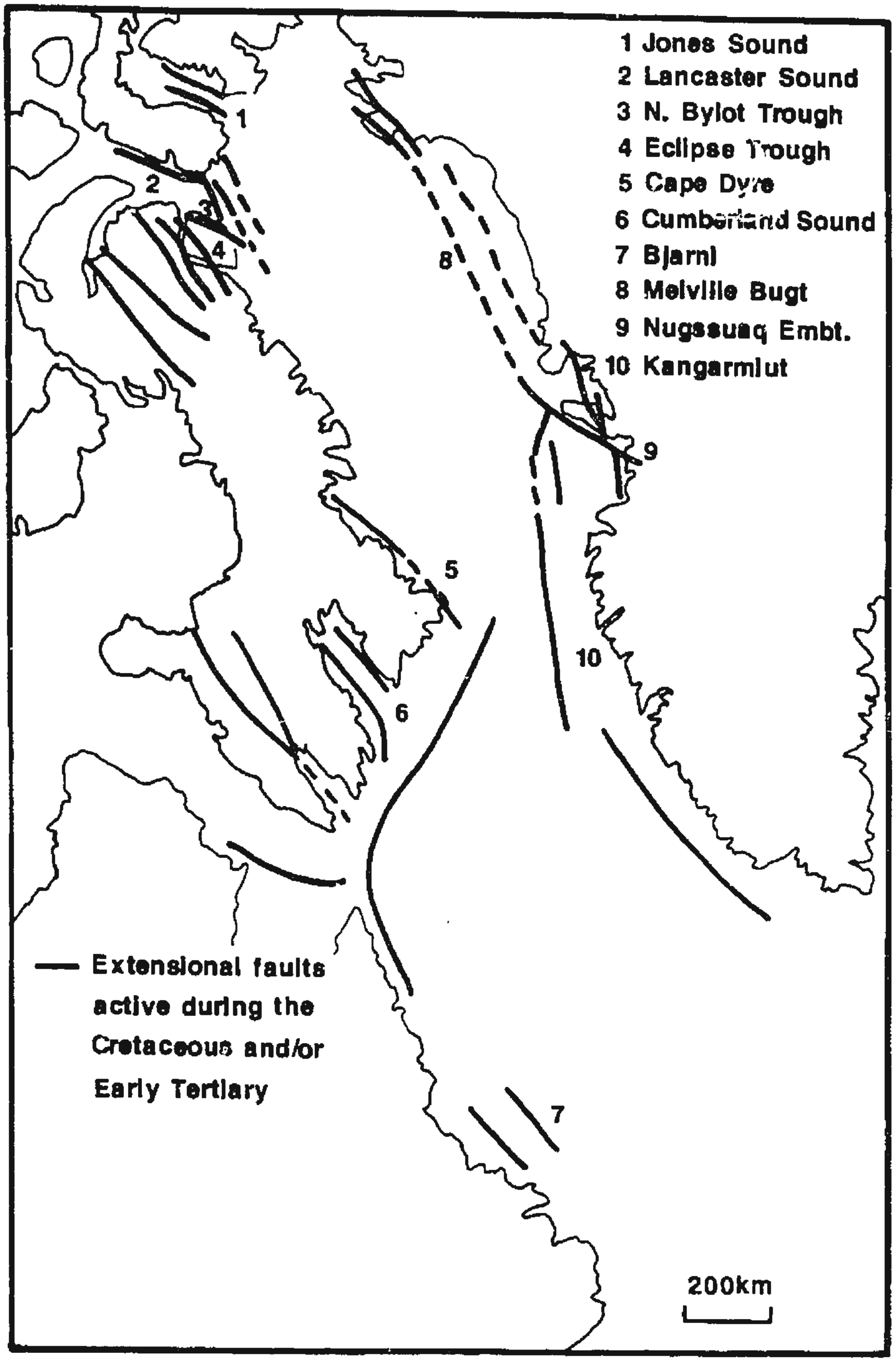

Figure 4.6. Principle Cretaceous and Tertiary fault bounded basins of the Baffin Bay Labrador Sea region (Modified from Miall et al., 1980).

previously submerged bounding highs and older strata within the basin. The increased sedimentation combined with a reduced sea level would generate a regressive depositional cycle. Evidence to support this hypothesis includes the deposition of very mature polycyclic sandstones (Pond Inlet Formation white quartz sandstone lithotype) and the abundance of reworked palynomorphs in the Paleocene (TT) assemblage zone. This hypothesis must, however, be considered tentative as the details of the process and timing of rifting in the Davis Strait and Baffin Bay are still in dispute. More conclusive evaluations of sedimentologic controls must await the detailed examination of the tectonic history and seismic stratigraphy of the region.

CHAPTER 5 CONCLUSIONS

This integrated palynologic, stratigraphic, and sedimentologic study has established a geologic model for basin fill from the southwest coast of Bylot Island. The results improve our understanding of the evolution of Eclipse Trough, and provide a general depositional model for use in the examination of other nearby basins (eg. North Bylot Trough and Lancaster Aulacogen; Figure 1.1).

Eclipse Group is physically and tectonically separate from the sedimentary units of Sverdrup Basin. Four formations are defined within the upper portion of this group; the Bylot Island, Pond Inlet, Navy Board, and Aktineq formations. These strata consist of marine basin plain deposits (Bylot Island Formation), a fan-delta / shelf - submarine fan/ basin plain complex (Pond Inlet and Navy Board Formations) and a meandering stream fluvial deltaic sequence (Aktineq Formation). This succession represents a transgressive - regressive sedimentary cycle which conformably overlies a similar Late Cretaceous cycle (Byam Martin and Sermilik formations; Sparkes, pers. comm., 1989) in the lower portion of the group..

Palynostratigraphy indicates that the marine transgression is Late Maastrichtian (HU biozone), whereas the regressive phase is Early Paleocene (TTa and TTb biozones). Invertebrate faunas and the previous work of

Ioannides (1986) on dinoflagellates support a Maastrichtian - Early Paleocene age.

Eclipse Trough developed in response to extensional tectonism (rifting or crustal attenuation) in Baffin Bay. Regional and global data suggest that eustatic sea level fluctuations and not tectonic movements, controlled deposition through the Late Maastrichtian - Early Paleocene time.

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PLATES

All specimens are illustrated in interference contrast. In the explanation of figures, the species name is followed by a field sample number, palynology processing / slide number (in brackets), microscope coordinates, view and magnification.

PLATE 1

Figure 1. Cingutriletes clavus (Balme) Dettmann; 310701 (425A); 4.0 91.0; proximal view (650X).

Figure 2. Densoisporites microrugulatus Brenner; 210706 (456a); 15.8 100.1; proximal view (1040X).

Figures 3 & 4. Antulsporites sp.1; 310704 (451b); 7.0 90.0; proximal and distal views (650X).

Figure 5. Murospora sp.1; 210707 (453B); 7.5 91.5; proximal view (650X).

Figure 6. Impardecispora sp.1; 010801 (465a); 14.5 80.1; proximal view (1040X).

Figure 7. Gleicheniidites senonicus Ross; 310701 (425a); 16.6 88.1; proximal view (1040X).

Figure 8. Lycopodiacidites canaliculatus Singh; 210707 (453a); 18.5 78.3; proximal view (1040X).

Figure 9. Hamulatisporis amplus Stanley; 210707 (453a); 17.0 93.5; distal view (416X).

Figures 10 & 11. Cicatricosisporites augustus Singh; 140704 (457b); 10.1 92.0; proximal and distal view (650X).

Figures 12 & 13. Cicatricosisporites hallei Delcourt and Sprumont; 120701 (446a) 18.5 78.3; proximal and distal views (650X).

Figures 14 & 15. Cicatricosisporites sp.1; 130707 (445a); 13.9 75.5; proximal and distal view (650X).

Figures 16 & 17. Radialisporis radiatus (Krutzsch) Krutzsch; 310704 (451a); 4.5 75.5; proximal and distal views. (650X).

Figure 18. Tigrisporites scurrandus Norris; 110703 (447a); 7.0 87.8; proximal view (650X).

1

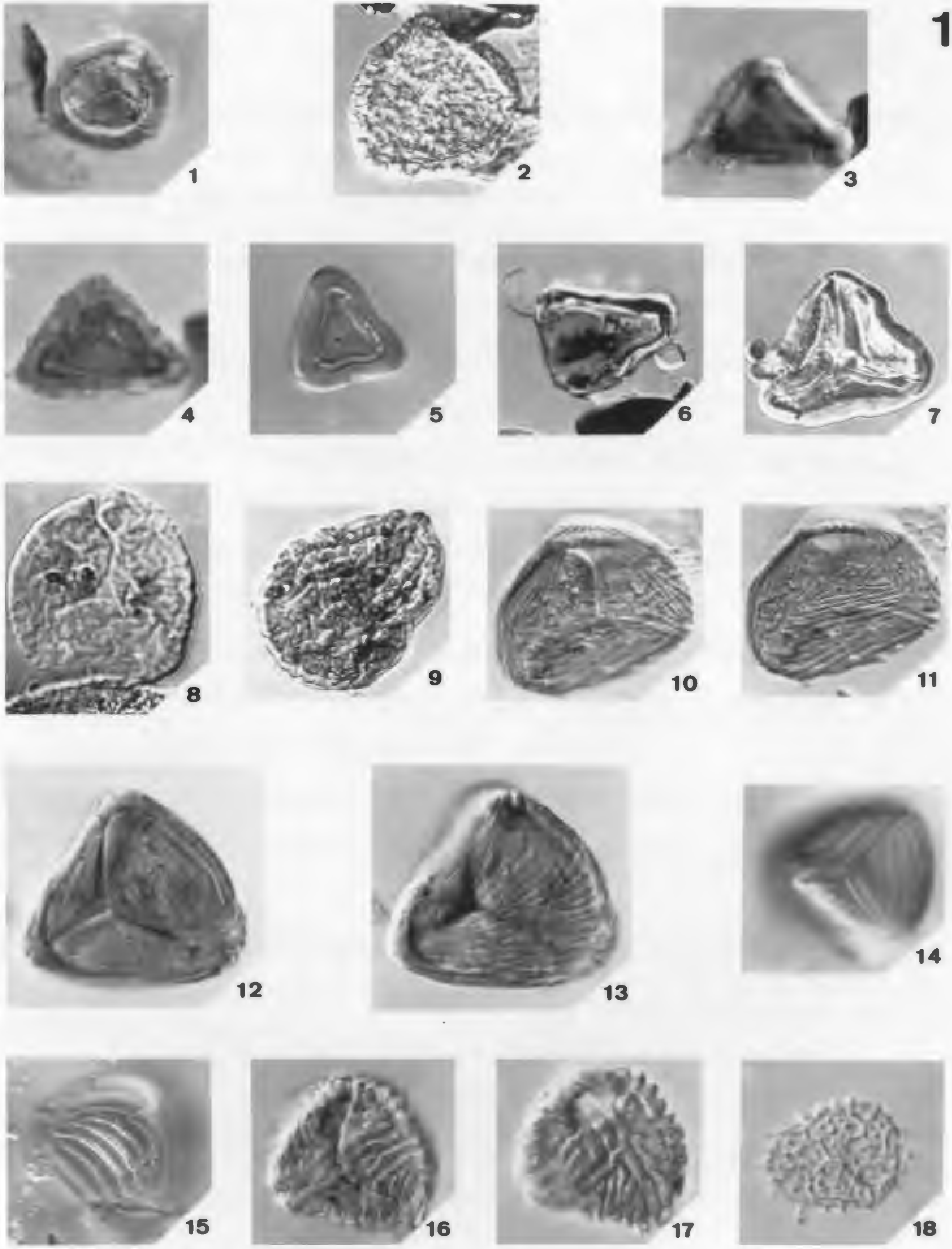


PLATE 2

Figure 1. Retitriletes austroclavatidites (Cookson) Doring et al.; 310710 (477a); 12.0 106.3; proximal view (416X).

Figure 2. Retitriletes eminulus (Dettmann); 310710 (477a); 21.0 84.8; proximal view (650X).

Figure 3. Retitriletes sp.1; 130707 (445b); 9.0 82.0; proximal view (416X).

Figures 4 & 5. Scopusporis sp.1; 210706 (456a); 10.9 83.1; proximal and distal view (650X).

Figure 6. Todisporites minor Couper; 210701 (462a); 8.9 80.9; proximal view (650X).

Figure 7. Stereisporites antiquasporites (Wilson and Webster) Dettmann; 010807 (478a); 8.3 82.4; proximal view (1300X).

Figures 8 & 9. Stereisporites regium (Drozhastchich) Drugg; 130707 (445b); 21.3 76.6; proximal and distal view (650X).

Figure 10. Cingulatisporites dakotaensis Stanley; 180703 (483a); 13.5 71.3; proximal view (650X).

Figure 11. Deltoidospora hallii Miner; 210705 (443a); 6.0 96.3; proximal view (1300X).

Figure 12. Deltoidospora diaphana Wilson and Webster; 260707 (452b) 16.0 97.7; proximal view (650X).

Figure 13. <u>Deltoidospora psilostoma</u> Rouse; 260706 (459b); 18.0 83.8; proximal view (520X).

Figure 14. <u>Cibotiumspora juncta</u> (Kara-Murza) Singh; 260706 (459a); 21.2 87.3; proximal view (1040X).

Figure 15. <u>Cyathidites australis</u> Couper; 310704 (451b); 9.0 98.8; oblique view (650X).

Figure 16. <u>Cyathidites minor</u> Couper; 120703 (461b); 15.0 89.4; proximal view (1040X).

Figure 17. <u>Neoraistrickia truncata</u> (Cookson) Potonié; 110709 (469b); 15.5 93.7; distal view (650X).

Figure 18. <u>Osmundaceae wellmanii</u> Couper; 130714 (458a); 16.5 90.5; proximal view (812X).

2

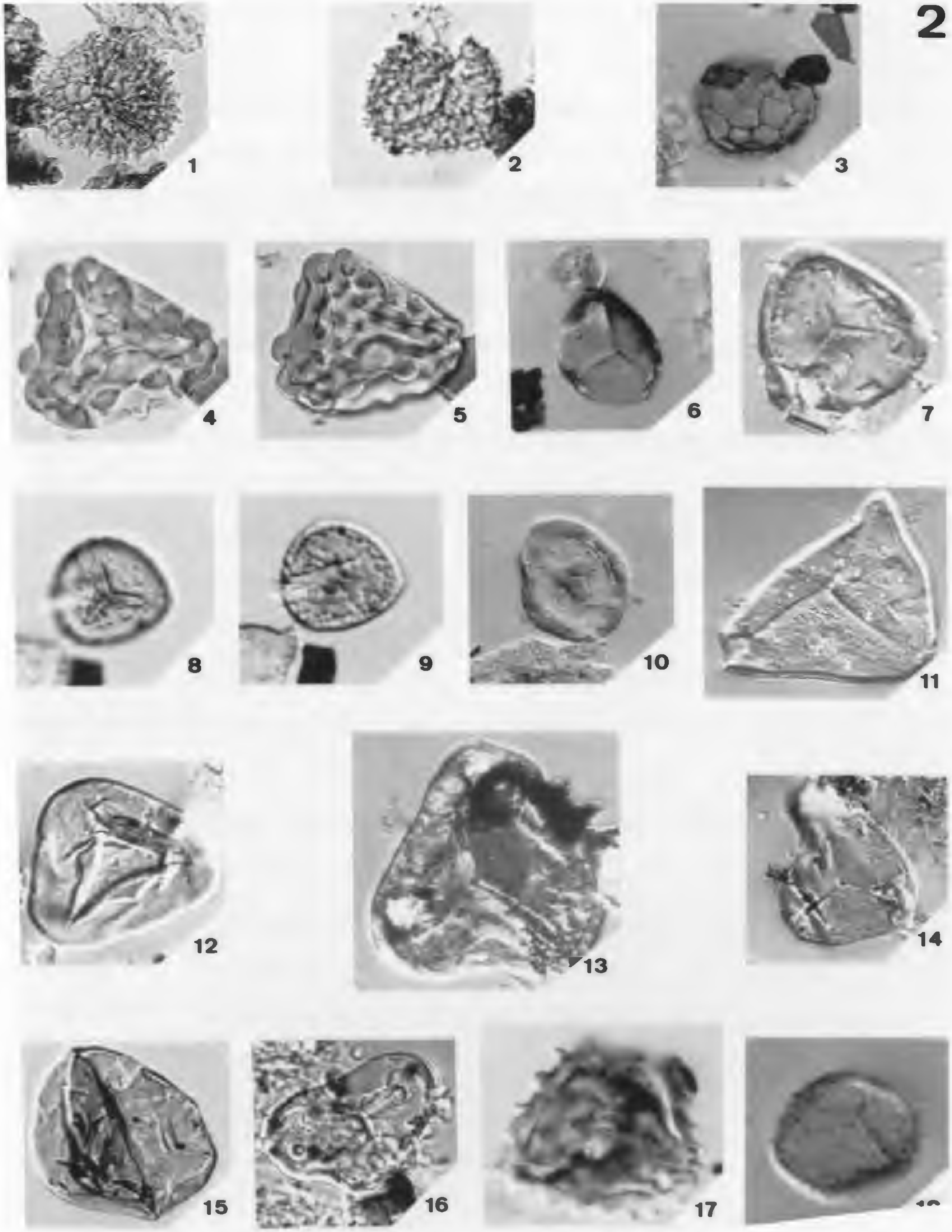


PLATE 3

Figure 1. Baculatisporites comaumensis (Cookson) Potonié; 310704 (451a); 5.9 73.0; oblique view (812X).

Figure 2. Foraminisporis wonthaggiensis (Cookson and Dettmann) Dettmann; 010812 (474a); 15.5 89.3; proximal view (650X).

Figure 3. Lophotriletes brevipapillosus (Couper) Wingate; 110703 (447a); 10.0 99.9; proximal view (1638X).

Figure 4. Echinatisporis varispinosus (Pocock) Srivastava; 110703 (447b); 6.5 93.0; oblique view (650X).

Figure 5. Ceratosporites equalis Cookson and Dettmann; 110703 (447b); 9.3 91.3; oblique view (1040X).

Figure 6. Ceratosporites morrinicolus Srivastava; 110709 (469a); 10.0 78.0; proximal view (650X).

Figure 7. Gemmatriletes sp.1; 110715 (467d); 5.0 92.5; oblique view (650X).

Figure 8. Verrucosisporites sp.1; 310704 (451a); 16.5 88.8; oblique view (650X).

Figure 9. Concavissimisporites sp.1; 310704 (451b); 4.0 103.3; proximal view (650X).

Figure 10. Laevigatosporites haardti (Potonié and Venitz) Thomson and Pflug; 120703 (461a); 6.0 104.6; equatorial view (650X).

Figure 11. Laevigatosporites haardti (Potoné and Venitz) Thomson and Pflug; 310704 (451a); 16.0 99.4; equatorial view (650X).

Figure 12. Punctatosporites scabratus (Couper) Singh; 210701 (434a); 5.8 87.2; equatorial view (650X).

Figure 13. Hazaria sheopiarii Srivastava; 110709 (469b); 15.4 90.8; oblique view (650X).

Figure 14. Unknown specimen 1.; 310704 (451b); 6.6 78.5; mid focus (1638X).

Figure 15. Podocarpidites ellipticus Cookson; 260707 (452a); 21.0 90.9; distal view (650X).

Figure 16. Podocarpidites biformis Rouse; 310704 (451a); 11.9 106.5; distal view (650X).

Figure 17. Podocarpidites minisculus Singh; 110715 (467b); 13.9 75.8; distal view (650X).

Figure 18. Podocarpidites multesimus (Bolkovitina) Pocock; 130714 (458a); 5.9 86.0; distal view (650X).

3

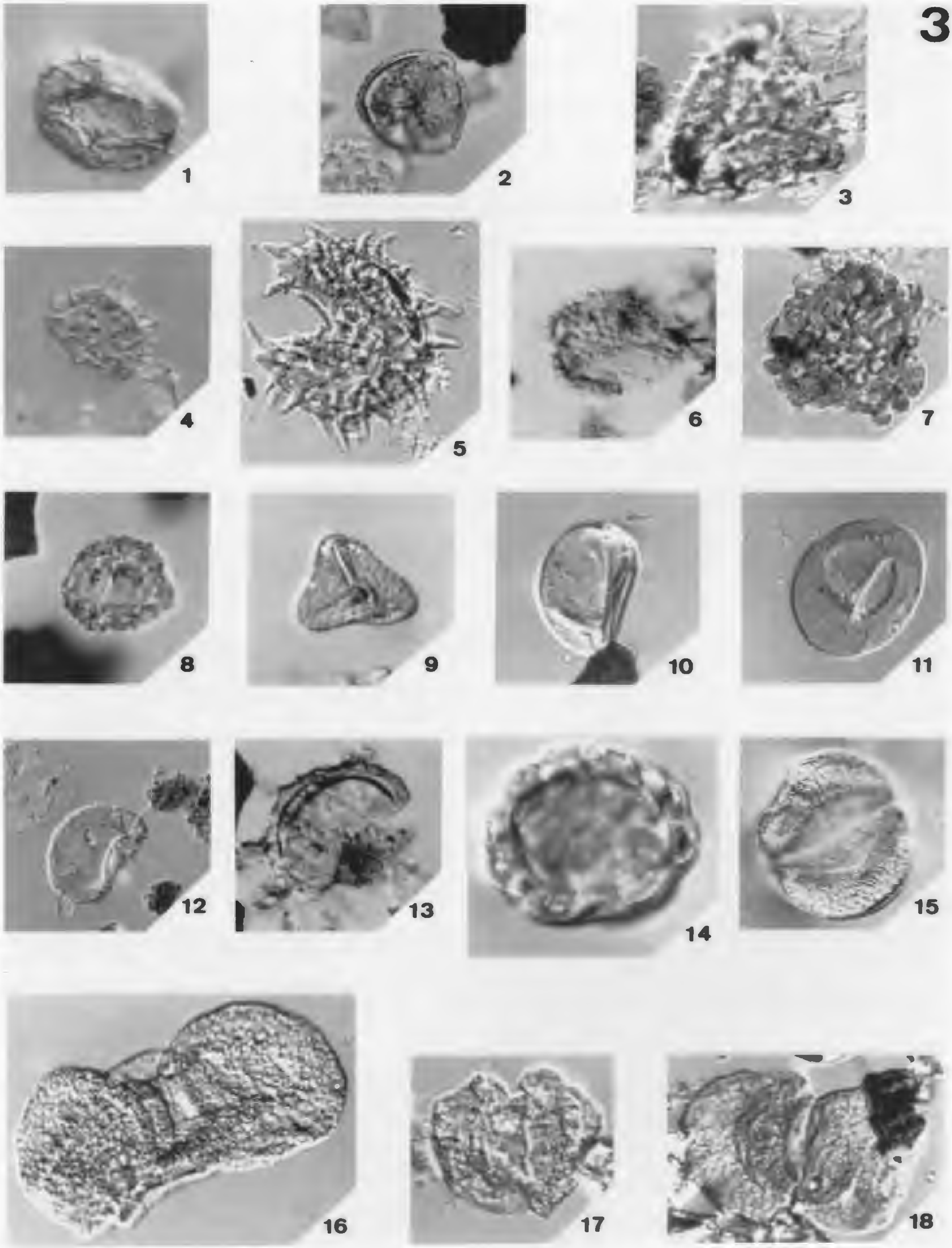


PLATE 4

Figure 1. Podocarpidites sp.1; 130707 (445b); 13.0 85.8; oblique view (650X).

Figure 2. Pityosporites alatipollenites (Rouse) Singh; 260709 (446a); 22.0 101.0; distal view (650X).

Figure 3. Pityosporites constrictus Singh; 260709 (446c); 11.0 87.6; equatorial view (416X).

Figure 4. Pityosporites elongatus (Norton and Hall) Tschudy; 310704 (451a); 16.5 98.3; oblique view (416X).

Figure 5. Pityosporites elongatus (Norton) var. grandis B.D Tschudy; 310704 (451a); 18.0 72.5; oblique view (416X).

Figure 6. Pityosporites sp.1; 130707 (442b); 15.0 77.3; oblique view (650X).

Figure 7. Pityosporites sp.2; 210701 (434a); 5.5 86.9; equatorial view (416X).

Figure 8. Alisporites bilateralis Rouse; 310704 (451b); 7.1 82.3; proximal view (650X).

Figure 9. Pristinuspollenites microsaccus (Couper) B.D Tschudy; 110703 (477b); 15.5 100.8; distal view (650X).

Figure 10. Pristinuspollenites inchoatus (Pierce) B.D. Tschudy; 220714 (450a); 11.0 93.1; distal view (650X).

Figure 11. Cedripites canadensis Pocock; 130707 (445a); 20.0 80.5; oblique view (416X).

Figure 12. Inaperturopollenites sp.1; 310710 (477a); 13.0 94.6; mid focus (1300X).

Figure 13. Inaperturopollenites sp.2; 220714 (450a); 4.0 109.0; mid focus (650X).

Figure 14. Taxodiaceaepollenites hiatus Potonié ex Potonié; 220714 (450b); oblique view (650X).

Figure 15. Taxodiaceaepollenites vacuipites (Wodehouse) Wingate; 210702 (449a); oblique view (650X).

Figure 16. Sequoiapollenites paleocenicus Stanley; 220714 (450b); 11.0 90.5; equatorial view (650X).

Figure 17. Cerebropollenites mesozoicus (Couper) Nilsson; 260709 (446b); 8.5 78.2; oblique view (650X).

4

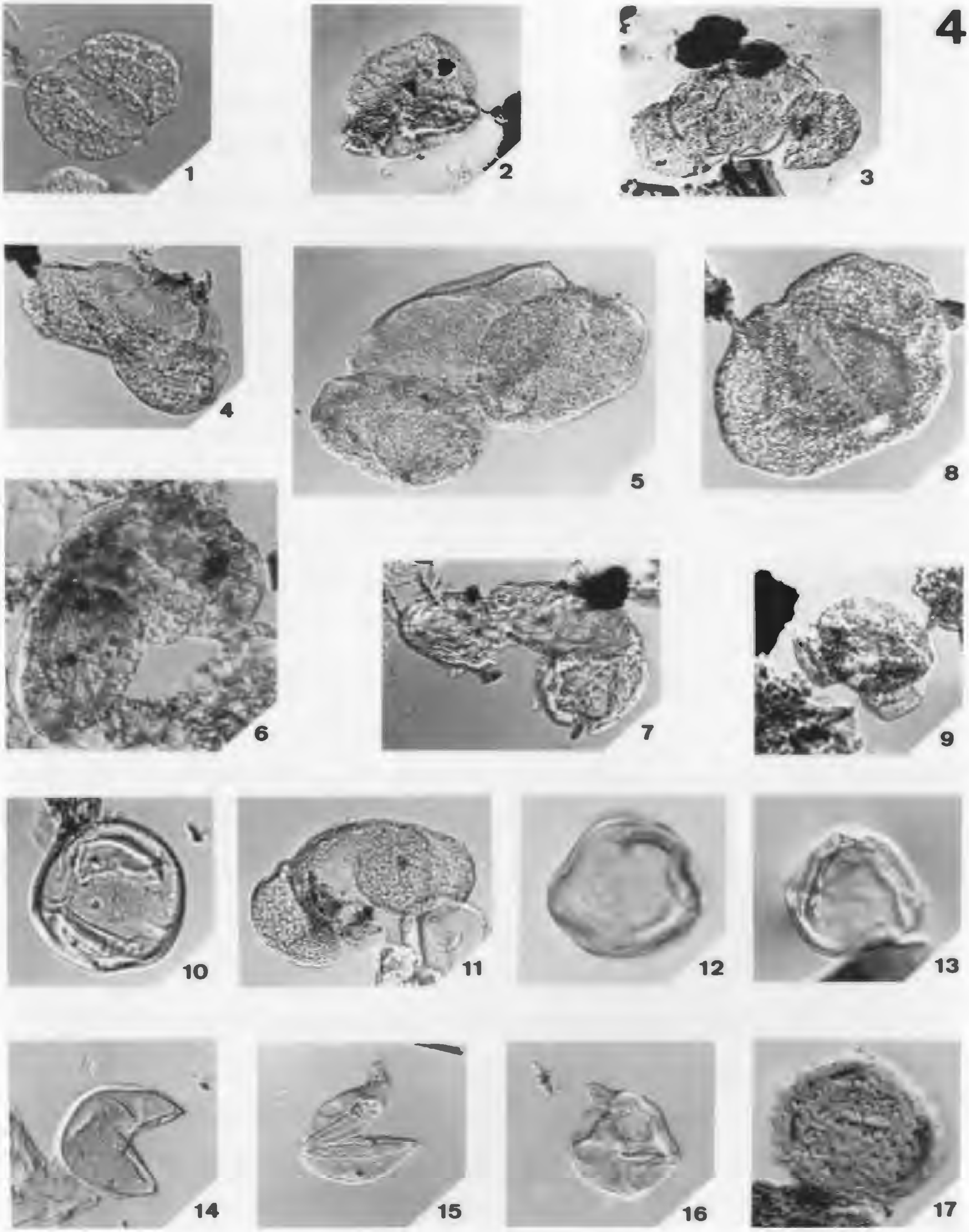


PLATE 5

Figure 1. Tricolpites hians Stanley; 010807 (478b); 8.5 94.3; equatorial view (1638X).

Figure 2. Tricolpites parvus Stanley; 260707 (452a); 19.5 97.0; polar view (1638X);

Figure 3. Tricolpites parvus Stanley; 010807 (478a); 8.5 84.3; equatorial view (1638X).

Figure 4. Tricolpites sp.1; 260707 (452b); 7.5 75.7; polar view (1638X).

Figure 5. Tricolpites sp.2; 310701 (425a); 4.5 94.6; polar view (1638X).

Figure 6. Unknown specimen 2; 310706 (470a); 18.0 100.6; polar view (1638X).

Figure 7. Kurtzipites sp.1; 120703 (461a); 16.5 107.0; polar view (1040X).

Figure 8. Classopollis classoides, Pflug emend. Pocock and Jansonius; 260707 (452b); 10.0 83.9; oblique view (650X).

Figure 9. Carpinipites ancipites (Wodehouse) Srivastava; 310706 (470a); 11.5 79.4; polar view (1040X).

Figure 10. Caryapollenites sp.1 Nichols and Ott; 310720 (429a); 20.0 96.4; polar view (650X).

Figure 11. Complexiopollis funiculus Tschudy; 260709 (446b); 7.5 91.9; polar view (1040X).

Figure 12. Intratriporopollenites sp.1; 210705 (443a); 5.0 86.6; polar view (1040X).

Figure 13. Momipites sp.1; 010801 (465a); 8.5 82.9; polar view (1300X).

Figure 14. Osculapollis perspectus R.H. Tschudy; 120703 (461b); 13.0 106.0; polar view (1040X).

Figure 15. Semioculopollis sp.1; 310706 (470a); 85.4 16.3; polar view (1300X).

5

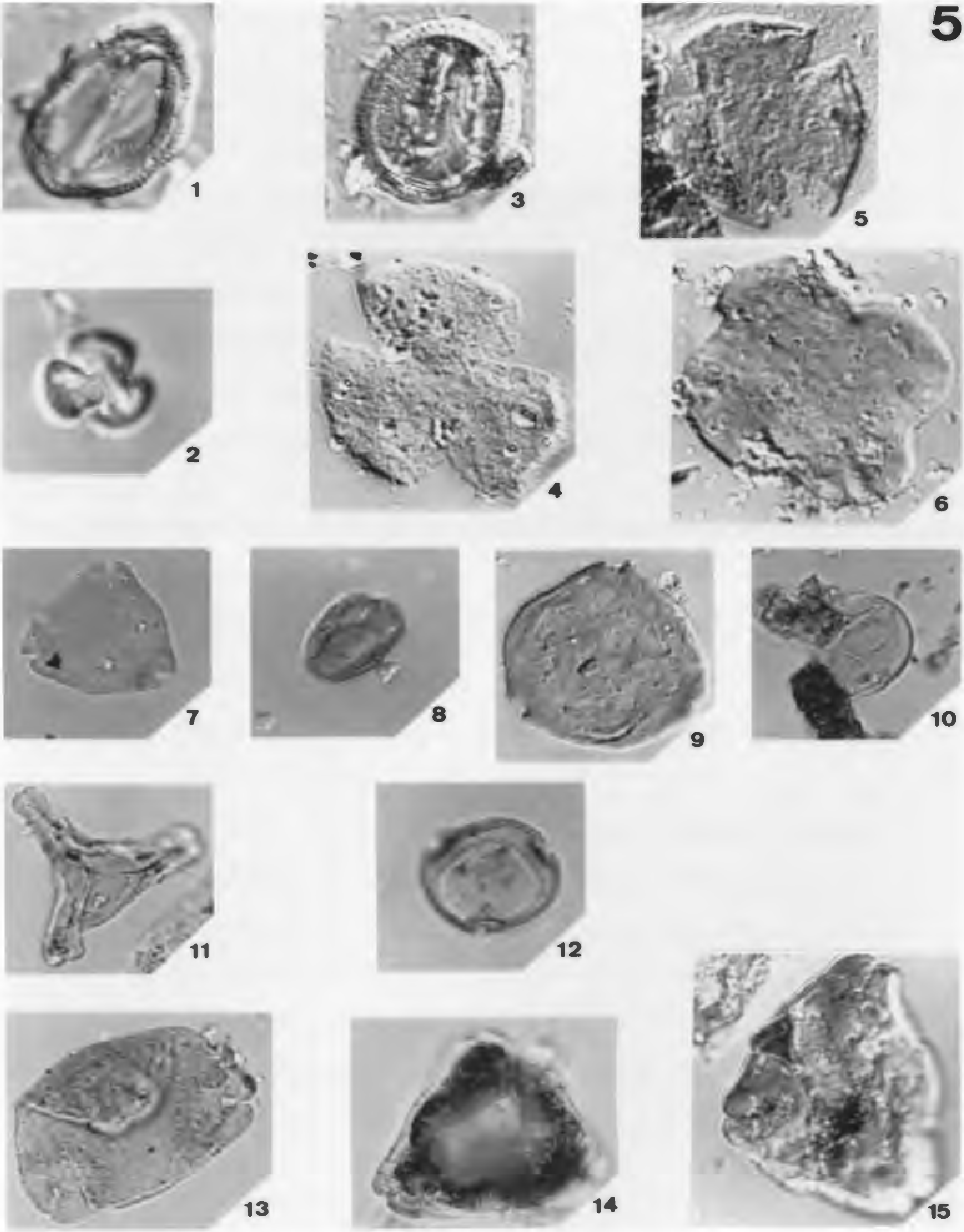


PLATE 6

Figure 1. Triatriopollenites sp.1; 010807 (478a); 7.5 98.0; polar view (2600X).

Figure 2. Trivestibulopollenites betuloides Thomson and Pflug; 220714 (450a); 11.5 100.5; polar view (1638X).

Figure 3. Trudopollis sp.1; 260707 (452a); 7.3 82.1; polar view (1040X).

Figure 4. Trudopollis sp.2; 310704 (451a); 14.0 93.4; polar view (1040X).

Figure 5. Trudopollis sp.3; 110715 (464a); 10.1 79.4; polar view (1300X).

Figure 6. Ulmipollenites sp.1; 210706 (456b); 9.0 96.7; polar view (1040X).

Figure 7. Clanculatus sp.1; 210707 (453b); 17.9 96.8; polar view (1040X).

Figure 8. Polyatripollenites stellatus (Potonié) Pflug; 310704 (451a); 8.5 99.3; polar view (1040X).

Figure 9. Polyvestibulopollenites verus (Potonié) Thomson and Pflug; 310710 (477a); 20.1 79.5; polar view (1040X).

Figure 10. Polyvestibulopollenites verus (Potonié) Thomson and Pflug; 110715 (467c); 19.0 70.5; polar view (1638X).

Figure 11. Polyvestibulopollenites trinus (Stanley) Norris; 110715 (467c); 11.0 71.6; polar view (1040X).

Figure 12. Wodehouseia sp.1; 110709 (469a); 2.0 83.6; polar view (1040X).

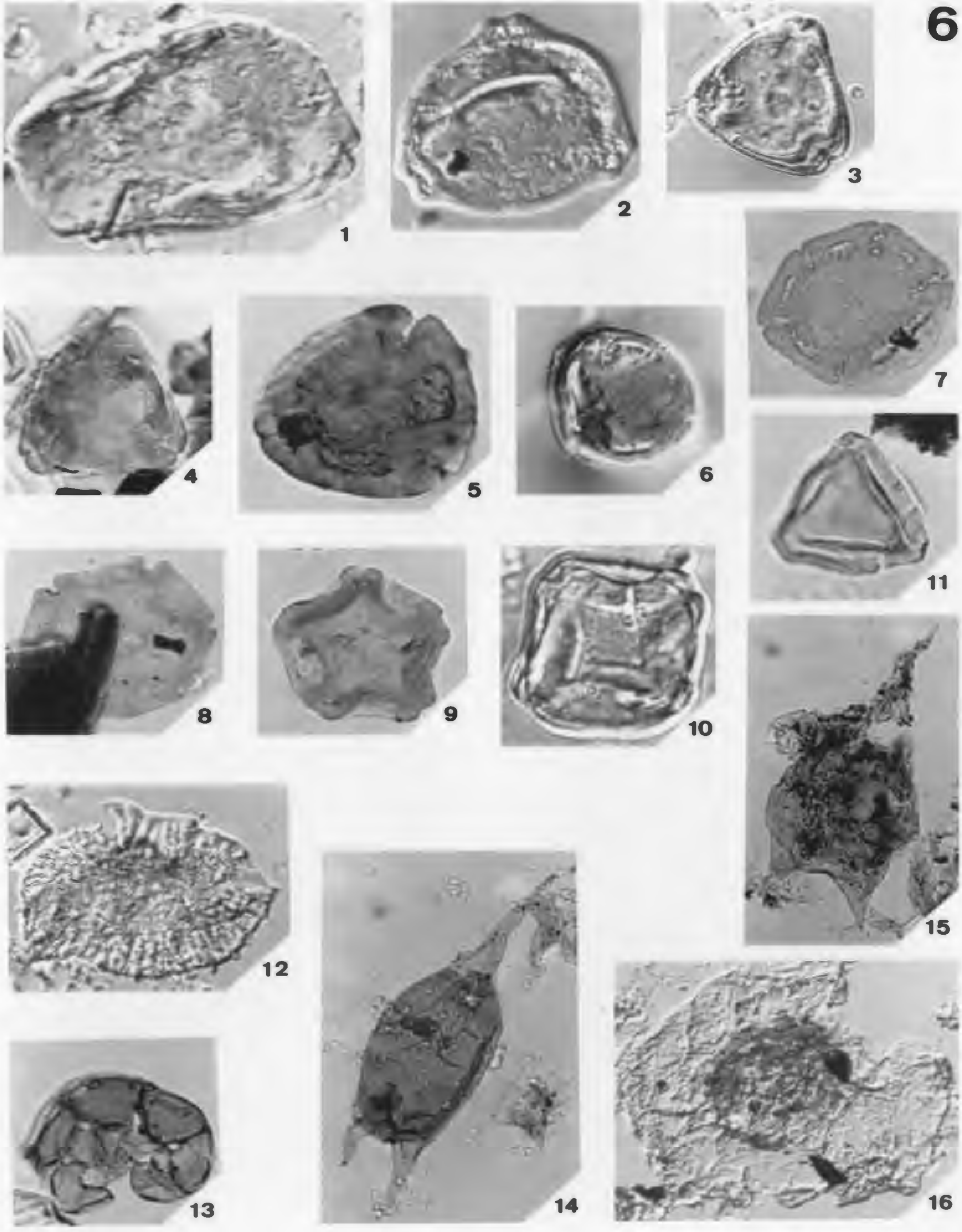
Figure 13. Pesavis parva Kalgutkar and Sweet; 010812 (474a); 17.0 98.0; mid focus (1040X).

Figure 14. Ceratiopsis diebelii (Alberti) Vozzhennikova; 210701 (462a); 2.9 91.3; equatorial view (416X).

Figure 15. Ceratiopsis speciosa (Alberti) Lentin and Williams; 140704 (457a); 8.3 104.7; equatorial view (416X).

Figure 16. Thalassiphora pelagica (Eisenack) Eisenack and Gocht; 130707 (442a); 20.0 88.9; mid focus (164X).

6



APPENDIX A_1
Sample processing data

Pollen Processing

Field Number	Processing Number	Formation	Location
110703	87447	Bylot Island	Sc
110709	87469	Bylot Island	Sc
210701	87462	Bylot Island	Sc
210702	87449	Bylot Island	Sc
210705	87443	Bylot Island	Sc
210706	87456	Bylot Island	Sc
210707	87453	Bylot Island	Sc
110715	87467	Pond Inlet a	Sc
120701	87466	Pond Inlet a	Sc
120702	87468	Pond Inlet a	Sc
120703	87461	Pond Inlet a	Sc
120704	87442	Pond Inlet a	Sc
220714	87450	Pond Inlet a	Sc
130707	87445	Pond Inlet b	Sc
130714	87458	Pond Inlet b	Sc
140704	87457	Pond Inlet b	Sc
140707	87460	Pond Inlet b	Sc
150706	87437	Pond Inlet b	Sc
160704	87448	Pond Inlet b	Sc
180703	87483	Pond Inlet b	Sc
260701	87463	Bylot Island	Tc
260703	87482	Bylot Island	Tc
260706	87459	Bylot Island	Tc
260707	87452	Pond Inlet a	Tc
260709	87446	Pond Inlet a	Tc
310701	87425	Pond Inlet a	Tc
310704	87451	Pond Inlet a	Tc
310706	87470	Pond Inlet a	Tc
310710	87477	Navy Board	Tc
310720	87429	Navy Board	Tc
010801	87465	Aktineq	Tc
010807	87478	Aktineq	Tc
010812	87474	Aktineq	Tc
040804	87481	Aktineq	Tc
040806	87438	Aktineq	Tc
040808	87476	Aktineq	Tc
040809	87471	Aktineq	Tc

Pond Inlet a - red arkosic sandstone lithotype; Pond Inlet b - white quartz sandstone lithotype; Sc - south coast; Tc - Twosnout Creek.

APPENDIX D_1

Petrology Point Count Data
(Percentages rounded)

POND INLET FORMATION
(white quartz sandstone lithotype)

Sample	Qz	Ks	Pl	Gr	Mt	Ss	Bi	Cl	Gl	Am	Op	Other
130708	84	-	4	7	-	-	T	T	T	-	T	-
130710	78	3	7	4	-	-	2	-	3	-	3	Zr
140708	91	2	2	4	1	-	-	-	T	0	-	-
140709	87	3	2	7	-	-	1	-	-	-	-	-
140710	91	2	T	6	-	-	1	-	-	-	T	Ga
150703	94	T	2	3	T	-	-	-	-	-	-	-
160705	87	1	5	1	-	-	4	-	1	T	1	Ga Zr
230701	86	-	11	1	-	-	1	-	T	-	-	-
230702	85	1	3	4	2	-	2	-	3	-	T	-
230703	84	2	4	7	-	T	1	-	2	T	T	-
230709	84	1	4	7	1	-	T	1	1	-	1	Ga
230711	91	-	5	4	-	-	T	-	-	-	-	-
260705	92	1	5	1	-	-	-	-	1	-	-	-
260707	90	3	5	T	-	1	-	-	1	-	T	-
270701	92	5	2	T	-	-	-	-	T	-	-	-
270705	85	3	4	7	T	-	-	-	T	-	1	Ga
270706	92	T	2	3	-	-	1	-	1	-	1	-
280708	96	-	2	2	-	-	-	-	T	-	-	-

Qz = Quartz, Ks = K-feldspar, Pl = Plagioclase, Gr = Granitic rock fragments, Mt = Metamorphic rock fragments, Ss = Sandstone fragments, Bi = Biotite, Cl = Chlorite, Gl = Glauconite, Am = Amphibole, Op = Opaque grains, Zr = Zircon, Ga = Garnet, Px = Pyroxene, T = Trace. "Other" minerals comprise less than 1% of grains.

APPENDIX D_2

Petrology Point Count Data
(Percentages rounded)

POND INLET FORMATION (Red arkosic sandstone lithotype)

Sample	Qz	Ks	Pl	Gr	Mt	Ss	Bi	Cl	Gl	Am	Op	Other
220702	24	17	12	31	11	-	1	2	-	-	2	Ga
220707	37	3	31	15	4	-	5	2	-	1	2	Zr Px
220710	35	28	8	20	8	-	1	-	-	-	-	-
230704	35	20	9	19	7	3	1	4	-	1	1	-
230705	50	5	27	10	5	-	2	1	-	T	T	Ga
230707	36	16	27	3	T	-	2	1	-	T	2	-
230708	27	30	23	10	5	T	3	1	-	-	1	-
230710	52	6	13	12	7	-	6	1	2	-	2	Ga Zr
230712	19	29	26	11	8	-	3	T	-	3	1	Ga
240702	27	33	20	5	2	-	6	4	-	-	3	Px
240703	36	10	25	15	7	-	5	T	1	-	1	-

AKTINEQ FORMATION

Sample	Qz	Ks	Pl	Gr	Mt	Ss	Bi	Cl	Gl	Am	Op	Other
310721	20	14	21	11	20	-	8	3	-	T	3	Ga Px
010806	18	21	27	5	24	-	2	-	-	T	1	Ga
010811	15	26	30	10	12	-	3	1	-	T	1	-
040810	29	35	20	3	7	-	1	2	-	2	T	Ga Zr

Qz = Quartz, Ks = K-feldspar, Pl = Plagioclase, Gr = Granitic rock fragments, Mt = Metamorphic rock fragments, Ss = Sandstone fragments, Bi = Biotite, Cl = Chlorite, Gl = Glauconite, Am = Amphibole, Op = Opaque grains, Zr = Zircon, Ga = Garnet, Px = Pyroxene. "Other" minerals comprise less than 1% of grains.

APPENDIX E_1 Grain Size Analysis Summary

Pond Inlet Formation (White quartz sandstone lithotype)

Sample	Percent Fines	Mean Grain Size	Sorting
130708	0.9%	1.48ø	0.71
130710	6.6%	2.16ø	0.91
140708	1.2%	1.58ø	0.73
140709	0.5%	1.45ø	0.79
140710	0.9%	1.39ø	0.68
150703	0.9%	1.41ø	0.75
160702	0.5%	1.29ø	0.83
160705	3.5%	2.52ø	0.52
230701	5.3%	2.22ø	0.81
230703	2.9%	1.77ø	0.80
230709	1.6%	1.66ø	0.77
230711	3.2%	1.80ø	0.75
260705	1.7%	2.14ø	0.57
260707	3.5%	2.49ø	0.49
270712	0.9%	1.74ø	0.69
270701	7.4%	2.16ø	0.67
270706	1.3%	2.03ø	0.67
290701	1.6%	2.15ø	0.75
310706	0.8%	1.80ø	0.56
Average	**2.4%**	**1.85ø**	**0.71**

Pond Inlet Formation (Red arkosic sandstone lithotype).

Sample	Percent Fines	Mean Grain Size	Sorting
220704	1.2%	1.33ø	0.92
230702	6.7%	1.85ø	0.75
230708	3.9%	1.91ø	0.82
230710	5.0%	1.87ø	0.80
240702	7.9%	2.60ø	0.61
240703	2.5%	1.56ø	0.99
Average	**4.5%**	**1.85ø**	**0.82**

Pond Inlet Formation (Red arkosic sandstone lithotype).

Sample	Percent Fines	Mean Grain Size	Sorting
310721	10.3%	2.44ø	0.73
010806	8.4%	1.79ø	0.80
010811	10.2%	2.37ø	0.68
Average	**9.6%**	**2.20ø**	**0.74**

APPENDIX E_2 Grain Size Analysis

SAMPLE 130710

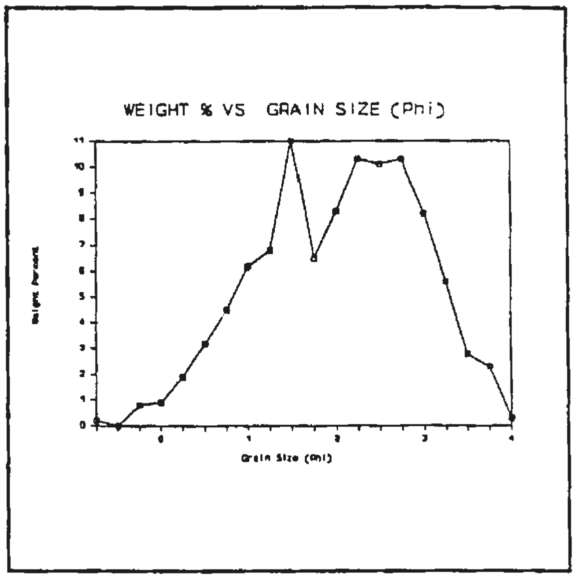
Formation: Pond Inlet

Section: 3 south coast

Location: 35.5m

Desc.: white quartz sandstone
(subarkose)

Sample weight : 5.62g
Weight of fines: 0.27g
Percent fines : 6.6%
Mean grain size: 2.16ø
Sample sorting : 0.91



SAMPLE 140708

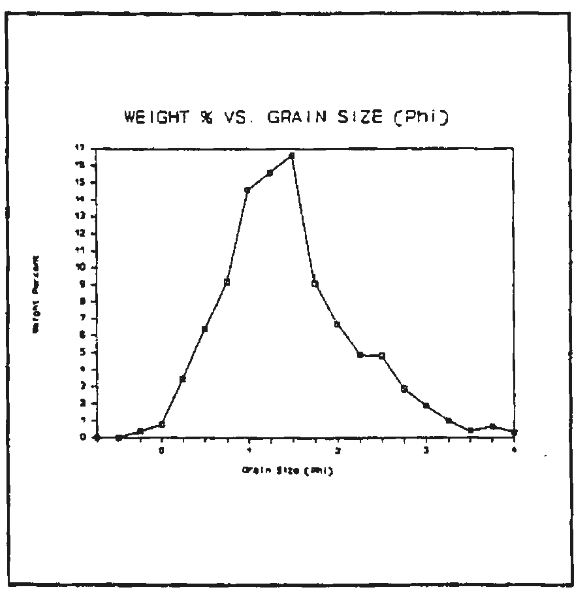
Formation: Pond Inlet

Section: 6 south coast

Location: 0m

Desc: white quartz sandstone
(quartzarenite)

Sample weight : 7.48g
Weight of fines: 0.09g
Percent fines : 1.2%
Mean grain size: 1.58ø
Sample sorting : 0.73



APPENDIX E_3 Grain Size Analysis

SAMPLE 140709

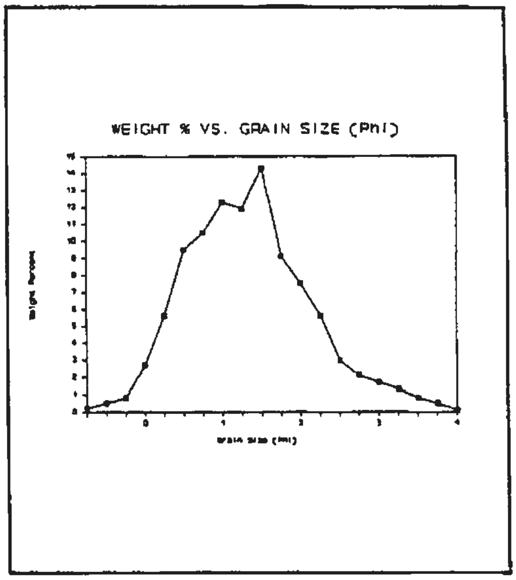
Formation: Pond Inlet

Section: 6 south coast

Location: 78m

Desc.: white quartz sandstone (subarkose)

Sample weight : 5.54g
Weight of fines: 0.03g
Percent fines : 0.5%
Mean grain size: 1.45ø
Sample sorting : 0.79



SAMPLE 140710

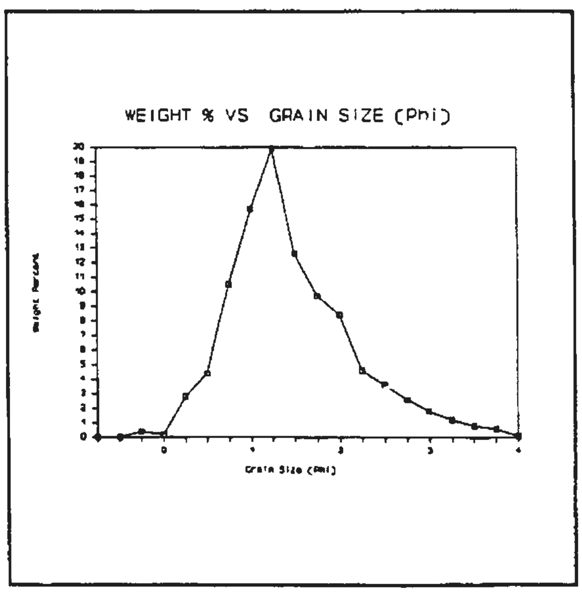
Formation: Pond Inlet

Section: 6 south coast

Location: 98m

Desc: white quartz sandstone (quartzarenite)

Sample weight : 6.42g
Weight of fines: 0.06g
Percent fines : 0.89%
Mean grain size: 1.39ø
Sample sorting : 0.68



APPENDIX E_4 Grain Size Analysis

SAMPLE 150703

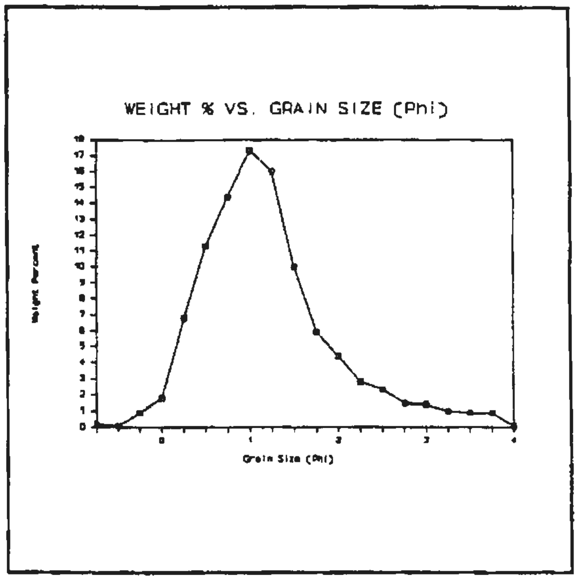
Formation: Pond Inlet

Section: 7 south coast

Location: 50m

Desc.: white quartz sandstone (quartzarenite)

Sample weight : 5.62g
Weight of fines: 0.05g
Percent fines : 0.9%
Mean grain size: 1.41ø
Sample sorting : 0.75



SAMPLE 160702

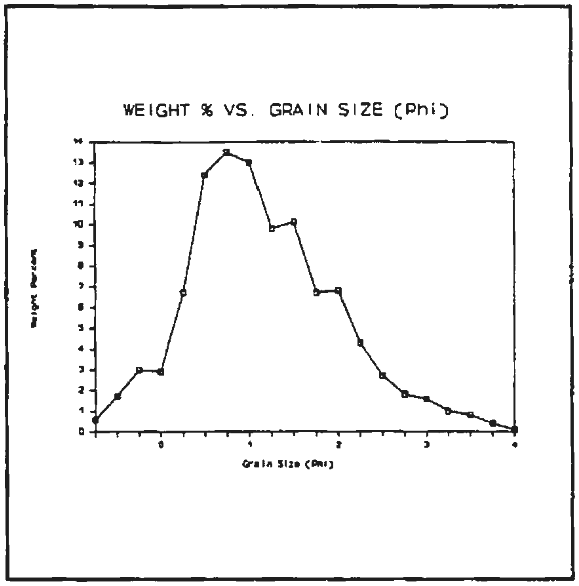
Formation: Pond Inlet

Section: 9 south coast

Location: 25m

Desc: white quartz sandstone

Sample weight : 5.56g
Weight of fines: 0.03g
Percent fines : 0.5%
Mean grain size: 1.29ø
Sample sorting : 0.83



APPENDIX E_5 Grain Size Analysis

SAMPLE 160705

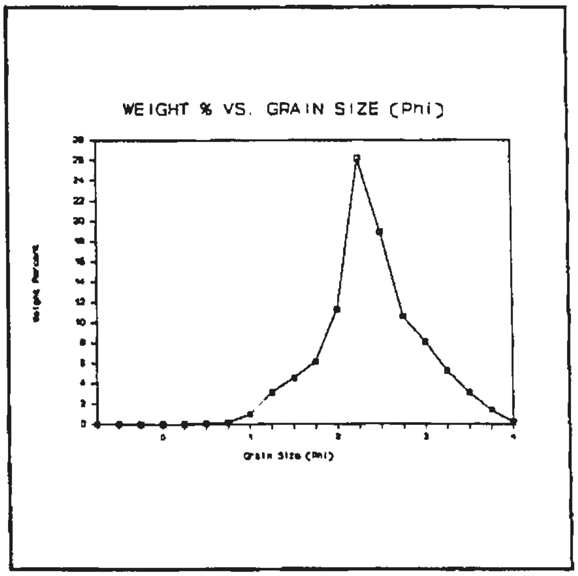
Formation: Pond Inlet

Section: 9 south coast

Location: 6m

Desc.: white quartz sandstone (subarkose)

Sample weight : 5.8g
Weight of fines: 0.2g
Percent fines : 3.5%
Mean grain size: 2.52ø
Sample sorting : 0.52



SAMPLE 230701

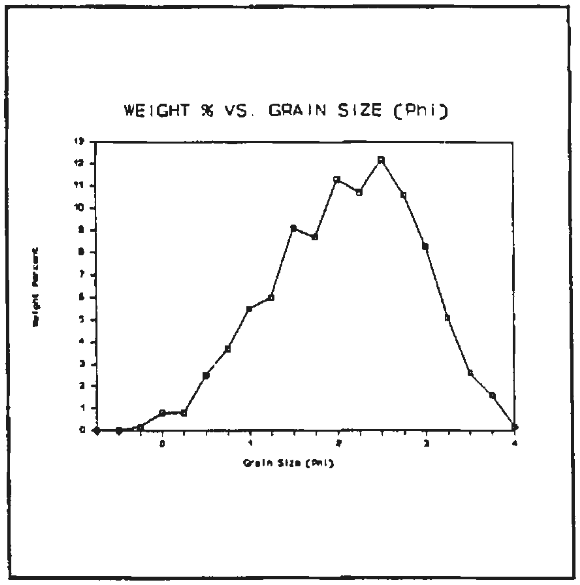
Formation: Pond Inlet

Section: 3 south coast

Location: 15m

Desc: white quartz sandstone (subarkose)

Sample weight : 8.67g
Weight of fines: 0.46g
Percent fines : 5.3%
Mean grain size: 2.22ø
Sample sorting : 0.81



APPENDIX E_6 Grain Size Analysis

SAMPLE 230703

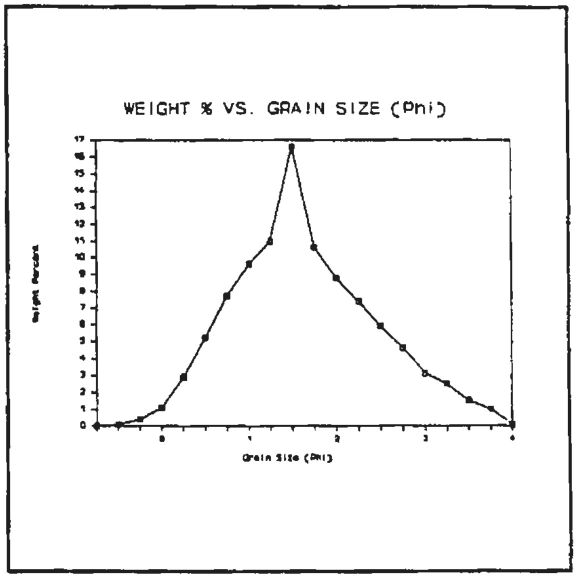
Formation: Pond Inlet

Section: 3 south coast

Location: 30m

Desc.: white quartz sandstone (subarkose)

Sample weight : 7.09g
Weight of fines: 0.21g
Percent fines : 2.9%
Mean grain size: 1.77ø
Sample sorting : 0.80



SAMPLE 230709

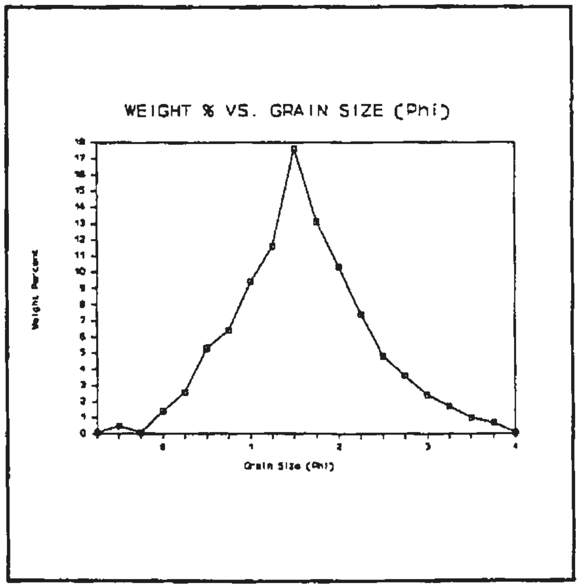
Formation: Pond Inlet

Section: 4 south coast

Location: 8m

Desc: white quartz sandstone (sublitharenite)

Sample weight : 6.08g
Weight of fines: 0.10g
Percent fines : 1.6%
Mean grain size: 1.66ø
Sample sorting : 0.77



APPENDIX E_7 Grain Size Analysis

SAMPLE 230711

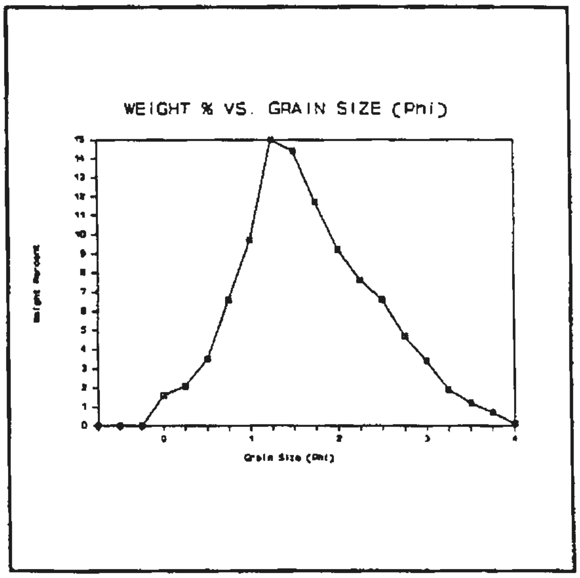
Formation: Pond Inlet

Section: 4 south coast

Location: 13.5m

Desc.: white quartz sandstone
(quartzarenite)

Sample weight : 7.54
Weight of fines: 0.24g
Percent fines : 3.2%
Mean grain size: 1.80ø
Sample sorting : 0.75



SAMPLE 260705

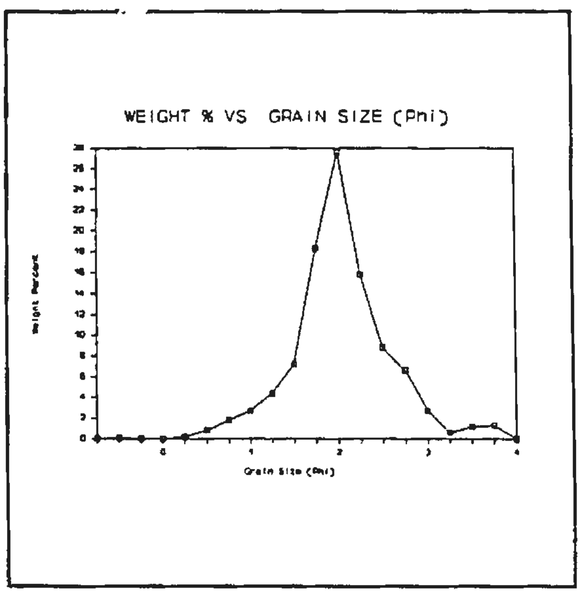
Formation: Pond Inlet

Section: 1 Twosnout Creek

Location: 31.5m

Desc: white quartz sandstone

Sample weight : 7.70
Weight of fines: 0.13g
Percent fines : 1.7%
Mean grain size: 2.14ø
Sample sorting : 0.57



APPENDIX E_8 Grain Size Analysis

SAMPLE 260707

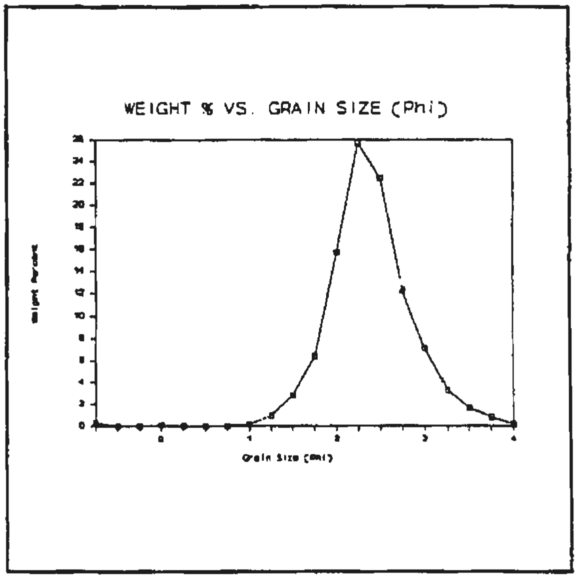
Formation: Pond Inlet

Section: 1 Twosnout Creek

Location: 34.5m

Desc.: white quartz sandstone

Sample weight : 7.49
Weight of fines: 0.26g
Percent fines : 3.5%
Mean grain size: 2.49ø
Sample sorting : 0.49



SAMPLE 270712

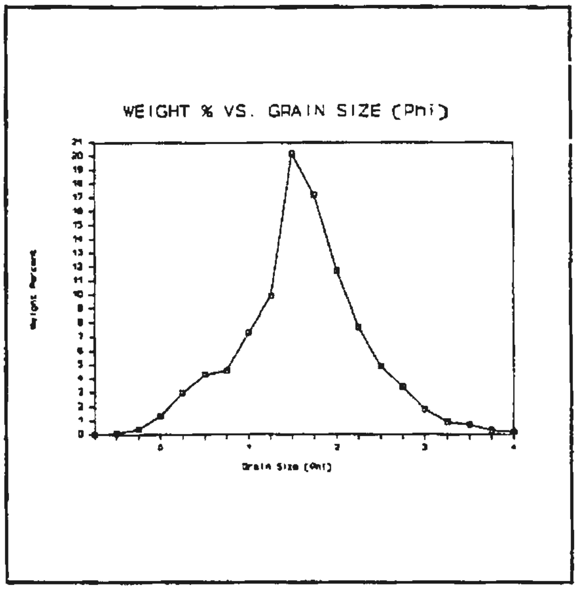
Formation: Pond Inlet

Section: 2 Twosnout Creek

Location: 42m

Desc: white quartz sandstone

Sample weight : 7.01g
Weight of fines: 0.06g
Percent fines : 0.9g
Mean grain size: 1.74ø
Sample sorting : 0.69



APPENDIX E_9 Grain Size Analysis

SAMPLE 270701

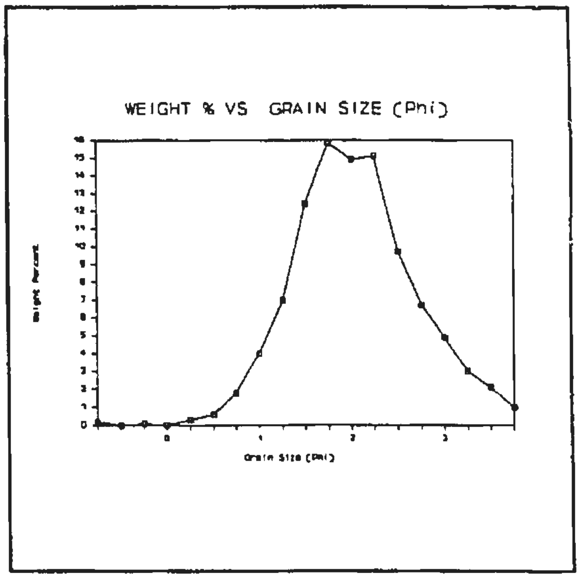
Formation: Pond Inlet

Section: 2 Twosnout Creek

Location: 0m

Desc.: white quartz sandstone (quartzarenite)

Sample weight : 7.43
Weight of fines: 0.55g
Percent fines : 7.4%
Mean grain size: 2.16ø
Sample sorting : 0.67



SAMPLE 270706

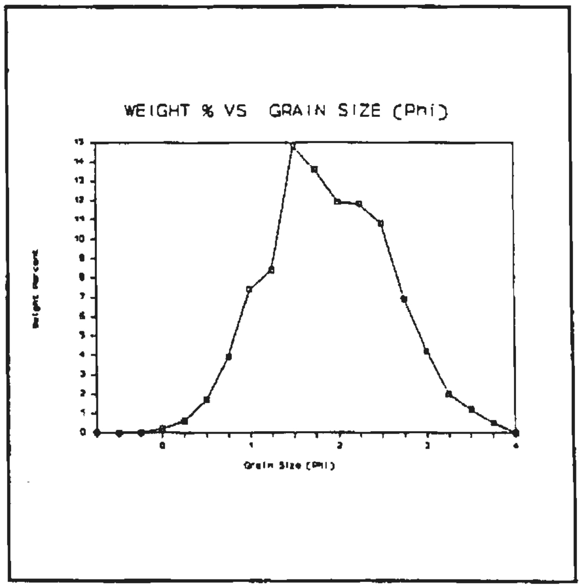
Formation: Pond Inlet

Section: 2 Twosnout Creek

Location: 207m

Desc.: white quartz sandstone (subarkose)

Sample weight : 8.44g
Weight of fines: 0.11g
Percent fines : 1.3%
Mean grain size: 2.03ø
Sample sorting : 0.67



APPENDIX E_{10} Grain Size Analysis

SAMPLE 290701

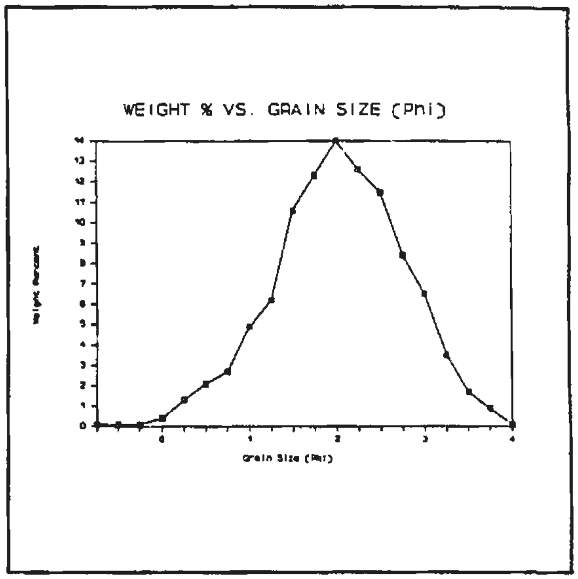
Formation: Pond Inlet

Section: 4 Twosnout Creek

Location: 0m

Desc.: white quartz sandstone

Sample weight : 6.92g
Weight of fines: 0.11g
Percent fines : 1.6%
Mean grain size: 2.15ø
Sample sorting : 0.75



SAMPLE 310706

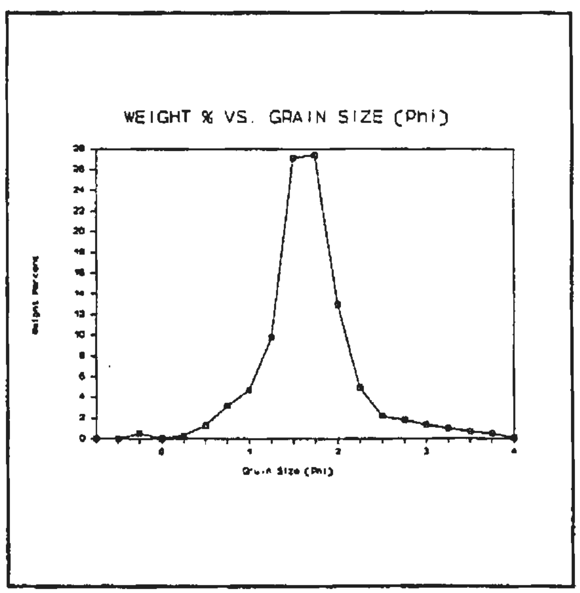
Formation: Pond Inlet

Section: 6 Twosnout Creek

Location: 114.5m

Desc.: white quartz sandstone (subarkose)

Sample weight : 5.93g
Weight of fines: 0.05g
Percent fines : 0.8%
Mean grain size: 1.80ø
Sample sorting : 0.56



APPENDIX E_{11} Grain Size Analysis

SAMPLE 130708

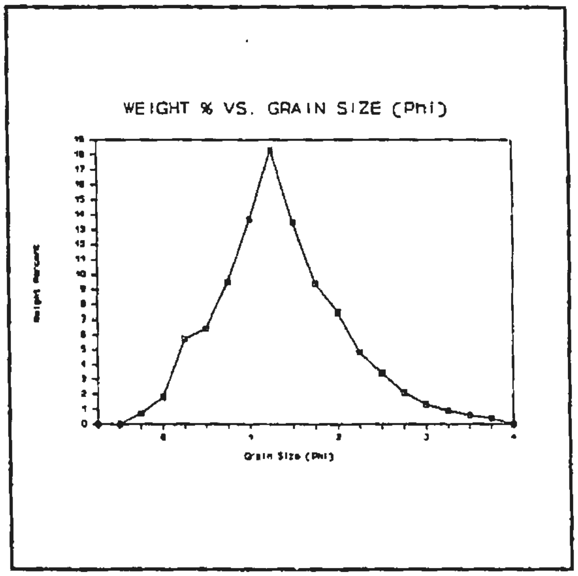
Formation: Pond Inlet

Section: 3 south coast

Location: 18.5m

Desc.: red arkosic sandstone
(lithic arkose)

Sample weight : 6.89g
Weight of fines: 0.06g
Percent fines : 0.9%
Mean grain size: 1.48ø
Sample sorting : 0.71



SAMPLE 220704

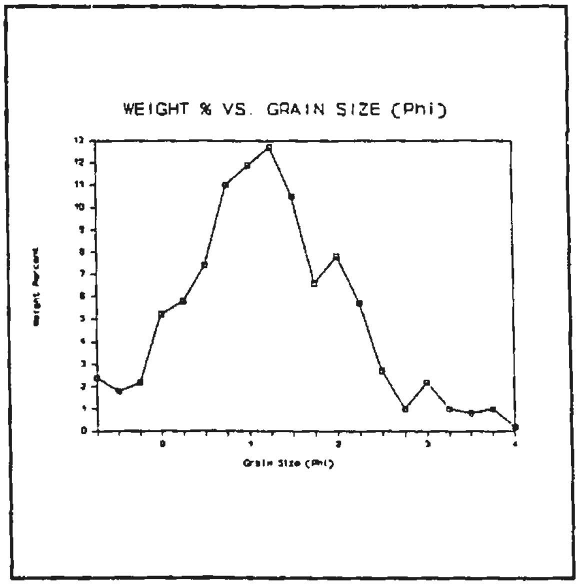
Formation: Pond Inlet

Section: 1 south coast

Location: 205m

Desc.: red arkosic sandstone

Sample weight : 6.90
Weight of fines: 0.08g
Percent fines : 1.2%
Mean grain size: 1.33ø
Sample sorting : 0.92



APPENDIX E_{12} Grain Size Analysis

SAMPLE 230702

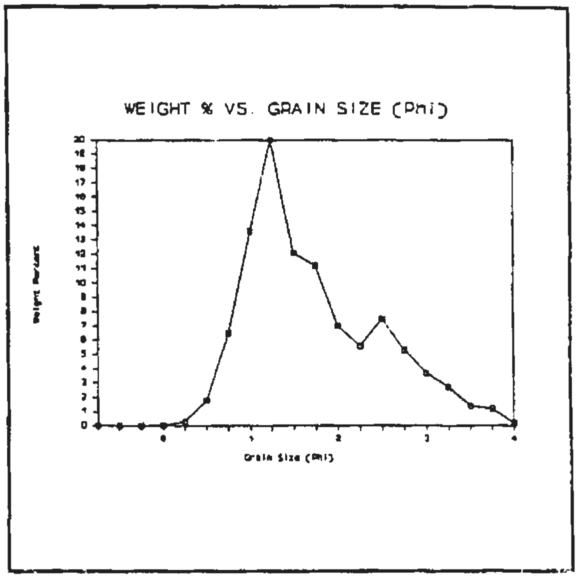
Formation: Pond Inlet

Section: 3 south coast

Location: 24m

Desc.: red arkosic sandstone

Sample weight : 5.50
Weight of fines: 0.37g
Percent fines : 6.7%
Mean grain size: 1.85ø
Sample sorting : 0.75



SAMPLE 230708

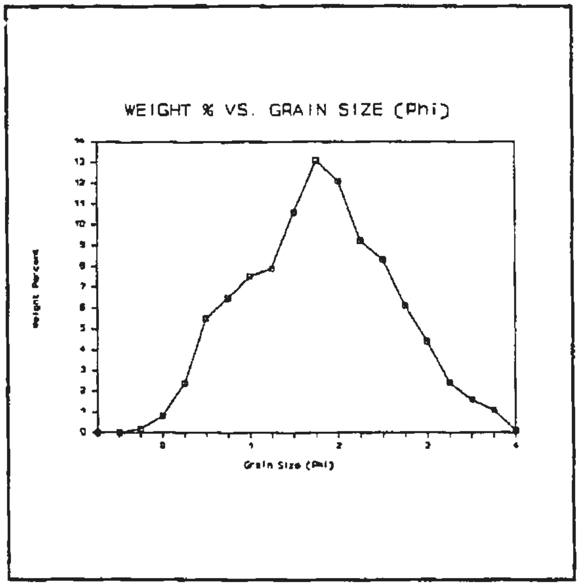
Formation: Pond Inlet

Section: 4 south coast

Location: 11m

Desc.: red arkosic sandstone
(lithic arkose)

Sample weight : 6.88g
Weight of fines: 0.27g
Percent fines : 3.9%
Mean grain size: 1.91ø
Sample sorting : 0.82



APPENDIX E_{13} Grain Size Analysis

SAMPLE 230710

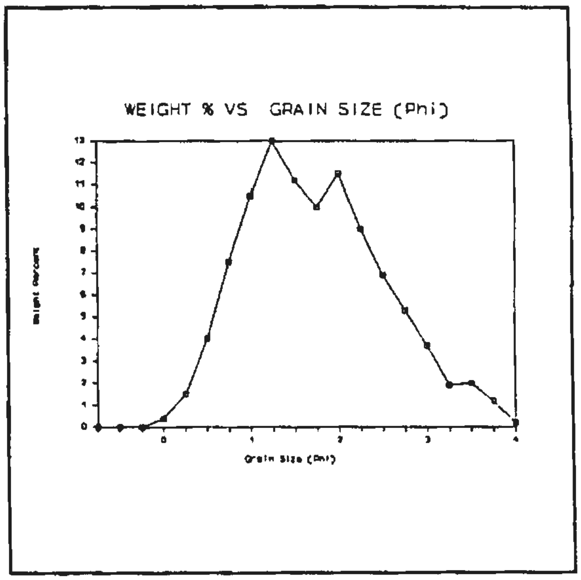
Formation: Pond Inlet

Section: 4 south coast

Location: 5m

Desc.: red arkosic sandstone
(lithic arkose)

Sample weight : 5.83g
Weight of fines: 0.29g
Percent fines : 5.0%
Mean grain size: 1.87ø
Sample sorting : 0.80



SAMPLE 240702

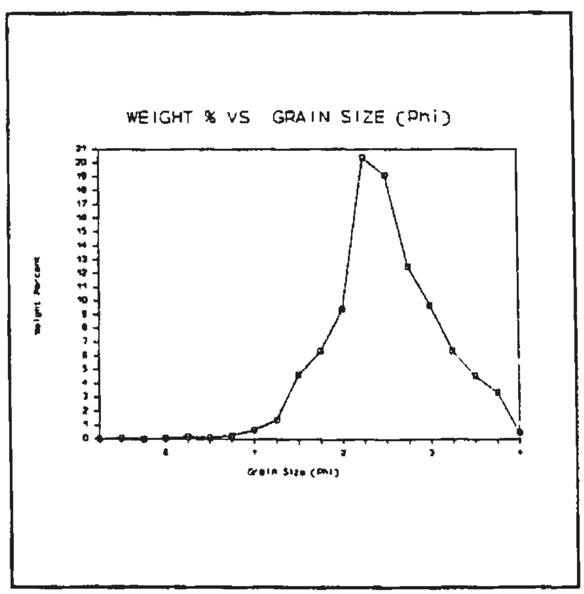
Formation: Pond Inlet

Section: 18 scuth coast

Location: 0m

Desc.: red arkosic sandstone
(arkose)

Sample weight : 5.59g
Weight of fines: 0.44g
Percent fines : 7.9%
Mean grain size: 2.60ø
Sample sorting : 0.61



APPENDIX E_{14} Grain Size Analysis

SAMPLE 240703

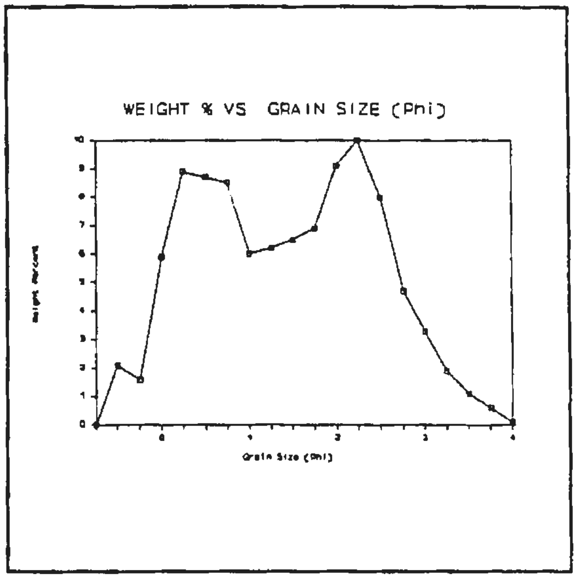
Formation: Pond Inlet

Section: 18 south coast

Location: 13.5m

Desc.: red arkosic sandstone
(lithic arkose)

Sample weight : 7.48g
Weight of fines: 0.19g
Percent fines : 2.5%
Mean grain size: 1.56ø
Sample sorting : 0.99



SAMPLE 310721

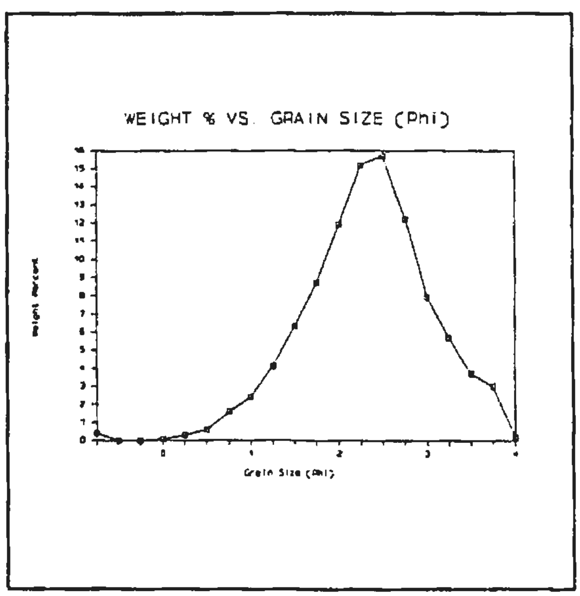
Formation: Aktineq

Section: 6 Twosnout Creek

Location: 371m

Desc.: red arkosic sandstone
(arkose)

Sample weight : 5.17g
Weight of fines: 0.53g
Percent fines : 10.3%
Mean grain size: 2.44ø
Sample sorting : 0.73



APPENDIX E_{15} Grain Size Analysis

SAMPLE 010806

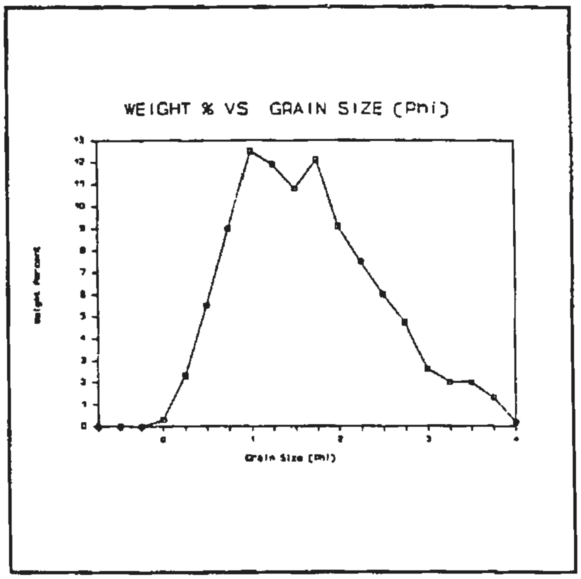
Formation: Aktineq

Section: 19 Central Area

Location: 72m

Desc.: red arkosic sandstone (lithic arkose)

Sample weight : 5.84g
Weight of fines: 0.49g
Percent fines : 8.4%
Mean grain size: 1.79ø
Sample sorting : 0.80



SAMPLE 010811

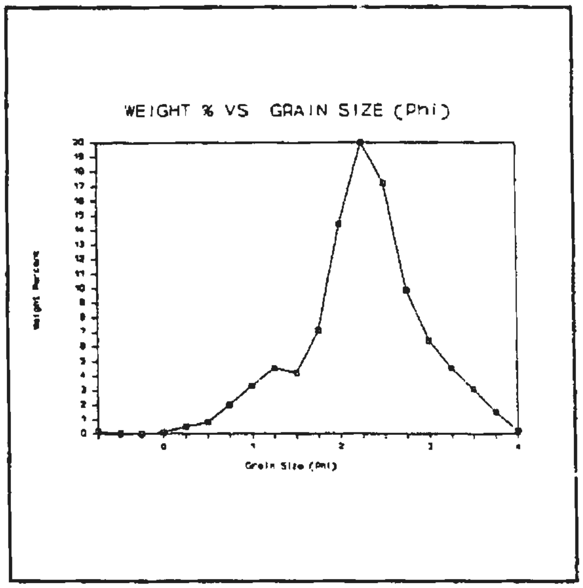
Formation: Aktineq

Section: 19 Central Area

Location: 172m

Desc: red arkosic sandstone (arkose)

Sample weight : 6.19
Weight of fines: 0.63g
Percent fines : 10.2%
Mean grain size: 2.37ø
Sample sorting : 0.68



APPENDIX G_1
Section Descriptions

<u>Section SC3</u>

Location: latitude 72°54'N longitude 78°19'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
200-280m south coast

0.0 - 5.0m Stacked sandstone beds; beds decimetre scale; basal contact sharp and erosional; sandstones light grey, medium to coarse, well rounded and sorted; organic fragments present, most abundant at the top of the sequence; sandstones iron stained around organic fragments; shell fragments uncommon. Sample: 130707 (0m sandstone).

5.0 - 10.0m Stacked upward fining pebbly sandstones to sandy siltstone beds; beds decimetre scale, having sharp and erosional bases with coarse pebbly sand lag; sands fine upward to unit top; beds capped by centimetre scale iron stained black siltstones; sands reddish grey, coarse to fine, poorly sorted and rounded; shell fragments rare.

10.0 - 14.0m Thick upward fining massive sandstone bed; base sharp and erosional, covered by pebbly sandstone; sandstones light grey, well sorted and rounded, and fine upward to unit top; bed capped by centimetre scale iron stained black siltstone; shell fragments rare.

14.0 - 19.5m Thick upward fining massive sandstone bed; base is sharp and erosional; unit capped by 1 metre thick iron stained fine sandstone; sandstones light grey, medium grained, well sorted and rounded. Sample: 130708 (18.5m sandstone).

19.5 - 23.0m Stacked sequence of upward fining pebbly sandstones to muddy siltstones with abundant shell fragments; beds decimetre scale with sharp and erosional bases; pebble lag common; beds fine upward through reddish grey sandstones to heavily iron stained black muddy siltstone; soft sediment deformation and scouring common. Sample: 130709 (19.5m black muddy siltstone).

23.0 - 27.5m Stacked upward fining and massive sandstone beds; beds decimetre scale, bases sharp; beds commonly separated by centimetre scale black sandy siltstones; sandstones light grey, medium grained, well sorted and rounded.

27.8 - 52.5m Stacked massive sandstone beds; beds metre scale with sharp, scoured bases; pebble lag common; beds commonly separated by centimetre scale black sandy siltstones; shell fragments and organic clasts rare; sandstones light grey, coarse to medium grained, well sorted and rounded;. Samples: 130710 (35.5m sandstone); 130711 (51m sandstone).

52.5 - 58.0m Stacked upward fining sandstones to silty mudstone beds; beds metre scale; bases sharp and erosional, commonly scoured, often covered with a pebble lag; sands fine upward to unit top; beds capped by decimetre thick iron stained black muddy siltstones; sandstones reddish grey, coarse to fine, poorly sorted and rounded; soft sediment deformation, ripples, and rip up clasts common.

58.0 - 63.5m Thick, massive sandstone bed; base is sharp and erosional, covered by coarse sandstone; sandstone is light grey, well sorted and rounded; bed is capped by centimetre scale iron stained black siltstone; shell fragments are rare.

63.5 - 84.0m Stacked sandstone beds; beds decimetre scale with sharp and erosional bases; beds frequently capped by thin iron stained silty mudstone; sandstones light grey, medium to coarse, well rounded and sorted; rip up clasts common. Sample: 130712 (84m sandstone).

84.0 - 98.0m Stacked upward fining sandstone to sandy siltstone beds; beds decimetre scale, having sharp, erosional and often scoured bases; sandstones reddish grey, coarse to fine, poorly sorted and rounded; sandstones fine upward to bed top; beds capped by decimetre scale iron stained black siltstones; rip up clasts, ripples and soft sediment deformation common. Samples: 130713 (92m sandstone).

98.0 - 110.0m Stacked sandstones similar to above but having pebbly sandstone lag in scours; beds decimetre to metre scale. Samples: 130714 (104m sandstone).

APPENDIX G2
Section Descriptions

Section SC4

Location: latitude 72°53'N longitude 78°23'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
300-355m south coast

0.0 - 6.0m Stacked upward fining sandstones to sandy siltstone beds; beds decimetre scale, with sharp and erosional bases; sandstones fine upward into heavily iron stained black muddy siltstones; iron stains surrounding sandstones; sandstones reddish grey, coarse to fine, poorly sorted and rounded; rip up clasts, ripples, and soft sediment deformation structures common. Sample: 140701 (5m siltstone).

6.0 - 7.5m Interbedded upward fining reddish grey sandstones and black muddy siltstones with light grey massive sandstones; beds decimetre scale; reddish grey sandstones and black siltstones identical to previous unit; light grey sandstones massive, medium grained, well sorted and rounded, and frequently contain rip up clasts; all sandstones iron stained by Fe leached from black siltstones.

7.5 - 10.0m Stacked massive sandstone beds; beds decimetre scale with sharp, erosional, undulatory bases; sandstones light grey, coarse to fine, well sorted and rounded; shell fragments uncommon.

10.0 - 13.0m Interbedded upward fining reddish grey sandstones and black muddy siltstones with light grey massive sandstones; beds decimetre scale; unit is identical that located between 6.0 and 7.5 metres.

13.0 - 14.5m Thick upward fining massive sandstone bed; base sharp and erosional; unit capped by decimetre scale iron stained silty mudstone; sandstones light grey, well sorted and rounded, and medium grain size; shell fragments rare.

14.5 - 18.8m Two upward fining massive sandstone beds; bases are sharp and erosional; sandstone are light grey, coarse to medium, well sorted and rounded; shell fragments common; units capped by decimetre thick iron stained silty mudstone.

18.8 - 19.5m Upward fining massive sandstone bed; base undulatory and erosional with centimetre scale pebbly sandstone lag; sandstone medium grained, fines upward to unit top.

19.5 - 20.0m Sandstone unit identical to previous unit but having fewer pebbles; unit capped by centimetre scale iron stained black muddy siltstone.

20.0 - 25.0m Interbedded upward fining reddish grey sandstones and black muddy siltstones with light grey massive sandstones; beds decimetre scale; reddish grey sandstones and black siltstones identical to previous unit; light grey sandstones massive, well sorted and rounded, frequently contain rip up clasts; all sandstones iron stained by Fe leached from black siltstones. Sample: 140702 (25m siltstone).

25.0 - 31.0m Thick upward fining massive sandstone bed; base sharp and erosional; sandstone is medium grained, light grey, well sorted and rounded.

31.0 - 55.0m Stacked upward fining sandstone beds; beds decimetre scale with sharp erosional bases, covered by centimetre scale pebbly sandstone with shell fragments; beds capped by centimetre scale iron stained muddy siltstone; sandstones light grey, coarse to medium, well sorted and rounded; scouring common.

APPENDIX G_3
Section Descriptions

Section SC5

Location: latitude 72°52'N longitude 78°31'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
355-413m south coast

0.0 - 4.2m Stacked upward fining sandstones to sandy siltstone beds; sands reddish grey, coarse to fine, poorly sorted and rounded; beds decimetre scale with sharp and erosional bases; sands fine upward to unit top; beds capped by centimetre scale iron stained black siltstones; shell fragments rare. Sample: 140703 (1m siltstone).

4.2 - 6.5m Two upward fining reddish grey pebbly sandstone and black muddy siltstone beds; unit bases sharp and erosional, covered by pebbly sandstone; rip up clasts and shell fragments common near the unit bases.

6.5 - 22.5m Stacked massive to upward fining sandstone beds; beds metre scale; bases sharp and erosional, covered by pebbly sandstone; sandstones medium grained, light grey, well sorted and rounded; beds have massive base, grading up to planar beds; beds occasionally capped by iron stained silty mudstone; metre scale trough cross sets and rip up clast rare.

22.5 - 23.5m Thick massive green sandstone; base sharp and erosional; sandstone fine grained, well sorted, and contains shell fragments. Sample: 140704 (23m sandstone).

23.5 - 68.0m Stacked sandstone beds identical to beds described between 6.5 - 22.5m. Samples: 140705 (40m silty mudstone); 140706 (68m silty mudstone).

APPENDIX G_4
Section Descriptions

Section SC8

Location: latitude 72°53'N longitude 78°37'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
570-650m south coast

0.0 - 26.0m Stacked massive sandstone beds; beds metre scale; bases sharp erosional, often scoured; sandstones light grey, very clean, coarse to fine, well sorted and rounded; beds may be capped by decimetre scale iron stained silty mudstone; sedimentary structures include metre scale trough-cross stratification and rip up clasts, but are rare; soft sediment deformation and centimetre scale ripples are common in the silty mudstone caps; shell fragments are rare. Samples: 150708 (0m sandstone); 150709 (16m siltstone).

26.0 - 42.0m Stacked upward fining sandstone beds; with the exception of graded bedding these beds are identical to those found between 0.0 and 26.0 metres. Sample: 150710 (42m silty mudstone).

42.0 - 55.0m Stacked massive sandstone beds; beds metre scale and identical to those described between 0.0 and 26.0m but lack the iron stained silty mudstone caps.

55.0 - 76.0m Stacked upward fining sandstone beds; beds identical to those described between 26.0 and 42.0 metres. Sample: 150711 (74.5m silty mudstone).

76.0 - 94.5m Stacked upward fining sandstone beds; beds decimetre scale; bases sharp and erosional, often scoured; beds capped by a decimetre to centimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and rounded; sedimentary structures restricted to rip up clasts; soft sediment deformation and centimetre scale ripples common in silty mudstone caps; Sample: 150712 (94.5m silty mudstone).

APPENDIX G_5
Section Descriptions

Section SC9

Location: latitude 72°53'N longitude 78°37'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
540-615m south coast

0.0 - 12.0m Interbedded silty mudstones and sandstones; sandstones centimetre scale, massive, light grey, very clean, coarse to fine, well sorted and well rounded; muddy siltstones decimetre scale, black, iron stained, commonly rippled (centimetre scale), and exhibit soft sediment deformation features. Sample: 160701 (0.0m silty mudstone).

12.0 - 25.0m Stacked massive sandstone beds; beds metre scale; bases sharp and erosional, often scoured; beds may be capped by a decimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and well rounded; sedimentary structures include rare metre scale trough-cross stratification and rip up clasts; soft sediment deformation and centimetre scale ripples common in silty mudstone caps; shell fragments are rare. Sample: 160702 (25m sandstone).

25.0 - 45.0m Stacked sandstone beds; beds metre scale and identical to those located between 12.0 and 25.0 metres except they contain decimetre scale trough cross-stratification; paleocurrent direction towards 066°. Samples: 160703 (45m silty mudstone).

45.0 - 60.0m Three massive sandstone beds; beds identical to those described between 12.0 and 25.0 metres. Sample: 160704 (60m muddy siltstone).

60.0 - 67.0m Stacked sandstone beds; beds metre scale and identical to those described between 25.0 and 45.0 metres; paleocurrent direction towards 045°.

67.0 - 69.0m Thick upward fining sandstone bed; base is sharp and erosional, with pebble conglomerate lag; sandstone light grey, very clean, coarse to fine, well sorted and well rounded; bed is capped by a decimetre scale iron stained silty mudstone.

69.0 - 75.0m Stacked sandstone beds; beds identical to those described between 25.0 and 45.0 metres; paleocurrent direction towards 045°.

APPENDIX G_6
Section Descriptions

<u>Section SC10</u>

Location: latitude 72°51'N longitude 78°38'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
560-587m south coast

0.0 - 26.0m Stacked massive to upward fining sandstone beds; beds metre scale; bases sharp and erosional, often scoured; beds may be capped by decimetre scale iron stained silty mudstone; sandstones are light grey, very clean, coarse to fine, well sorted and rounded; sedimentary structures include rare metre scale trough-cross stratification and rip up clasts; soft sediment deformation and centimetre scale ripples common in the silty mudstone caps; shell fragments rare.
Sample: 160705 (6m sandstone).

26.0 - 27.0m Three laminated muddy siltstone beds; beds have sharp base; siltstones are black with an iron staining; soft sediment deformation evident.

APPENDIX G_7
Section Descriptions

<u>Section SC11</u>

Location: latitude 72°50'N longitude 78°39'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
580-619m south coast

0.0 - 39.0m Stacked massive to upward fining sandstone beds; beds metre scale; bases sharp erosional, often scoured; beds may be capped by a decimetre scale iron stained silty mudstone; sandstones are light grey, very clean, coarse to fine, well sorted and well rounded; sedimentary structures include rare metre scale trough-cross stratification and rip up clasts; load structures, soft sediment deformation and centimetre scale ripples common in the silty mudstone caps; shell fragments are rare. Samples: 160706 (0.5m silty mudstone); 160707 (16m silty mudstone); 160708 (39m silty mudstone).

APPENDIX G_8
Section Descriptions

Section SC12

Location: latitude 72°50'N longitude 78°40'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
600-658m south coast

0.0 - 58.0m Stacked massive to upward fining sandstone beds; beds decimetre to metre scale; bases sharp, erosional, often scoured; beds may be capped by centimetre to decimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and rounded; sedimentary structures include metre scale trough-cross stratification and rip up clasts; load structures, soft sediment deformation and centimetre scale ripples common in the silty mudstone caps; shell fragments rare.
Samples: 160709 (6m muddy siltstone); 160710 (30m muddy siltstone); 160711 (51m muddy siltstone); 160712 (58m muddy siltstone).

APPENDIX G_9
Section Descriptions

<u>Section</u> <u>SC13</u>

Location: latitude 72°49'N longitude 78°42'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
650-702m south coast

0.0 - 44.5m Stacked massive to upward fining sandstone beds; beds decimetre to metre scale; bases sharp, erosional, often scoured; pebbly sandstone lag present rarely; sandstones light grey, very clean, coarse to fine, well sorted and well rounded; beds may be capped by centimetre to decimetre scale iron stained silty mudstone; sedimentary structures include decimetre scale trough-cross stratification and rip up clasts; load structures, soft sediment deformation and centimetre scale ripples common in the silty mudstone caps; shell fragments are rare. Samples: 170701 (7.5m muddy siltstone); 170702 (23m muddy siltstone).

44.5 - 49.0m Interbedded muddy siltstones and sandstones; sandstones beds decimetre scale, light grey, very clean, coarse to fine, well sorted and rounded, and contain decimetre scale trough cross-stratification; muddy siltstones black, iron stained, commonly rippled (centimetre scale), often exhibiting soft sediment deformation features. Sample: 170703 (49m muddy siltstone).

49.0 - 52.0m Stacked massive to upward fining sandstone beds; beds are decimetre to metre scale, identical to those described between 0.0 and 45.5 metres.

APPENDIX G_{10}
Section Descriptions

<u>Section SC14</u>

Location: latitude 72°49'N longitude 78°43'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
700-724.5m south coast

0.0 - 5.0m Stacked massive to upward fining sandstone beds; beds decimetre to metre scale; bases sharp and erosional, often scoured; pebbly sandstone lag present rarely; beds may be capped by a centimetre to decimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and well rounded; sedimentary structures include decimetre scale trough-cross stratification and rip up clasts; paleocurrent direction towards 360°; load structures, soft sediment deformation and centimetre scale ripples common in the silty mudstone caps; shell fragments are rare.

5.0 - 24.5m Stacked massive to upward fining sandstone beds; beds decimetre to metre scale, identical to those described between 0.0 and 5.0 metres except they lack silty mudstone caps.

APPENDIX G_{11}
Section Descriptions

<u>Section SC15</u>

Location: latitude 72°49'N longitude 78°47'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
725-752m south coast

0.0 - 27m Stacked massive to upward fining sandstone beds; beds decimetre to metre scale; bases are sharp and erosional, often scoured; beds may be capped by a centimetre to decimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and well rounded; rip up clasts are common; load structures, soft sediment deformation and centimetre scale ripples are common in the silty mudstone caps. Sample: 170704 (10m muddy siltstone).

APPENDIX G_{12}
Section Descriptions

<u>Section SC16</u>

Location: latitude 72°51'N longitude 78°52'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
690-720.5m south coast

0.0 - 30.5 Stacked massive to upward fining sandstone beds; beds metre scale; bases sharp, erosional, often scoured; beds may be capped by a centimetre to decimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and well rounded; load structures and soft sediment deformation are common in the silty mudstone caps; shell fragments are rare. Samples 180701 (0m sandstone); 180702 (22m muddy siltstone).

APPENDIX G_{13}
Section Descriptions

<u>Section SC17</u>

Location: latitude 72°52'N longitude 78°52'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
200-289m south coast

0.0 - 30.0m Stacked massive to upward fining sandstone beds; beds decimetre to metre scale; bases sharp, erosional, often scoured; beds capped by centimetre to decimetre scale iron stained silty mudstone; sandstones light grey, very clean, coarse to fine, well sorted and rounded; sedimentary structures include rip up clasts and metre scale trough-cross stratification; plant fragments, load structures, soft sediment deformation and centimetre scale ripples are common in silty mudstone caps. Sample 180703 (9m muddy siltstone).

APPENDIX G_{14}
Section Descriptions

<u>Section SC18</u>

Location: latitude 72°52'N longitude 78°35'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
200-230.5m south coast

0.0 - 3.5m Stacked massive and upward fining sandstone beds interbedded with black silty mudstone beds; sandstone beds decimetre scale, light grey, very clean, coarse to fine, well sorted and well rounded; siltstones are centimetre scale, heavily iron stained; sedimentary structures include rip up clasts and flame structures. Samples 240701 (1.5m muddy siltstone), 240702 (2m sandstone).

3.5 - 30.5m Stacked sandstone beds with pebble and boulder conglomerate lenses; sandstones decimetre to metre scale; bases of beds sharp and erosional, tops commonly capped by decimetre thick black muddy siltstone; sandstones dominantly reddish grey, coarse to fine, poorly sorted and rounded; isolated sandstone beds composed of light grey, very clean, coarse to fine, well sorted and well rounded sandstone similar to that described between 0.0 and 3.5m; conglomerate units are decimetre to metre scale, lensoid in shape, having concave up erosional base, and sharp top; clasts poorly sorted, well rounded, and rarely imbricated; clast types dominantly metamorphic, with some igneous, and rare red sandstone clasts. Samples 240703 (13m sandstone), 240704 (13.5m igneous and metamorphic pebbles), 240705 (20m muddy siltstone)

APPENDIX G[15]
Section Descriptions

<u>Section TC1</u>

Location: latitude 73°14'N longitude 79°50'W
Formation: Bylot Island/Pond Inlet/Navy Board
Pollen Zone: Hu/TTa
Dominant Lithology: Shale/Quartz sandstone/Shale
Position relative to composite section:
0-150m Twosnout Creek

0.0 - 4.0m Massive black shale. Sample 260701 (0.0m shale).

4.0 - 6.0m Massive sandstone bed; sandstone medium to fine grained, light grey, well sorted, well rounded, and contains numerous shale rip up clasts, particularly near the base. Sample 260702 (4m sandstone).

6.0 - 9.5m Massive black shale.

9.5 - 13.5m Interbedded massive black shale and sandstone beds; sandstone beds decimetre scale massive but otherwise identical to that described between 4.0 and 6.0m. Sample 260703 (10.5m shale).

13.5 - 31.5m Massive black shale. Sample 260704 (30m shale).

31.5 - 33.5m Massive sandstone; unit is identical to the sandstone bed found between 4.0 and 6.0m.

33.5 - 33.7m Massive black shale. Sample 260706 (33.5m shale).

33.7 - 42.5m Massive sandstone; bed fines upward into overlying shale; sandstone medium to fine grained, light grey, well sorted, well rounded, but contains few shale rip up clasts. Sample 260707 (40.0m sandstone).

42.5 - 43.0m Bedded sandstone; sandstone unit has an undulatory erosional base, and varies in thickness from a few centimetres to a metre; sandstone is medium to fine grained, dark grey, well sorted, well rounded, and strongly cemented by $CaCO_3$; thin contorted bedding is evident. Sample 260708 (42.5m sandstone).

43.0 - 55.0m Massive black shale. Sample (50m shale).

55.0 - 67.5m Interbedded massive black shale and sandstone beds; sandstones decimetre to centimetre scale, fine grained, well sorted and rounded, and heavily iron stained; sandstones contain abundant rip up clasts and flame structures. Sample 260710 (60m shale).

67.5 - 73.0m Stacked upward fining sandstone beds; each bed consists of decimetre scale well cemented fine iron stained sandstone which fines upward into black shale; each unit 20 - 30 centimetres thick, and rests erosionally on the underlying bed; sandstones commonly have planar laminations near the base, and ripples at top. Sample 260711 (70m sandstone).

73.0 - 150.0m Black shale with thin sandstone stringers; sandstones are centimetre scale, laterally continuous, composed of iron stained massive fine sandstone. Samples 260712 (121m shale), 260713 (141m shale).

APPENDIX G16.
Section Descriptions

Section TC2

Location: latitude 73°14'N longitude 79°59'W
Formation: Pond Inlet Pollen Zone: TTa
Dominant Lithology: Quartz sandstone
Position relative to composite section:
40-311m Twosnout Creek

0.0 - 46.0m Massive sandstone unit; sandstones medium to coarse, light grey, well sorted and rounded, very clean and poorly cemented; sedimentary structures rare, but some metre scale trough cross stratification and large (1 - 2m) concretions present; fossil debris abundant and includes bryozoan, scaphopod and bivalve fragments. Samples 270701 (5m sandstone), 270702 (20m fossil debris).

46.0 - 55.0m Interbedded massive sandstone beds and black shale; sandstone beds decrease in thickness upward through the section from metre to centimetre scale; beds composed of sandstone identical to that described between 0.0 and 46.0m, but contain abundant rip up clasts; shale interbeds structureless, but increase in thickness upward through section.

55.0 - 117.0m Massive black shale with sandstone stringers; sandstone beds centimetre scale, laterally continuous, fine grained, well sorted and heavily iron stained. Samples 120703 (90m shale), 270704 (106m shale).

117.0 - 271.0m Stacked massive sandstones with shale partings; beds decimetre to metre scale in thickness, lensoid in shape, with concave up erosional base and capped by decimetre thick shale partings; beds commonly scour into underlying beds; cyclic upward thinning and fining of beds evident; sandstones light grey, medium to coarse grained, well sorted and rounded; sedimentary structures include metre scale trough cross-stratification, flame structures and rip up clasts; fossil debris and concretions common. Samples 270706 (207m sandstone); 270707 (208m shale); 270708 (230m shale); 270709 (248m shale).

APPENDIX G[17]
Section Descriptions

Section TC3

Location: latitude 73°13'N longitude 79°53'W
Formation: Bylot Island/Pond Inlet/Navy Board
Pollen Zone: Hu/TTa
Dominant Lithology: Shale/Quartz sandstone/Shale
Position relative to composite section:
20-179m Twosnout Creek

0.0 - 13.5m Massive black shale. Sample 280701 (0m shale).

13.5 - 19.5m Interbedded sandstone and shale; sandstone beds have sharp erosional bases, are decimetre to centimetre scale, massive, laterally continuous, and contain numerous rip up clasts and flame structures; beds thicken and coarsen up section; sandstones are light grey, medium to fine grained, well sorted and rounded. Sample 280702 (15m shale).

19.5 - 65.5m Stacked sandstone beds with thin shale partings; sandstone beds sheetlike to broadly lensoid in shape, commonly scoured, decimetre to meter in thickness; beds thin and fine upward through top 10 metres of zone; sandstones light grey, medium to fine grained, well sorted and rounded; sedimentary structures rare, but include centimetre to metre scale trough cross stratification, rip up clasts, and flame structures; shale units contain coaly fragments. Samples 280703 (30.5m shale); 280704 (56m shale).

65.5 - 99.0m Interbedded massive black shale and sandstone; sandstone beds sheetlike, centimetre to decimetre in thickness; beds become progressively thinner and finer upward through the zone and occur several per metre; sandstones light grey, medium to fine grained, well sorted and rounded; sedimentary structures rare, but include centimetre to metre scale concretions, rip up clasts, and flame structures. Sample 280705 (74.5m shale).

99.0 - 130.5m Black with thin sandstone stringers. Sample 280706 (99m shale); 280707 (118.5m shale).

130.5 - 159.0m Stacked upward fining sandstone beds interbedded with thick shale beds; sandstone beds sheetlike, consisting of dark grey medium to fine sandstone which fines upward into shale; sedimentary structures dominated by planar lamination at base, and ripples nearer the sandstone tops; units several decimeters thick, and occur in sandstone dominated packages separated by thick shale units; sandstone packages thin and shale units thicken upward. Samples 270709 (137m shale); 270710 (139m muddy sandstone); 120711 (159m shale).

APPENDIX G[18]
Section Descriptions

Section TC4

Location: latitude 73°13'N longitude 79°45'W
Formation: Pond Inlet/Navy Board
Pollen Zone: TTa
Dominant Lithology: Quartz sandstone/Shale
Position relative to composite section:
40-327m Twosnout Creek

0.0 - 147.0m Cyclic upward thinning and fining sandstone beds; cycles ranged from metres to tens of metres in thickness and consisted of stacked upward fining beds which thin upward through the cycle; cycles located from 0-13m, 13-18.5m, 18.5-25.5m, 25.5m-84m, 84-105.5m and 105.5-147m; individual beds ranged from several metres to centimetres in thickness, scoured erosional base, with a pebble lag, and fined upward into centimetre to decimetre thick shale parting; sandstones light grey, medium to fine grained, well sorted and rounded; sedimentary structures generally restricted to the middle and upper portions of cycles, and consisted of dominantly rip up clasts near bed bases, and trough cross-stratification and ripples in the middle and upper portions of beds; complete and fragmental bivalves and gastropods common in several pebble lags. Samples 290701 (0.0m shale); 300701 (13m shale); 300702 (22m shale); 290702 (28m shale); 290703 (48m shale); 290704 (65.5m shale); 290705 (66m bivalves and gastropods); 300703 (82m shale); 290706 (106m shale).

147.0 - 165.5m Black shale with sandstone stringers; sandstones centimetre thick laterally continuous sheets which occur several per metre near the base of zone, but gradually decrease upward; units are dark grey, fine grained, well sorted and massive. Sample 300704 (150m shale).

165.5 - 220.0m Massive black shale. Samples 300705 (167m shale); 300706 (184m shale); 300707 (203m shale); 300708 (220m shale).

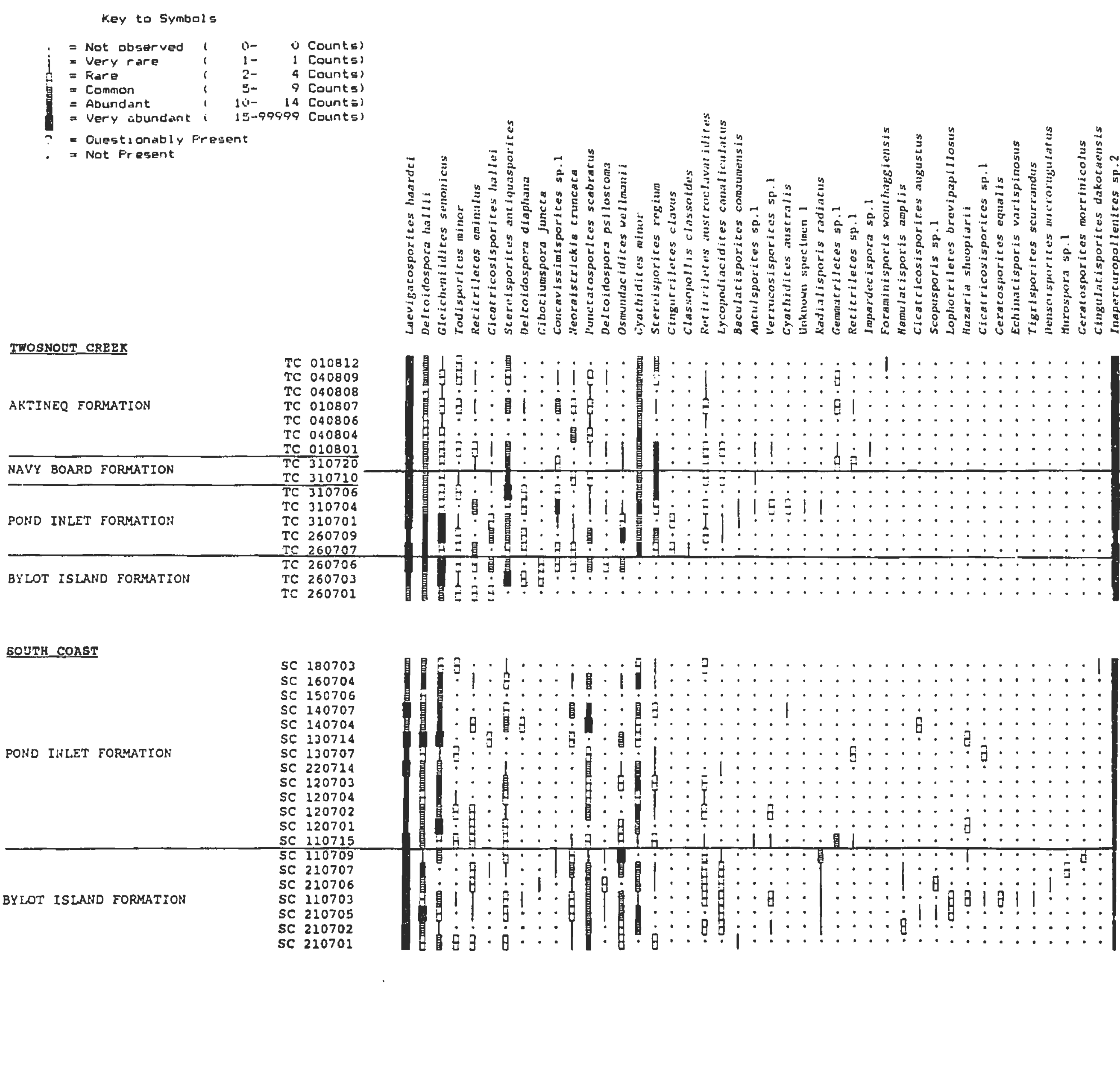
220.0 - 235.5m Black shale with sandstone stringers; this unit is identical to that described between 147.0 and 165.5. Samples 300709 (228.5m shale).

235.5 - 254.5m Massive black shale. Sample 300710 (254m shale).

254.5 - 287.0m Black shale with sandstone stringers; unit is similar to that described between 147.0 and 165.5m but showing no discernable increase or decrease upward. Samples 300711 (273.5m shale).

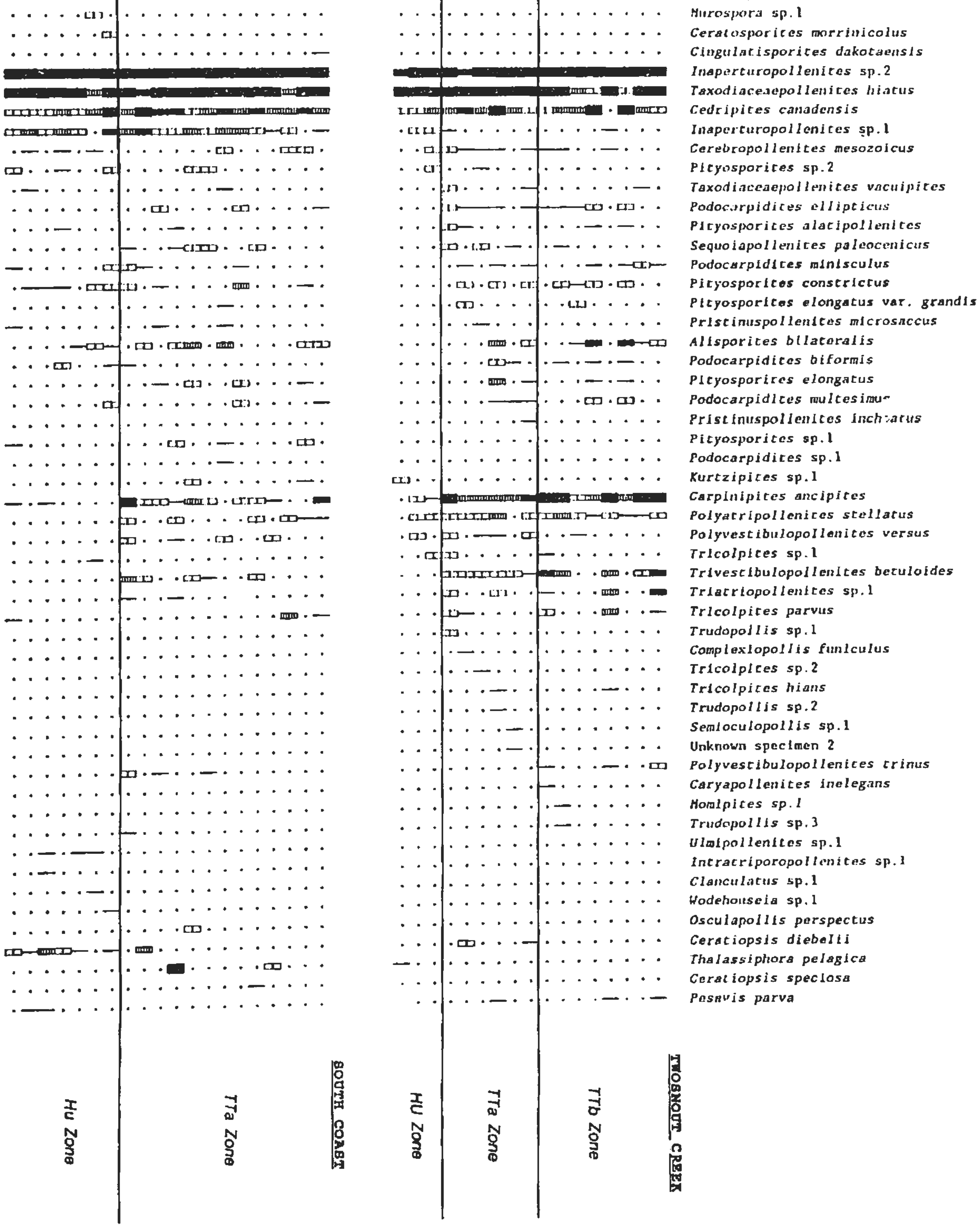
Palynom

RANGE CHART OF GRAPHIC ABUNDANCES BY MANUAL ORDERING



APPENDIX F

ynomorph Range Chart



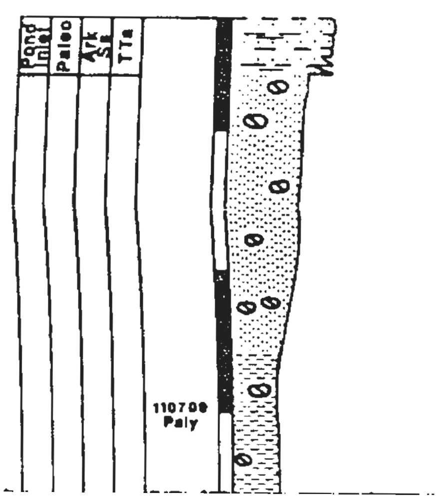
BYLOT ISLAND FORMATION

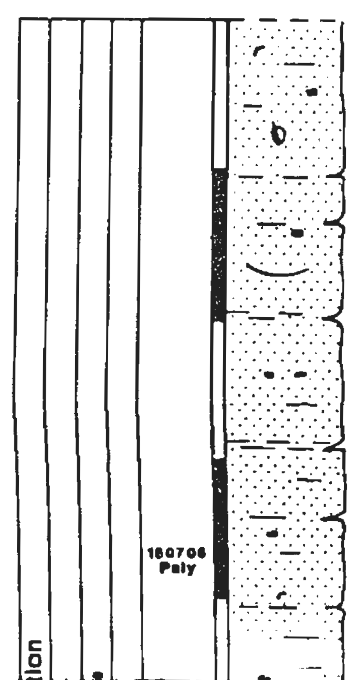
Type Section
Location: south coast (Ts1)*
Lat. 72 53 N
Long. 79 41 W

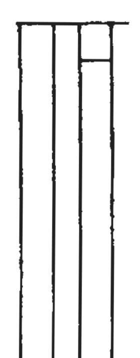
POND INLET FORMATION

Type Section
Location: south coast (Ts2)*
Lat. 72 52 N
Long. 79 24 W

Referen
Location: sc
Lat.
Long.





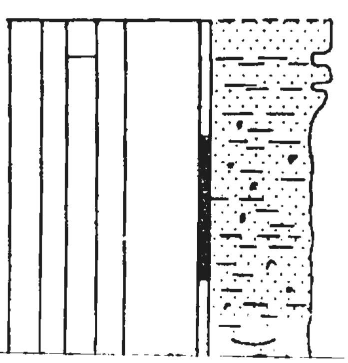


Appendix B

TYPE AND REFERENCE SECTIONS

ORMATION

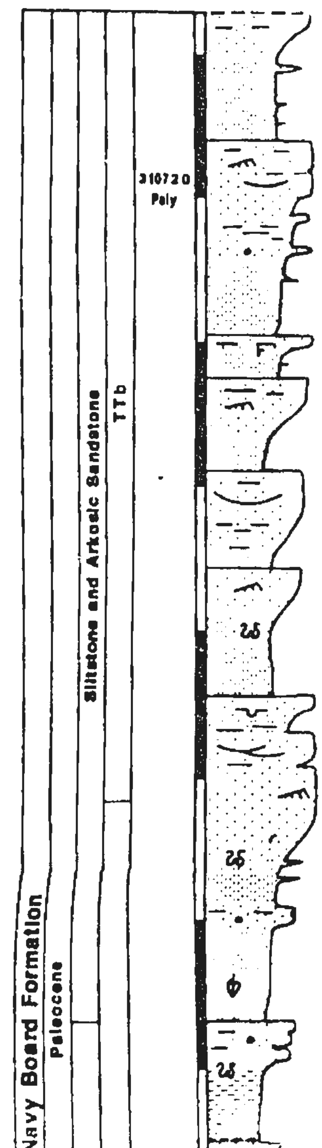
Reference Section
Location: south coast (Rs2)*
Lat. 72 53 N
Long. 79 41 W



NAVY BOARD FORMATION

Type Section
Location: Twosnout Creek (Ts3)*
Lat. 73 14 N
Long. 75 59 W

Reference Section
Location: Twosnout Creek (Rs3)*
Lat. 73 10 N
Long. 79 45 W



Appendix B

TYPE AND REFERENCE SEC

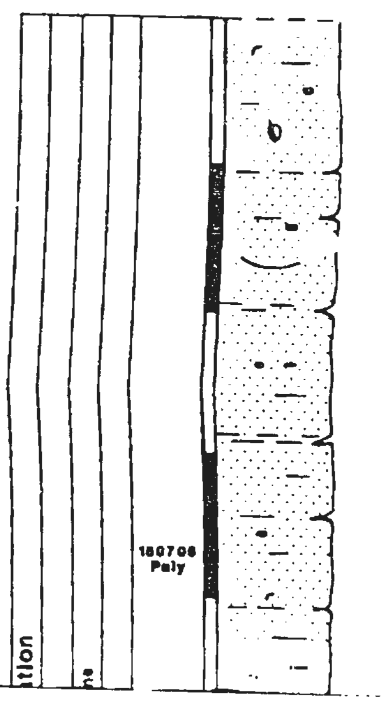
POND INLET FORMATION

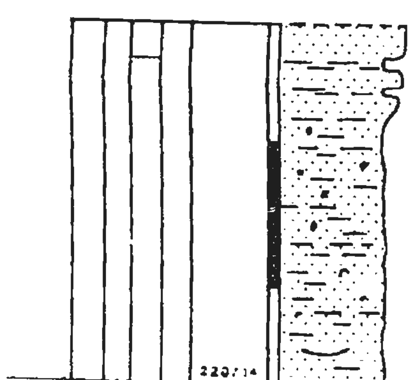
Type Section
Location: south coast (Ts2)*
Lat. 72 52 N
Long. 79 24 W

Reference Section
Location: south coast (Rs2)*
Lat. 72 53 N
Long. 79 41 W

NAVY

Type Section
Location: Twoanout Creek (Ts3)
Lat. 73 14 N
Long. 75 59 W





B

SECTIONS

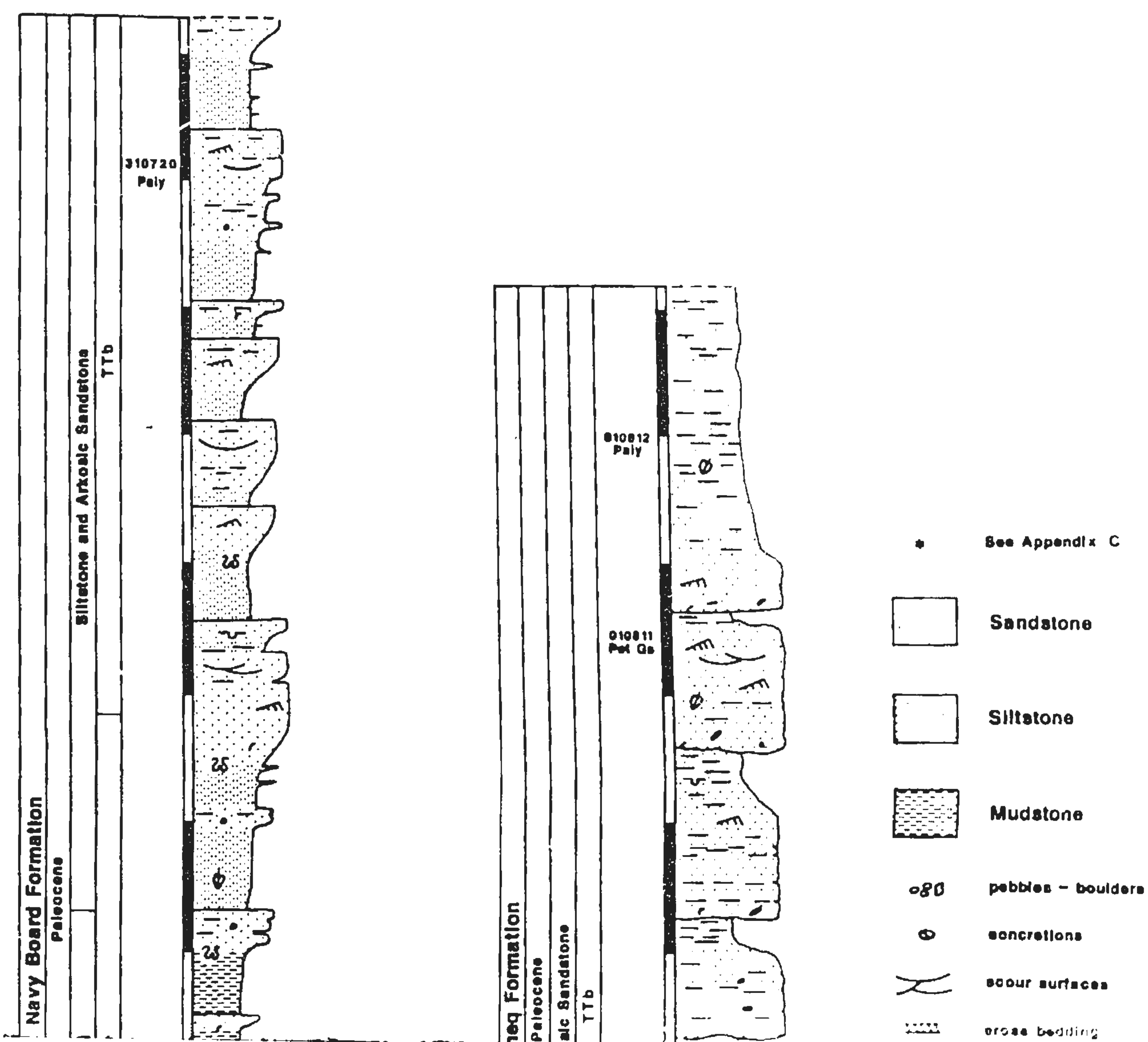
NAVY BOARD FORMATION

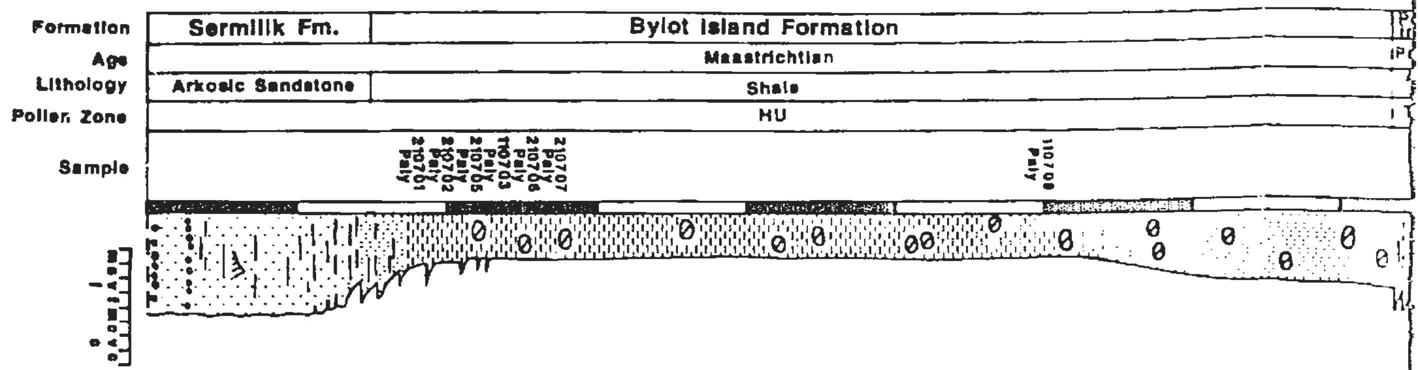
k (Ts3)*

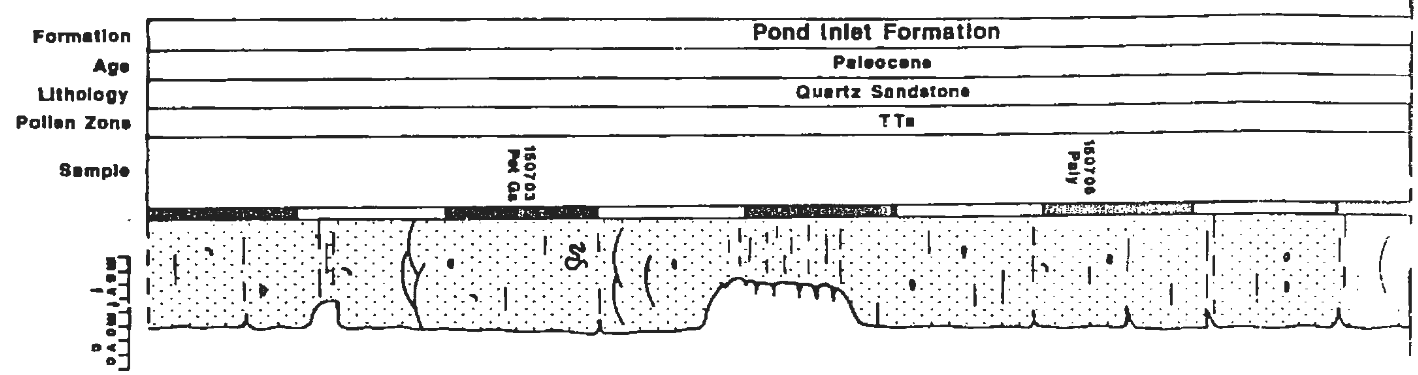
Reference Section
Location: Twosnout Creek (Rs3)*
Lat. 73 10 N
Long. 79 45 W

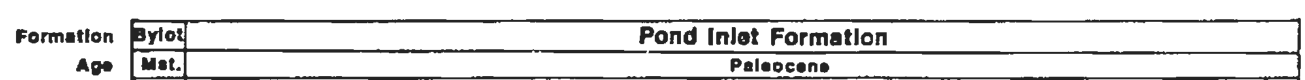
AKTINEQ FORMATION

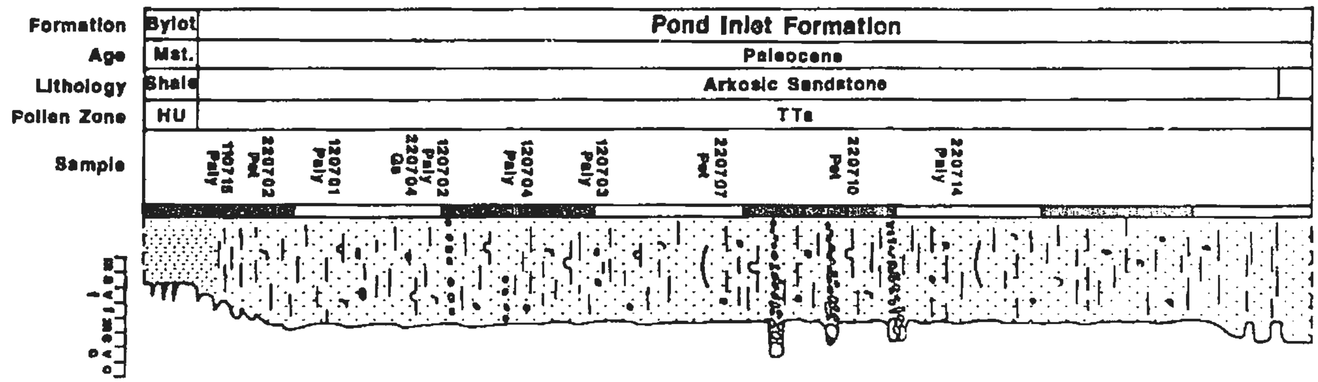
Type Section
Location: Twosnout Creek (Ts4)*
Lat. 73 08 N
Long. 79 27 W



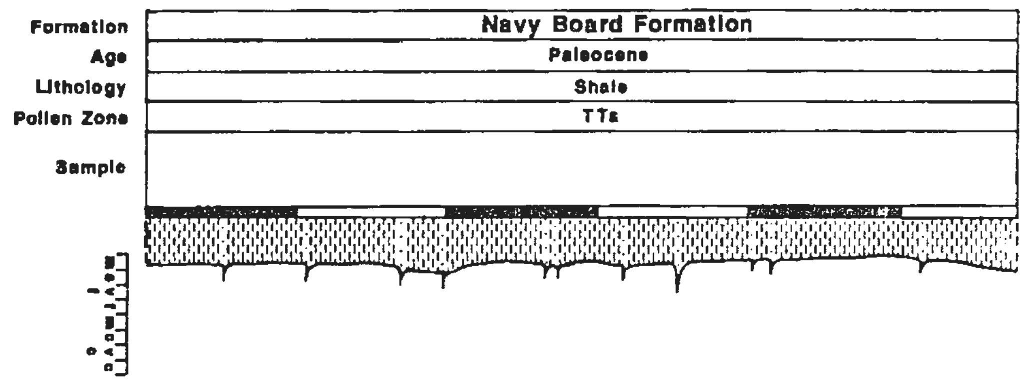

Formation
Sermilik Fm.
Bylot Island Formation
Age
Maastrichtian
Lithology
Arkosic Sandstone
Shale
Pollen Zone
HU
Sample


Formation
Pond Inlet Formation
Age
Paleocene
Lithology
Quartz Sandstone
Pollen Zone
TTa
Sample
150703 Pet Gs
150706 Paly

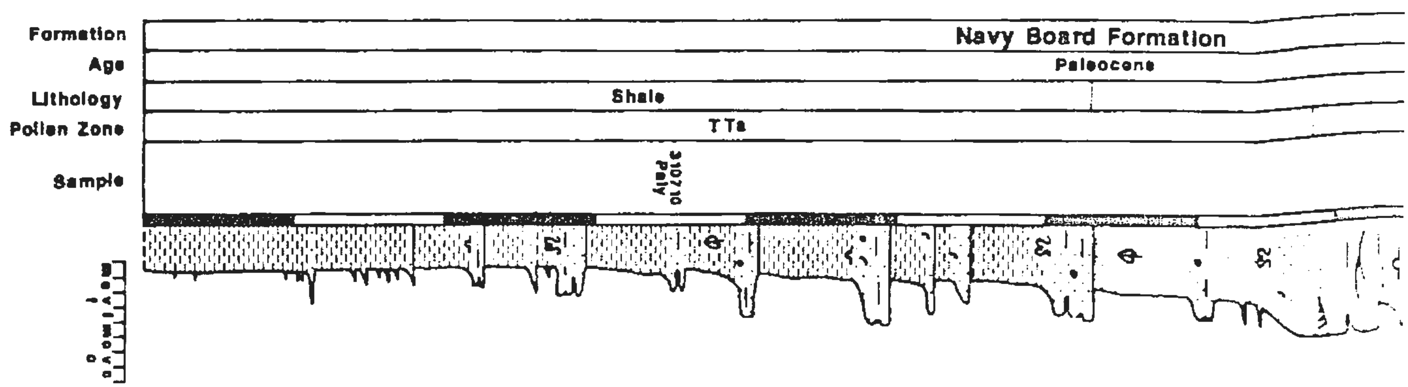

Formation
Bylot
Pond Inlet Formation
Age
Mst.
Paleocene



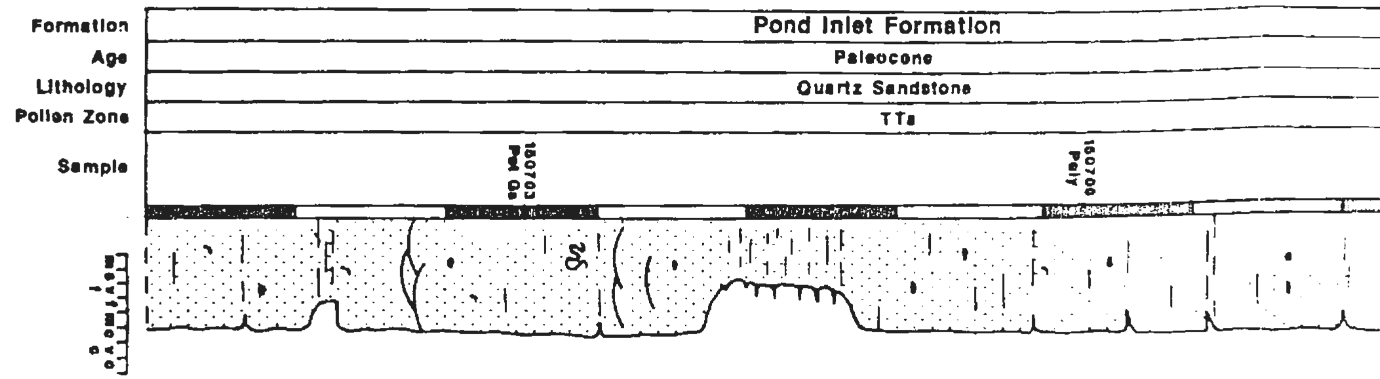
Formation
Age
Lithology
Pollen Zone
Sample
Bylot
Pond Inlet Formation
Mst.
Paleocene
Shale
Arkosic Sandstone
HU
TTa
110715 Paly
220702 Pet
120701 Paly
220704 Gs
120702 Paly
120704 Paly
120703 Paly
220707 Pet
220710 Pet
220714 Paly

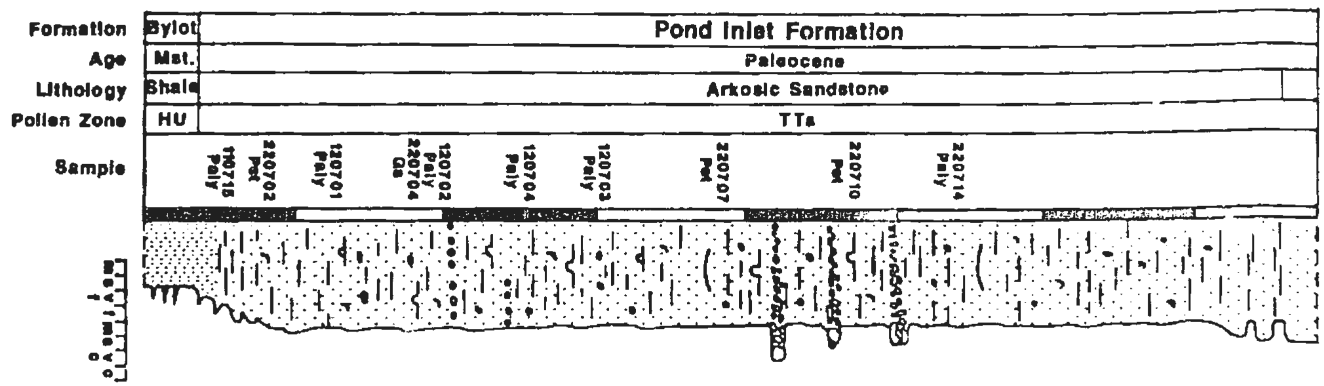


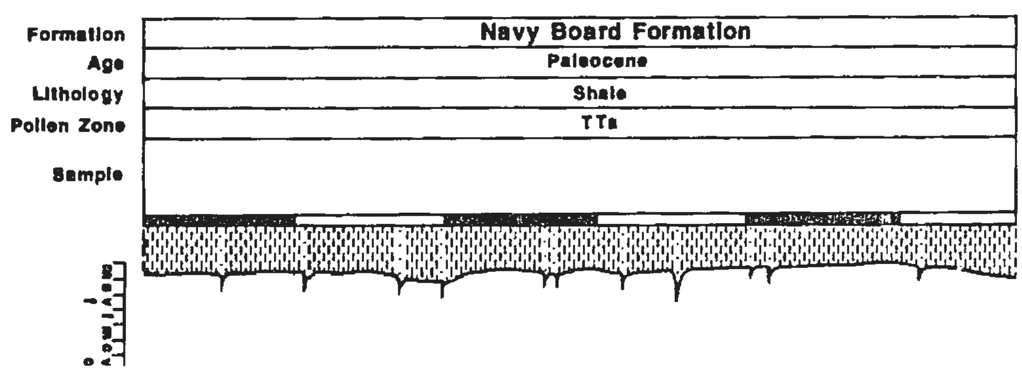
Formation
Age
Lithology
Pollen Zone
Sample
Navy Board Formation
Paleocene
Shale
TTa

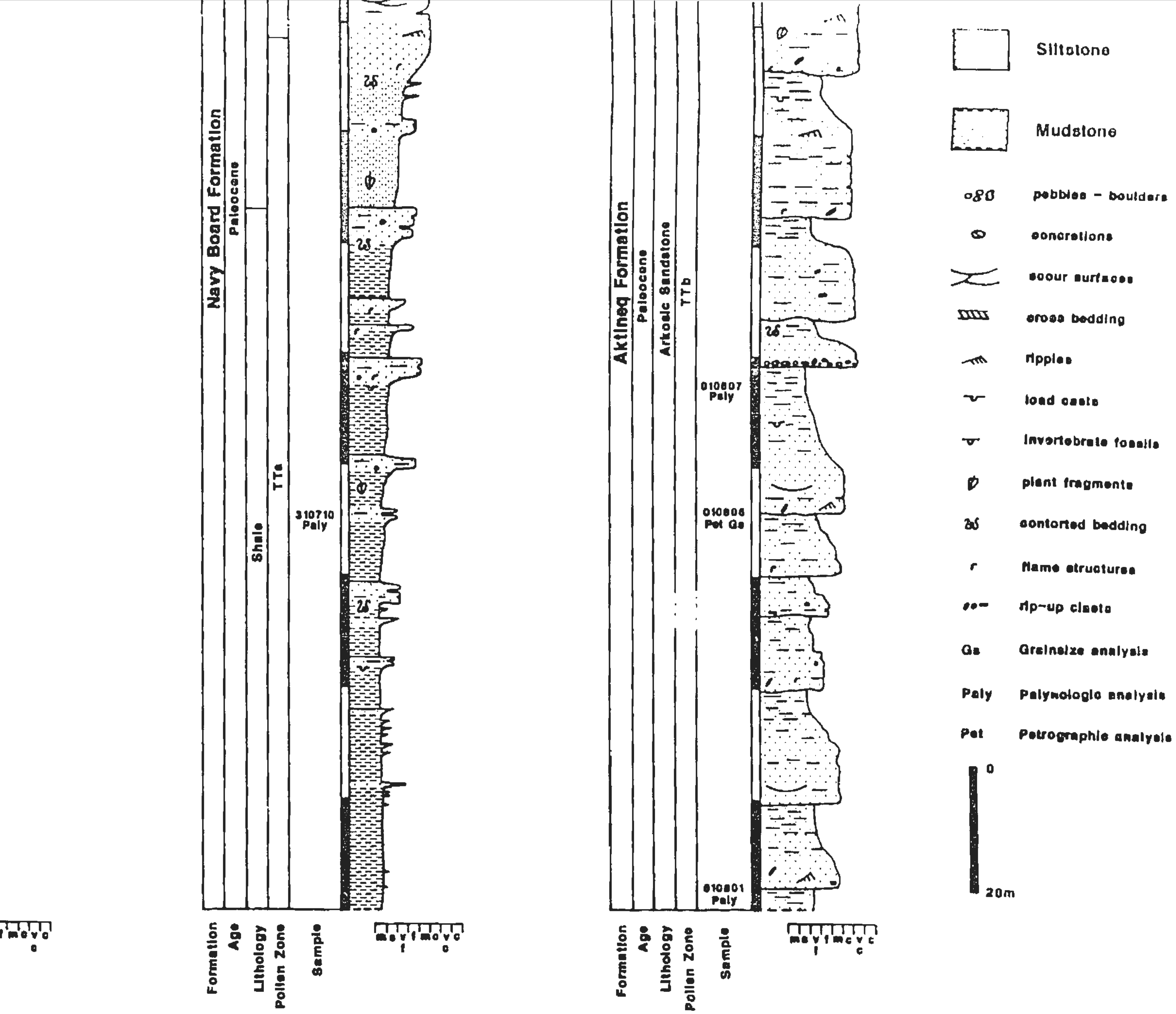


Formation
Age
Lithology
Pollen Zone
Sample
Navy Board Formation
Paleocene
Shale
TTa
310710 Paly


Formation
Pond Inlet Formation
Age
Paleocene
Lithology
Quartz Sandstone
Pollen Zone
TTa
Sample
150703 Pot Gs
150700 Paly


Formation
Bylot
Pond Inlet Formation
Age
Mst.
Paleocene
Lithology
Shale
Arkosic Sandstone
Pollen Zone
HU
TTa
Sample
110715 Paly
220702 Pot
120701 Paly
220704 Gs
120702 Paly
120704 Paly
120703 Paly
220707 Pot
220710 Pot
220714 Paly


Formation
Navy Board Formation
Age
Paleocene
Lithology
Shale
Pollen Zone
TTa
Sample



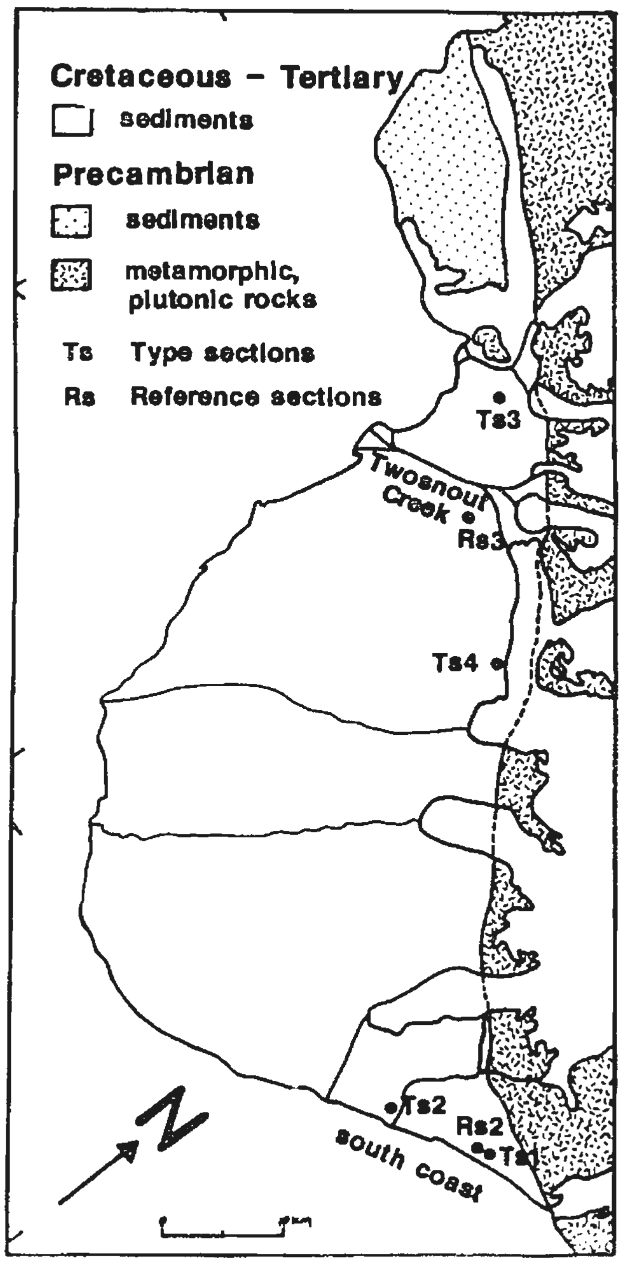
Navy Board Formation
Paleocene
Shale
TTa
310710
Paly
Aktineq Formation
Paleocene
Arkosic Sandstone
TTb
010807
Paly
010806
Pet Gs
010801
Paly
Formation
Age
Lithology
Pollen Zone
Sample
m s vf f m c vc
f c
Siltstone
Mudstone
pebbles – boulders
concretions
scour surfaces
cross bedding
ripples
load casts
invertebrate fossils
plant fragments
contorted bedding
flame structures
rip-up clasts
Gs
Grainsize analysis
Paly
Palynologic analysis
Pet
Petrographic analysis
0
20m

LOCATION AND RELATIVE STRATIGRAPHI

Geographic locations

Southwest Bylot Island

Tw

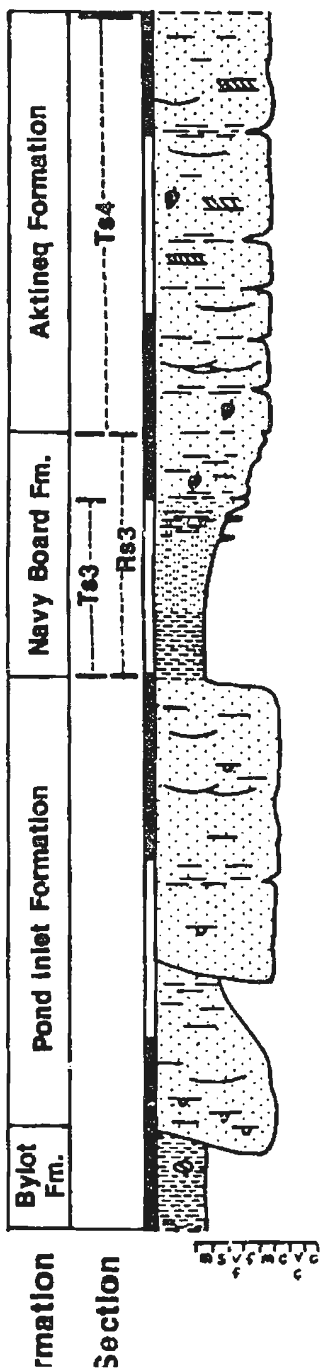


Appendix C

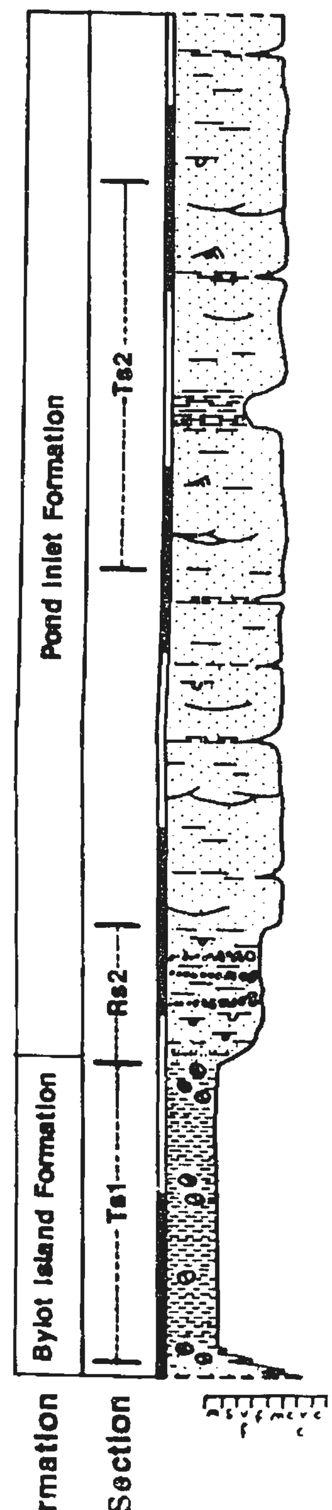
iRAPHIC POSITION OF TYPE AND REFERENCE SECTIONS

Stratigraphic locations

Twosnout Creek Composite Section



South Coast Composite Section

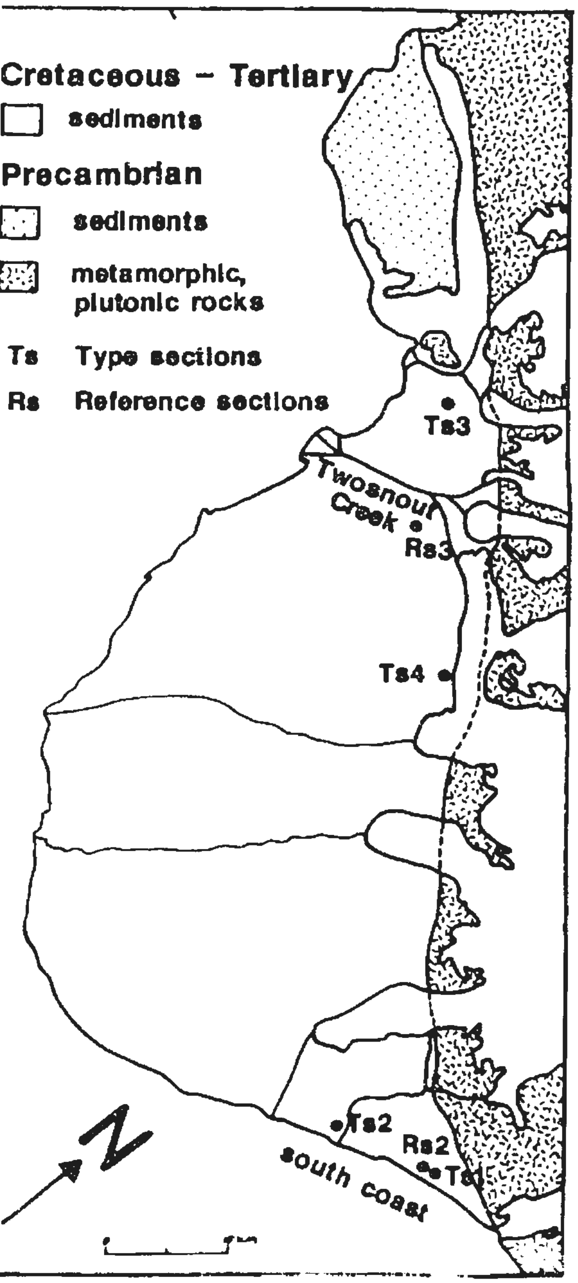


Appendix C

LOCATION AND RELATIVE STRATIGRAPHIC POSITION OF TYP

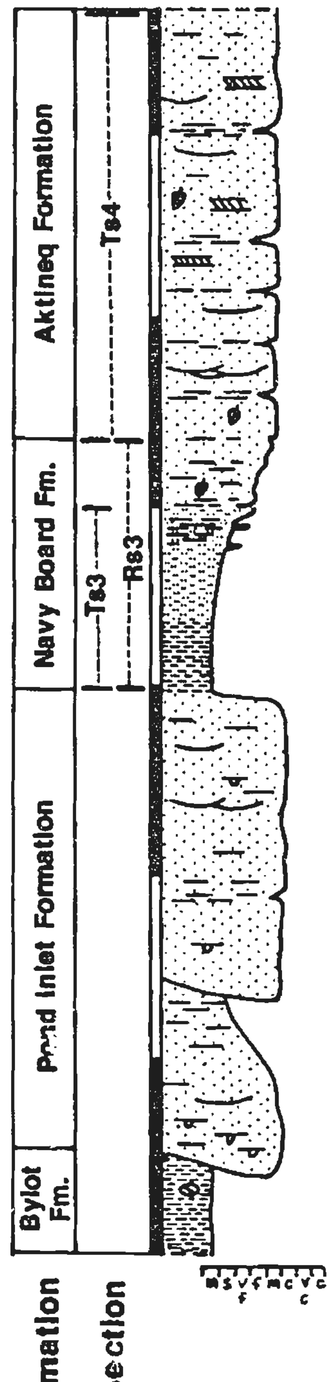
Geographic locations

Southwest Bylot Island



St

Twosnout Creek Composite Sec

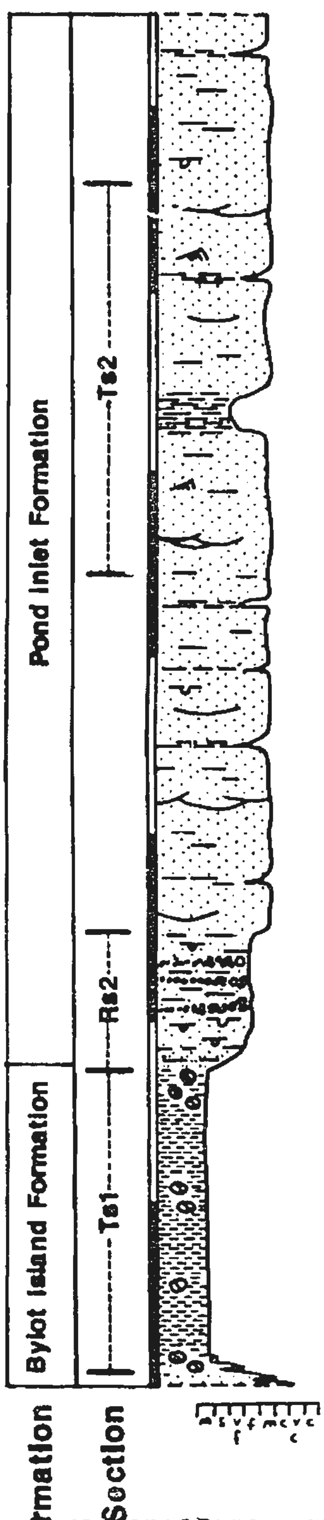


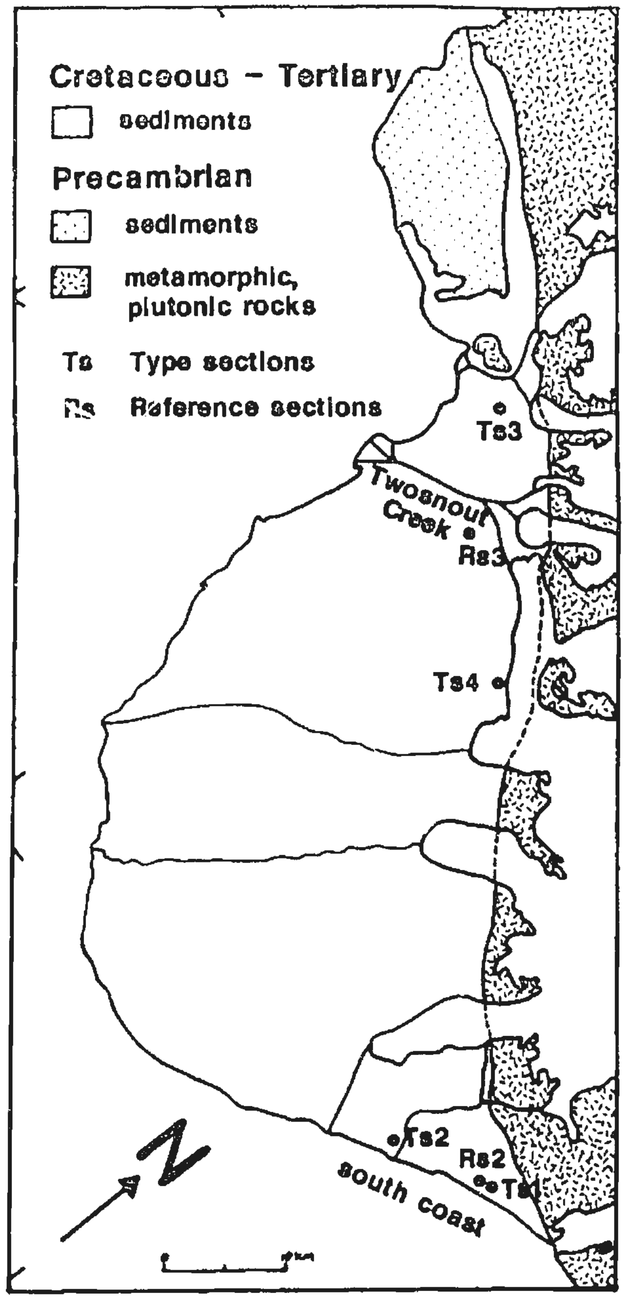
'E AND REFERENCE SECTIONS

tratigraphic locations

ction

South Coast Composite Section





Ts1 Bylot Island Fm. Type Section

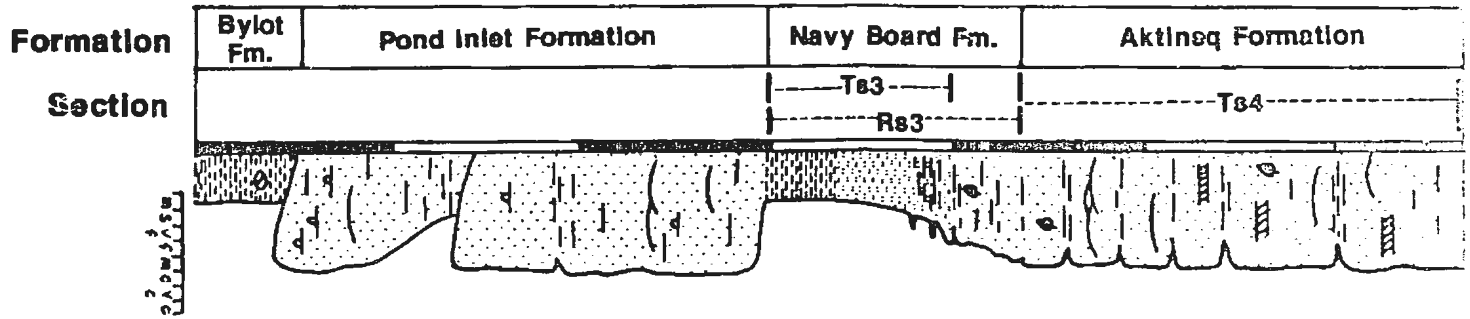
Ts3 Navy Board Fm. Type Section

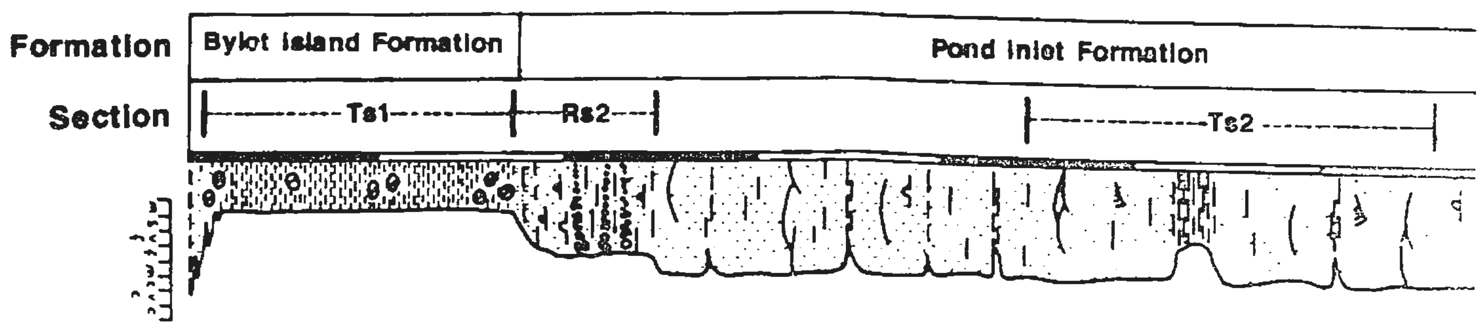
Rs2 Pond Inlet Reference Section

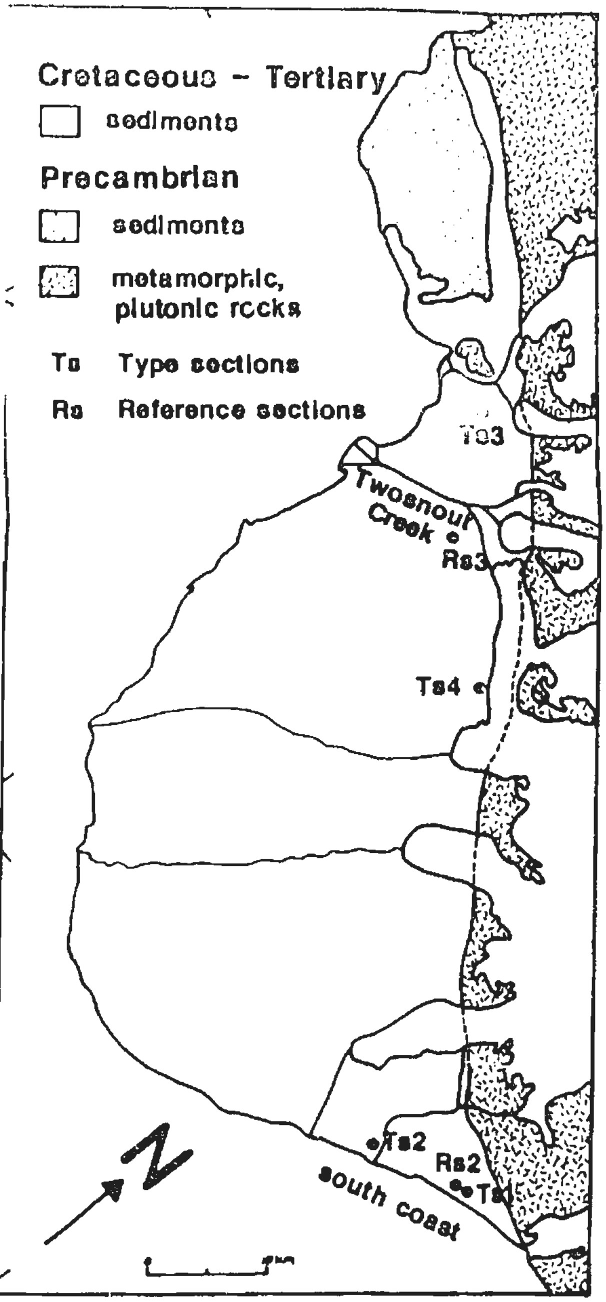
Ts2 Pond Inlet Fm. Type Section

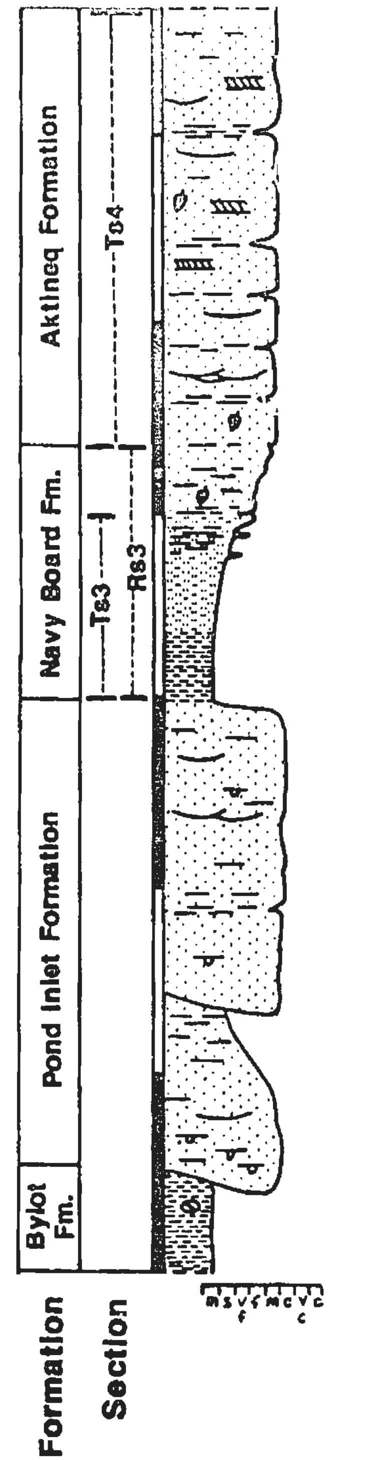
Ts4 Aktineq Fm. Type Section

Rs3 Navy Board Reference Section









Ts1 Bylot Island Fm. Type Section

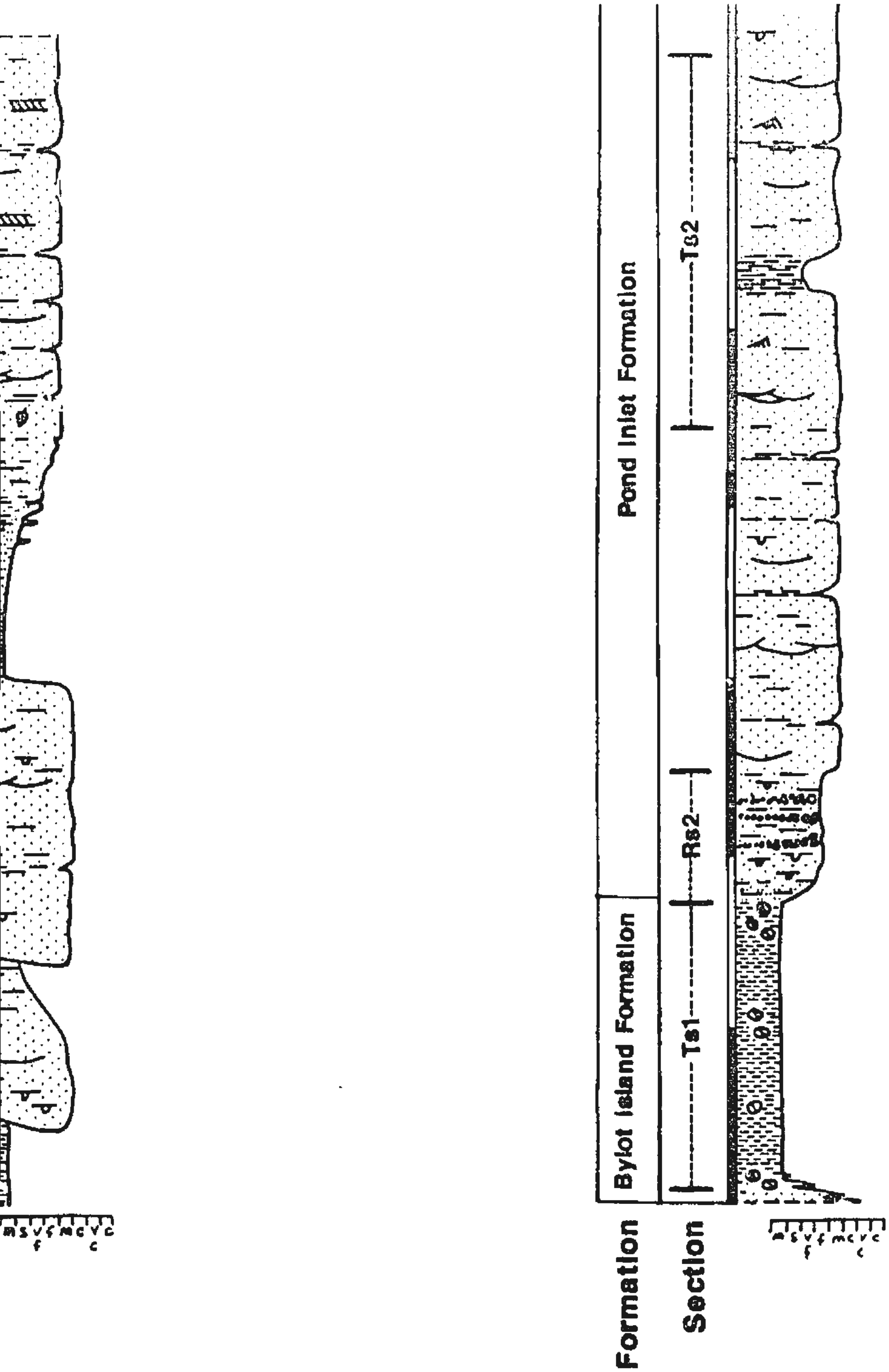
Ts3 Navy Board Fm. Type Section

Rs2 Pond Inlet Reference Section

Ts2 Pond Inlet

Ts4 Aktineq Fm

Rs3 Navy Boar



2 Pond Inlet Fm. Type Section

Aktineq Fm. Type Section

Navy Board Reference Section