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# DESCRIPTIVE NOTES

## INTRODUCTION

The bedrock geology of northern Baffin Island and northern Melville Peninsula (Fig.1) records almost three-billion years of Earth history and covers an area of approximately 242,000 km². This map is derived from a digital geoscience knowledge base CO-ROM (de Kemp and Scott, 1998). The primary data source for the present compilation is the series of regional geological maps published by the Geological Survey of Canada (see Fig. 2a) following helicopter and fixed-wing reconnaissance operations in the 1950's, 1960's and 1970's (Blackadar, 1958a, b, 1959b, c, d, e, f, g, h; Blackadar, 1960a, b; Blackadar and Fahrig, 1961; Blackadar, 1962a, b, c, d, e, f, g, h; Blackadar, 1963; Blackadar, 1962, 1963; Fahrig, 1967a, b; Schau and Henderson, 1972; Schau, 1973; Schau, 1974). Additional information has been derived from detailed field investigations that were carried out in a limited number of areas, i.e. north of Fury and Hecla Strait (Henderson, 1985; Henderson, 1987; Henderson, 1988; Henderson, 1989; Henderson, 1990; Henderson, 1991; references within), Eqe Bay (Bethune and Scammell, 1997), and northeastern Melville Peninsula (Fahrig, 1987). Numerous thematic investigations and follow-up laboratory work have been undertaken; this work is referenced at appropriate points throughout the field text that follows. All ages reported here are U-Pb on zircon, unless otherwise noted.

The goal of this compilation is to provide a new, synoptic view of the bedrock geology of the selected area. Compilation at 1:250 000 scale has been undertaken to facilitate digital data capture, analysis and map production (i.e. printer resolution). The decision to scale-up from 1:250 000 locally required some simplification; readers are directed to the original data sources (Fig. 2a-c), as the present map is not intended to supersede these documents. In creating an integrated legend and geological synthesis, reinterpretation of some units was required to avoid "boundary faults" at the edges of maps. As is evident in comparing the Archean and Paleoproterozoic geology from east to west across the map area, the nature of the available data is quite variable from area to area. Consequently, the level of detail, the number of scale of observation and locally extensive areas cover during the early reconnaissance operations, observational differences between the geologists involved in the original fieldwork, and the distribution of bedrock exposure (Jackson, 1985), rather than a manifestation of real geological differences across the map area.

## GEOLOGICAL FRAMEWORK

A wide spectrum of rocks is present in the map area, representing a range of diverse geological environments. Among the oldest units so far identified are ca. 2.90 Ga polyphase orthogneisses that range in composition from tonalite to granodiorite. These orthogneisses are commonly intruded by monzonite to granite plutons and dykes that are assigned to the ~2.76-2.72 Ga Mary River and ~2.68 Ga Prince Albert groups. Monzogranite to granodiorite plutons rocks intrude both the greenstones and the older orthogneisses. A phase of high-grade metamorphism is locally recorded at ~2.5 Ga. Paleoproterozoic sedimentary basin development is recorded by deposition of the dominantly siliciclastic rocks of the Piling Group, units that can be traced from the Melville Peninsula across Baffin Island as far west as the Victoria Island Archipelago, Northwest Territories. These rocks were deformed and metamorphosed during a period of global orogenesis at ca. 1.85 Ga.

Mesoproterozoic extension of the western and northern part of the area is recorded by the deposition of well-preserved and little metamorphosed siliciclastic, carbonate and volcanic rocks of the Bylot Supergroup and Fury and Hecla Group. Zinc and lead ore of the Nanisivik Mine, the only currently producing operation in the map area, is hosted by carbonate rocks of the Society Cliffs Formation, Fury and Hecla Group. Rocks of the Bylot Supergroup host a regional swarm of diabase dykes, emplaced at ca. 0.720 Ga, at the base of the area. Cambrian to Silurian platform limestone, dolomite and siliciclastic rocks unconformably overlie the Precambrian rocks. On Bylot Island and along the southern coast of Baffin Island, Cretaceous and Tertiary strata are preserved. Bedrock exposures are locally dominated by unconsolidated clastic deposits of Quaternary age (Dredge et al., 1986, and references within; Dredge, in prep.).

## DESCRIPTION OF THE MAP UNITS

### ARCHEAN

Orthogneisses and plutonic rocks

Baffin Island (Amm to Aum)

Foliated metabolc migmatitic gneiss (**Amm**), that ranges from granodiorite to quartz monzonite and weathers light grey to pinkish grey, is interpreted as the oldest recognized rock unit in the region (e.g., Jackson, 1965). Quartz monzonite to granodiorite complexes minor components of the unit. The rocks of this unit are complex and texturally diverse, ranging from weakly foliated to locally migmatitic and to locally well-banded gneiss. Mafic to ultramafic rocks occur as narrow bands of amphibolite, metapelitic/semi and graphite-bearing metasediments, and minor ultramafic rocks are represented by outcrops of this unit. Pressure-dependent lakebjer aluer or diamond-bearing kimberlitic rocks are not known to occur in this unit. Pressure-dependent kimberlitic rocks are known to occur in the Prince Albert Group (Fig. 2c). These diatremes are thought to be Paleozoic in age, based on their relationship to Paleozoic rocks in southern Baffin Island. Subordinate areas underlain by some of the younger map units (e.g. **Apfmu**, **Apfgr**, **ppfgr**, **pphgr**) may locally be present within Aem. On north central Baffin Island, near the type area for the greenstones of the Mary River Group, a sample of Amm yielded a ~2.90 Ga U-Pb zircon crystallization age (Jackson et al., 1990). Similar rocks are also present south of Isortoq Fiord, on eqe of Eqe Bay, and in the Prince Albert Hills, where determined for a sample of granitic gneiss, and 2776±2 Ma for a sample of heterogeneous layered gneiss (Bethune and Scammell, 1997). Reconnaissance Nd isotopic data discovered a wide range of $T_{DM}$ ages for "basement" gneisses, up to 3.7 Ga, suggesting that a variety of older material is present in the protest area (Jackson and Hegner, 1992).

In the Eqe Bay area, Bethune and Scammell (1997) interpret the complex layering in quartz monzonite to granodiorite has been identified in the southern part of the map area (NTS 37C; Koch, 1973; Koch, 1974; Lake Sillard). This gneiss is grey-weathering until is locally foliated, yielding a steely appearance, and is pervasively treated. Intrusive bodies that range from granodiorite to monzogranite (**Ag**) are present throughout the area. A range of ages, from 2729+ 2/-2 Ma to 2711±2 Ma, is reported for 6 separate **Ag** intrusions in the Eqe Bay-Isortoq Fiord area (Bethune and Scammell, 1997). Rocks of the Mary River Group (**Amm**, **Aem**, **Aum**) are intruded by a suite of monzonite to granite plutons (the type Mary River area is 2709+ 4/-3 Ma (Jackson et al., 1990). Ultramafic rocks, ranging from serpentinite to hornblendite (**Aum**), foliated to schistose and dark green to brown weathering, have been identified within unit Amm (Jackson et al., 1990; Scott, 1997). Rocks of the Mary River Group are subjected to the northern margin of the Foxe Fold Belt (Jackson and Taylor, 1972).

Melville Peninsula (**Aggn** to **Aamp**) (southern sheet only)

Pale grey gneisses that range in composition from tonalite to granodiorite (**Aggn**) are considered the oldest unit recognized on Melville Peninsula. Rocks of the Prince Albert Group (**Apfmu**, **Apfgr**, **pphgr**, **pphmp**) intrude and can be followed along its eqe for "basement" gneisses, up to 3.7 Ga, suggesting that a variety of older material is present in the protest area (Jackson and Hegner, 1992).

In the Eqe Bay area (NTS 37C), intermediate to mafic monzonite to quartz monzonite to granodiorite has been identified in the southern part of the map area (NTS 37C; Koch, 1973; Koch, 1974; Lake Sillard). The gneiss is grey-weathering until is locally foliated, yielding a steely appearance, and is pervasively treated. Intrusive bodies that range from granodiorite to monzogranite (**Ag**) are present throughout the area. A range of ages, from 2729+ 2/-2 Ma to 2711±2 Ma, is reported for 6 separate **Ag** intrusions in the Eqe Bay-Isortoq Fiord area (Bethune and Scammell, 1997). Rocks of the Mary River Group (**Amm**, **Aem**, **Aum**) are intruded by a suite of monzonite to granite plutons (the type Mary River area is 2709+ 4/-3 Ma (Jackson et al., 1990). Ultramafic rocks, ranging from serpentinite to hornblendite (**Aum**), foliated to schistose and dark green to brown weathering, have been identified within unit Amm (Jackson et al., 1990; Scott, 1997). Rocks of the Mary River Group are subjected to the northern margin of the Foxe Fold Belt (Jackson and Taylor, 1972).

A suite of plutons that ranges from granite to granodiorite (**Aggn**) has been named the Lake Harbour plutonic complex (Schau, 1983). Tectonite, these rocks range from massive and equigranular to porphyritic. Inclusions of tonalitic gneiss are present locally. Similar granitic rocks have yielded ages of 2729 and 2758 Ma southwest of the present map area (Hutch, 1983), suggesting that 2.73-2.71 Ga granitic magmatism occurred throughout the map area.

The Melville Peninsula gneiss complex (**Aamp**) designates regions where rocks have an undeciphered assemblage of well layered granitoid gneiss (**Aggn**); rocks of the Hall Lake plutonic complex (**Ahl**); and metabasaltic gneiss.

Supracrustal rocks

Baffin Island: Mary River Group (**Aamv** to **Aaum**)

The Archean supracrustal rocks of the Mary River Group, northern Baffin Island, comprise dominantly siliciclastic and mafic-volcanic rocks preserved at upper greenschist to amphibolite facies conditions. Little is known of the primary stratigraphic relationships within the Mary River Group. The Mary River Group has been subdivided into four fault-bounded packages, Mary River (NTS 37D), Deep, Mikkel, Jackson, 1990, 1991b) and Eqe Bay (NTS 37C; Bethune and Scammell, 1997), and references within). It has been suggested that similar Archean supracrustal rocks on the Melville Peninsula, the Prince Albert Group are correlative with the Mary River Group, collectively comprising part of Core-nother Dogan (Jackson, in press).

The Mary River Group is a complex metavolcanic rocks (**Aaem**) are stratigraphically lowest in the sequence, preserved as big, lenticular, tectonic slivers within the Mary River Group. Ultramafic rocks (**Aaum**) are present in the Mary River, the iron formation (**Aaif**) that is a characteristic feature of the Mary River Group throughout Baffin Island occurs near the base of the exposed section, with turbidic orthoquartzite (Jackson, in press). The iron formation contains gneiss dominantly oxide, aluminous and silicate-facies, whereas carbonate facies has only locally been identified. Rocks of the Mary River Group are intruded by a suite of monzonite to granite plutons (the type Mary River area is 2709+ 4/-3 Ma (Jackson et al., 1990). Ultramafic rocks, ranging from serpentinite to hornblendite (**Aum**), foliated to schistose and dark green to brown weathering, have been identified within unit Amm (Jackson et al., 1990; Scott, 1997). Rocks of the Mary River Group are subjected to the northern margin of the Foxe Fold Belt (Jackson and Taylor, 1972).

Deep volcanic rocks (**Aem**) are minor, where present, they consist of dacite, rhyodacite and various fragmental units. A sample of dacite from the type area of the Mary River Group is 2776 ±2 Ma (U-Pb; Jackson et al., 1990). A rhyodacite from the Eqe Bay greenstone belt, overlying the basal mafic volcanic package, is interpreted to be at least 2732+ 6/-7 Ma, but may be (in part) far as old as 2755±1 Ma (Bethune and Scammell, 1997). In the eqe of Isortoq Fiord, greenstone belt, a quartz-feldspar porphyry interpreted as synvolcanic with felsic volcanism has been dated at 2733±1 Ma (Bethune and Scammell, 1997). Felsic volcanic rocks are locally intruded by ultramafic rocks (**Aum**) of uncertain ultramafic rocks. Metapelitic quartzite, locally containing garnet and staurolite, (**Aaqm**) represent compositional layering ranges from thinly laminated to massive and very thickly bedded; recognizable turbiditic structures are preserved in some of the less deformed metasedimentary rocks. Quartzite, locally with minor pelite, is the most common sediment type. Iron formation (**Aaif**) is a characteristic feature of the Mary River Group throughout Baffin Island.

Medium to coarse-grained, dark greenish-grey amphibole (**Aaam**) is foliated to massive; these rocks may represent sills or thicker volcanic flows. Pale grey to white weathering meta-anorthosite (**Aaan**), preserving variable amounts of pyroxene, is found locally in association with rocks of the Mary River Group. Rocks of ultramafic composition (**Aaum**), comprising actinolite, chlorite, talc, hornblende, and serpentine, locally with diopside and/or garnet, are dark greenish black to black. They range from fine to medium-grained, are finely foliated to intensely sheared; some of these rocks may represent volcanic flows or thin sills. Textures interpreted as deformed and metamorphosed spinifex have been described from the Mary River area (Jackson, 1970b). Where detailed observations have not been made, or the distribution of rock types is too intricate to be shown at the present scale, occurrences of Mary River Group strata are designated as undivided (**Aava**).

Melville Peninsula: Prince Albert Group (**Aava**) (southern sheet only)

The Archean supracrustal rocks of the Prince Albert Group, Melville Peninsula, comprise chiefly mafic to ultramafic volcanic rocks, siliciclastic units and thin iron formation units that are preserved at upper greenschist to amphibolite facies conditions (**Aava**). An age of 2879 Ma has been reported for a rhyolite sampled on the Melville Peninsula (Henderson, 1985; Henderson, 1989; Fahrig, 1987). The Prince Albert Group has been subdivided into four sections of the Prince Albert Group in the Richards Bay area, northwestern Melville Peninsula (Isherwood of Goodwin, 1970 47D has been described in detail (Schau, 1987).

At Richards Bay, a 3000 m section of the Prince Albert Group has been divided into three formations. Neither the stratigraphic base nor top of the greenschist facies section is preserved, hence the thickness is considered a minimum. The lowermost Aava formation, Richards Bay Formation (**Aavrb**) comprises quartzite and conglomerate overlain by sedimentary rocks and minor conglomerate, overlain by a thin package of iron formation. A 1000 m siliciclastic interval (Richards Bay Formation) (**Aavsb**) comprises quartzite and conglomerate overlain by followed calcalbitite basalt, tuff bacious sedimentary rocks and oxide facies iron formation. The upper 2600 m (Mount Sabine Formation) (**Aavms**) comprises a followed tholeiitic to komatiitic basalt package overlain by volcanic breccias, siltstone, sandstone and cross-bedded arenite, mafic to ultramafic volcanic rocks, conglomerate, and arkosic grits. The sequence was folded prior to several episodes of faulting and granitoid pluton emplacement.

Deformation and metamorphism

A complex history of Archean metamorphism and deformation is recorded in the orthogneisses in the map area. The paucity of detailed observations precludes an in-depth discussion here. Field relationships indicate that at least one phase of deformation and high-grade metamorphism predates the ~2.76-2.72 Ga Mary River Group (Jackson and Davidson, 1975b; Jackson et al., 1975b; Jackson, in press). Two phases of deformation have been identified within the Mary River Group (Jackson et al., 1990; Jackson, in press). The first is characterized by tight to isoclinal folds with a north-south axial trend. The second is a broad, open to tight, east-west trending fold. The Mary River Group is unconformably below the turbiditic sedimentary rocks. At Eqe Bay, both events are younger than a 2714±2 Ma megacyclic granite that is foliated and folded (Bethune and Scammell, 1997). A penetrative (sub-)vertical foliation is developed in the Mary River Group. This foliation is well-developed in the Mary River Group and is the result of the highgrade event (Jackson et al., 1990; Jackson, in press). Greenschist facies retrogression is widespread in the Mary River Group (Jackson, in press). A metamorphic age of 2689±14 Ma has been reported from a granitoid cobble in a conglomerate at Eqe Bay (Bethune and Scammell, 1997), interpreted as a post-sedimentation event. The mafic component of a metabolic migmatite near the head of Cambridge Fiord yielded an age of 2734 ± 59/-46 Ma, whereas the leucosome phase gave an age of 2620 ± 11/-10 Ma (Jackson et al., 1995), clearly indicating a latest-Archean high-grade metamorphic event.

### ARCHEAN AND/OR PALEOPROTEROZOIC

Baffin Island (**Apfgr** to **Apfmu**)

Discrete bodies of foliated quartz monzonite-granodiorite, and less commonly granite (**Apfgr**), are present north-east of Mary River Group rocks, south of Foxe Fold Belt (Jackson et al., 1990). Compositional layering, ranging from faint layering and schlieren are present locally, as are mafic lenses and potassium feldspar augen. Along the eastern eqe of the map (north of Bodt Inlet, NTS 37D), homogeneous quartz-biotite-feldspar gneiss (**Apfhgn**) is present. The overall composition of the gneiss is granodiorite that is typically fine to medium grained and ranging from massive to foliated. Indistinct layering has been observed locally.

A unit of undifferentiated gneisses and mixed rocks (**Apfmu**) comprises mainly undivided **Amm**, minor supracrustal rocks (**Aava?**), veined gneiss, and agmatite, as well as possibly younger components such as **pPhg**, **pPmg**, and **pPgr**. Rocks of this unit have been intruded by granitoid rocks of the Prince Albert Group. The distribution of orthogneiss in crystalline Archean and Paleoproterozoic rocks is outlined by the orthogneisses isograd.

### PALEOPROTEROZOIC

Supracrustal rocks

Piling Group (**pPmb** to **pPmfo**) (southern sheet only)

The siliciclastic and carbonate rocks of the Piling Group on Baffin Island comprise the central exposures of an extensive sedimentary basin. The Piling Group has been correlated with the Penrhyn Group, Victoria Island Archipelago (Jackson Group, Henderson, 1987; Henderson, 1989a, 1989b, 1989c and subsequent to the coast of West Greenland (Rink Group; Taylor, 1982; Henderson and Pulvertaft, 1987). The exposures of the Piling Group that are shown in the southeast corner the present map are only a small proportion of the package on Baffin Island (Henderson, 1985a, 1985b; Wheeler et al., 1996). The rocks are preserved in a northeast to east-trending synformal structure; metamorphic grade increases from greenschist facies in the south to upper amphibolite facies in the northern margin to greenschist toward the core of the synform (Morgan et al., 1979; 1979; Jackson and Morgan, 1978).

The stratigraphically lowest unit of the Piling Group is the Dewar Lakes formation (**pPmd**) that consists of grey to white-weathering quartzite and feldspathic quartzite. Bedding ranges from finely laminated to massive. Minor amounts of muscovite schist, commonly with sillimanite, as well as rare rusty horizons, are present. Detrital zircons from a single sample of Dewar Lakes quartzite (base of the section) yield a maximum age of deposition of 2.2 Ga (Henderson, 2.85-2.84 Ga, the other 2.18-2.16 Ga (Henderson and Parrish, 1992). The older component may have been derived from the Archean rocks of the Churchill Province to the west. Overlying the Dewar Lakes formation is a 1000 m siliciclastic deltaic (e.g. Lake Harbour Group, Talyzaik pregnanite) or NE Lauretta (Scott and Gauthier, 1996; Scott, 1997). The Fort Lake formation (**pPmf**) comprises white to grey weathering dolostone, marble and calcsilicate gneiss, with minor siliciclastic rocks, rare rusty schist and quartzite. Stromatolites are locally abundant in the carbonate rocks. Bedding, generally centimetres to tens of centimetres thick and can be followed along strike for tens of metres. Thicknesses of up to several hundreds of metres are seen in the vicinity of Fort Lake at the southern edge of the map area.

The Astarte River formation (**pPmr**) is dominantly a rusty-weathering sulphide schist, interlayered with subordinate siliciclastic metasediments, calcsilicate and pelite, and minor sulphide-facies iron formation. Metamorphic iron formation (**pPmf**), principally oxide facies with subordinate silicate facies varies from fine to coarse-garnet and finely laminated and up to coarsely bedded. Minor amounts of quartzite, pelemite, mafic volcanics and amphibolite horizons are included in this map unit.

The Longstaff Bluff formation (**pPmb**) comprises a relatively homogeneous sequence of grey-weathering pelitic rocks that are volumetrically the most important component of the Piling Group. Rocks of the Longstaff Bluff formation are such as compositional variation from sandstone to mudstone and clast size grading, are well preserved and has led to the recognition of several lithofacies and depositional environments (Jackson et al., 1975a; Jackson, 1975). Minor amounts of rusty schist and calcsilicate rocks are also present in the Longstaff Bluff formation. Restricted occurrences of Piling Group strata that lie to the north of the principal continuous belts have not been internally subdivided (**pPmu**).

Baffin Island (**pPmo** to **pPmk**)

Banded migmatite (**pPmo**) occurs commonly with pelite and grey granitic rocks that are interbedded with, and commonly containing schlieren of gray to black rocks of mafic composition. Rocks of this unit vary from medium to fine grained, and contain minor components of biotite, garnet, sillimanite, cordierite, amphibole, pyroxene, metamorphosed anorthositic gabbro and late pegmatite granite dykes. Potassium feldspar megacrysts are abundant locally.

Pink to white weathering, fine-grained, massive to foliated granite (**pPmg**) is a distinctive, quartz monzonite composition, is present throughout the map area. This rock of this unit contain abundant schlieren, nebulae and potassium feldspar porphyroblasts. Components vary from foliated to thinly banded and massive.

Massive granite-granodiorite (**pPmgr**), chiefly quartz monzonite to granodiorite, weathers pink and commonly contains garnet and megacrysts, with abundant apatite and pegmatite dykes. Such dykes and sills are commonly present in older rocks. A weak lineation is present locally. Hypersthene-quartz monzonite (not shown) is included in hypersthene granite (**pPmgr**) and minor hypersthene granite (charnockite) (**pPhg**) are associated with massive granite-granodiorite. Hypersthene-quartz monzonite is well exposed in the Eqe Bay area, where it is cut by a suite of dolerite dykes (Bethune and Scammell, 1997). Hypersthene-bearing rocks are observed throughout the unit. Porphyritic granite is granodiorite (**pPgr**) weathers light grey, greyish-pink to pink, and is typically medium grained. Compositions range less commonly from granite to monzogranite. Hypersthene is ubiquitous but generally less than 1 modal percent. Rocks of this unit are interpreted as part of the Nanisivik-Prince Pillars Group at Nanisivik Point has been dated at 1621 ± 7/-4 Ma (Bethune and Scammell, 1997).

Deformation and metamorphism

There is widespread evidence of Paleoproterozoic deformation, and, a strong, ambient thermal overprint throughout the entire map area. In Archean rocks, Rb-Sr systematics commonly yield ages intermediate between Archean and Paleoproterozoic, and K-Ar ages (hornblende, muscovite and biotite) are dominantly 1.9-1.8 Ga (Jackson, 1965; Fahrig, 1967a; Fahrig, 1967b; Schau, 1974; Henderson, 1985; Henderson, 1989; Henderson, 1990; Henderson, 1991). The pervasive nature of the ages suggests that the entire Archean rocks (Morgan et al., 1979) suggests that the rocks of the Piling Group were buried to depths sufficient for hydrated-varying thrusting. Archean and Paleoproterozoic rocks are in the vicinity of the Baffin Island Shear Zone, which is a major, Paleoproterozoic, transpressional zone of high-strain, Lithoprobe seismic profile (Jackson et al., 1990; Jackson, 1990; Jackson, 1990; in press). Two phases of deformation have been identified within the Piling Group (Jackson et al., 1975a; Jackson, in press). The first is characterized by tight to isoclinal folds with a north-south axial trend. The second is a broad, open to tight, east-west trending fold. The Piling Group is unconformably below the turbidite sedimentary rocks. At Eqe Bay, both events are younger than a 2714±2 Ma megacyclic granite that is foliated and folded (Bethune and Scammell, 1997). A penetrative (sub-)vertical foliation is developed in the Piling Group. This foliation is well-developed in the Piling Group and is the result of the high-grade event (Jackson et al., 1975a; Jackson, in press). Greenschist facies retrogression is widespread in the Piling Group (Jackson, in press). A metamorphic age of 2689±14 Ma has been reported from a granitoid cobble in a conglomerate at Eqe Bay (Bethune and Scammell, 1997), interpreted as a post-sedimentation event. The mafic component of a metabolic migmatite near the head of Cambridge Fiord yielded an age of 2734 ± 59/-46 Ma, whereas the leucosome phase gave an age of 2620 ± 11/-10 Ma (Jackson et al., 1995), clearly indicating a latest-Archean high-grade metamorphic event.

### PALEOPROTEROZOIC

Baffin Island (**pPmfo** to **pPmfm**) (southern sheet only)

Medium to coarse-grained, dark green-grey amphibolite (**Aaam**) is foliated to massive; these rocks may represent sills or thicker volcanic flows. Pale grey to white weathering meta-anorthosite (**Aaan**), preserving variable amounts of pyroxene, is found locally in association with rocks of the Mary River Group. Rocks of ultramafic composition (**Aaum**), comprising actinolite, chlorite, talc, hornblende, and serpentine, locally with diopside and/or garnet, are dark greenish black to black. They range from fine to medium-grained, are finely foliated to intensely sheared; some of these rocks may represent volcanic flows or thin sills. Textures interpreted as deformed and metamorphosed spinifex have been described from the Mary River area (Jackson, 1970b). Where detailed observations have not been made, or the distribution of rock types is too intricate to be shown at the present scale, occurrences of Mary River Group strata are designated as undivided (**Aava**).

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At Richards Bay, a 3000 m section of the Prince Albert Group has been divided into three formations. Neither the stratigraphic base nor top of the greenschist facies section is preserved, hence the thickness is considered a minimum. The lowermost Aava formation, Richards Bay Formation (**Aavrb**) comprises quartzite and conglomerate overlain by sedimentary rocks and minor conglomerate, overlain by a thin package of iron formation. A 1000 m siliciclastic interval (Richards Bay Formation) (**Aavsb**) comprises quartzite and conglomerate overlain by followed calcalbitite basalt, tuff bacious sedimentary rocks and oxide facies iron formation. The upper 2600 m (Mount Sabine Formation) (**Aavms**) comprises a followed tholeiitic to komatiitic basalt package overlain by volcanic breccias, siltstone, sandstone and cross-bedded arenite, mafic to ultramafic volcanic rocks, conglomerate, and arkosic grits. The sequence was folded prior to several episodes of faulting and granitoid pluton emplacement.

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### ARCHEAN AND/OR PALEOPROTEROZOIC

Baffin Island (**Apfgr** to **Apfmu**)

Discrete bodies of foliated quartz monzonite-granodiorite, and less commonly granite (**Apfgr**), are present north-east of Mary River Group rocks, south of Foxe Fold Belt (Jackson et al., 1990). Compositional layering, ranging from faint layering and schlieren are present locally, as are mafic lenses and potassium feldspar augen. Along the eastern eqe of the map (north of Bodt Inlet, NTS 37D), homogeneous quartz-biotite-feldspar gneiss (**Apfhgn**) is present. The overall composition of the gneiss is granodiorite that is typically fine to medium grained and ranging from massive to foliated. Indistinct layering has been observed locally.

A unit of undifferentiated gneisses and mixed rocks (**Apfmu**) comprises mainly undivided **Amm**, minor supracrustal rocks (**Aava?**), veined gneiss, and agmatite, as well as possibly younger components such as **pPmg**, **pPmg**, and **pPgr**. Rocks of this unit have been intruded by granitoid rocks of the Prince Albert Group. The distribution of orthogneiss in crystalline Archean and Paleoproterozoic rocks is outlined by the orthogneisses isograd.

### PALEOPROTEROZOIC

Supracrustal rocks

Piling Group (**pPmb** to **pPmfo**) (southern sheet only)

The siliciclastic and carbonate rocks of the Piling Group on Baffin Island comprise the central exposures of an extensive sedimentary basin. The Piling Group has been correlated with the Penrhyn Group, Victoria Island Archipelago (Jackson Group, Henderson, 1987; Henderson, 1989a, 1989b, 1989c and subsequent to the coast of West Greenland (Rink Group; Taylor, 1982; Henderson and Pulvertaft, 1987). The exposures of the Piling Group that are shown in the southeast corner the present map are only a small proportion of the package on Baffin Island (Henderson, 1985a, 1985b; Wheeler et al., 1996). The rocks are preserved in a northeast to east-trending synformal structure; metamorphic grade increases from greenschist facies in the south to upper amphibolite facies in the northern margin to greenschist toward the core of the synform (Morgan et al., 1979; 1979; Jackson and Morgan, 1978).

The stratigraphically lowest unit of the Piling Group is the Dewar Lakes formation (**pPmd**) that consists of grey to white-weathering quartzite and feldspathic quartzite. Bedding ranges from finely laminated to massive. Minor amounts of muscovite schist, commonly with sillimanite, as well as rare rusty horizons, are present. Detrital zircons from a single sample of Dewar Lakes quartzite (base of the section) yield a maximum age of deposition of 2.2 Ga (Henderson, 2.85-2.84 Ga, the other 2.18-2.16 Ga (Henderson and Parrish, 1992). The older component may have been derived from the Archean rocks of the Churchill Province to the west. Overlying the Dewar Lakes formation is a 1000 m siliciclastic deltaic (e.g. Lake Harbour Group, Talyzaik pregnanite) or NE Lauretta (Scott and Gauthier, 1996; Scott, 1997). The Fort Lake formation (**pPmf**) comprises white to grey weathering dolostone, marble and calcsilicate gneiss, with minor siliciclastic rocks, rare rusty schist and quartzite. Stromatolites are locally abundant in the carbonate rocks. Bedding, generally centimetres to tens of centimetres thick and can be followed along strike for tens of metres. Thicknesses of up to several hundreds of metres are seen in the vicinity of Fort Lake at the southern edge of the map area.

The Astarte River formation (**pPmr**) is dominantly a rusty-weathering sulphide schist, interlayered with subordinate siliciclastic metasediments, calcsilicate and pelite, and minor sulphide-facies iron formation. Metamorphic iron formation (**pPmf**), principally oxide facies with subordinate silicate facies varies from fine to coarse-garnet and finely laminated and up to coarsely bedded. Minor amounts of quartzite, pelemite, mafic volcanics and amphibolite horizons are included in this map unit.

The Longstaff Bluff formation (**pPmb**) comprises a relatively homogeneous sequence of grey-weathering pelitic rocks that are volumetrically the most important component of the Piling Group. Rocks of the Longstaff Bluff formation are such as compositional variation from sandstone to mudstone and clast size grading, are well preserved and has led to the recognition of several lithofacies and depositional environments (Jackson et al., 1975a; Jackson, 1975). Minor amounts of rusty schist and calcsilicate rocks are also present in the Longstaff Bluff formation. Restricted occurrences of Piling Group strata that lie to the north of the principal continuous belts have not been internally subdivided (**pPmu**).

Baffin Island (**pPmo** to **pPmk**)

Banded migmatite (**pPmo**) occurs commonly with pelite and grey granitic rocks that are interbedded with, and commonly containing schlieren of gray to black rocks of mafic composition. Rocks of this unit vary from medium to fine grained, and contain minor components of biotite, garnet, sillimanite, cordierite, amphibole, pyroxene, metamorphosed anorthositic gabbro and late pegmatite granite dykes. Potassium feldspar megacrysts are abundant locally.

Pink to white weathering, fine-grained, massive to foliated granite (**pPmg**) is a distinctive, quartz monzonite composition, is present throughout the map area. This rock of this unit contain abundant schlieren, nebulae and potassium feldspar porphyroblasts. Components vary from foliated to thinly banded and massive.

Massive granite-granodiorite (**pPmgr**), chiefly quartz monzonite to granodiorite, weathers pink and commonly contains garnet and megacrysts, with abundant apatite and pegmatite dykes. Such dykes and sills are commonly present in older rocks. A weak lineation is present locally. Hypersthene-quartz monzonite (not shown) is included in hypersthene granite (**pPmgr**) and minor hypersthene granite (charnockite) (**pPhg**) are associated with massive granite-granodiorite. Hypersthene-quartz monzonite is well exposed in the Eqe Bay area, where it is cut by a suite of dolerite dykes (Bethune and Scammell, 1997). Hypersthene-bearing rocks are observed throughout the unit. Porphyritic granite is granodiorite (**pPgr**) weathers light grey, greyish-pink to pink, and is typically medium grained. Compositions range less commonly from granite to monzogranite. Hypersthene is ubiquitous but generally less than 1 modal percent. Rocks of this unit are interpreted as part of the Nanisivik-Prince Pillars Group at Nanisivik Point has been dated at 1621 ± 7/-4 Ma (Bethune and Scammell, 1997).

Deformation and metamorphism

There is widespread evidence of Paleoproterozoic deformation, and, a strong, ambient thermal overprint throughout the entire map area. In Archean rocks, Rb-Sr systematics commonly yield ages intermediate between Archean and Paleoproterozoic, and K-Ar ages (hornblende, muscovite and biotite) are dominantly 1.9-1.8 Ga (Jackson, 1965; Fahrig, 1967a; Fahrig, 1967b; Schau, 1974; Henderson, 1985; Henderson, 1989; Henderson, 1990; Henderson, 1991). The pervasive nature of the ages suggests that the entire Archean rocks (Morgan et al., 1979) suggests that the rocks of the Piling Group were buried to depths sufficient for hydrated-varying thrusting. Archean and Paleoproterozoic rocks are in the vicinity of the Baffin Island Shear Zone, which is a major, Paleoproterozoic, transpressional zone of high-strain, Lithoprobe seismic profile (Jackson et al., 1990; Jackson, 1990; Jackson, 1990; in press). Two phases of deformation have been identified within the Piling Group (Jackson et al., 1975a; Jackson, in press). The first is characterized by tight to isoclinal folds with a north-south axial trend. The second is a broad, open to tight, east-west trending fold. The Piling Group is unconformably below the turbidite sedimentary rocks. At Eqe Bay, both events are younger than a 2714±2 Ma megacyclic granite that is foliated and folded (Bethune and Scammell, 1997). A penetrative (sub-)vertical foliation is developed in the Piling Group. This foliation is well-developed in the Piling Group and is the result of the high-grade event (Jackson et al., 1975a; Jackson, in press). Greenschist facies retrogression is widespread in the Piling Group (Jackson, in press). A metamorphic age of 2689±14 Ma has been reported from a granitoid cobble in a conglomerate at Eqe Bay (Bethune and Scammell, 1997), interpreted as a post-sedimentation event. The mafic component of a metabolic migmatite near the head of Cambridge Fiord yielded an age of 2734 ± 59/-46 Ma, whereas the leucosome phase gave an age of 2620 ± 11/-10 Ma (Jackson et al., 1995), clearly indicating a latest-Archean high-grade metamorphic event.

## MESOPROTEROZOIC

Supracrustal rocks

Baffin Island: Bylot Supergroup (**mPbno** to **mPbsc**) (northern sheet only)

The Bylot Supergroup (Lemon and Blackadar, 1963) comprises up to 6100 m of well-preserved, widely to non-metamorphosed sequence of siliciclastic and carbonate rocks. The Bylot Supergroup is equivalent to the Borden Basin (Jackson and Blackadar, 1963; Jackson et al., 1990; Jackson, 1992). The rocks are preserved in a series of northeast-trending, fault-bounded, tilted blocks. The Bylot Supergroup is correlative with the Shaler Supergroup on Victoria Island and has been correlated with the Bylot Supergroup on Baffin Island (Jackson et al., 1990; Jackson, 1992). The Bylot Supergroup, Baffin Island and Melville Peninsula) and northern Greenland (Thule Group) (Jackson and Iannelli, 1981).

The base of the Bylot Supergroup is a regional unconformity. Basal units, commonly overlying the Archean and Paleoproterozoic crystalline basement, is the Nauyat Formation (**mPbno**). It consists of up to 430 m of thinly laminated to medium bedded, quartz arenite, quartzite, minor siltstone and shale. Minor amounts of chert, dolomite, and sandstone have been found and minor quartzite conglomerate has been observed at the base of the section. The Nauyat Formation is overlain by the Allen Bay Formation (**mPbsa**) and consists of up to 1250 m of dolomite, shale, and minor limestone. The Allen Bay Formation is overlain by the Karrat Formation (**mPbsc**) and consists of up to 1250 m of quartz arenite, siltstone, and shale. The Karrat Formation is overlain by the Society Cliffs Formation (**mPbsc**) in the Borden Peninsula (Jackson and Iannelli, 1981). Outside the Borden Peninsula, the