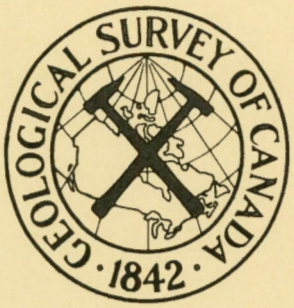

GEOLOGICAL
SURVEY
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CANADA

DEPARTMENT OF ENERGY,
MINES AND RESOURCES

PAPER 73-10

THREE NEW LOWER PALEOZOIC FORMATIONS OF THE BOOTHIA PENINSULA REGION, CANADIAN ARCTIC ARCHIPELAGO

(Report, 1 figure, 2 tables and 3 plates)

R. L. Christie

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ABSTRACT

Three newly named lower Paleozoic formations occur on Boothia Peninsula and this sequence of strata overlies nonconformably rocks of the Canadian Shield. The new formations include, for this region, the oldest bedded rocks of the Interior Platform. The lower Paleozoic strata are preserved on the flanks of Boothia Uplift and as outliers within the Precambrian terrane. The outliers are made up largely of the lower two formations, whereas the upper formation underlies large areas east and west of the Boothia Precambrian belt.

The basal unit, the Boothia Felix Formation, comprises sandstone and sandy dolomite, is about 350 feet (110 m) thick, and contains Middle Cambrian fossils. It is overlain by the Netsilik Formation, which consists of silty and sandy dolomite, dolomite, and intraformational conglomerate and breccia. This unit is about 500 feet (150 m) thick and has yielded Early Ordovician fossils. The youngest unit, the Franklin Strait Formation, which comprises dolomite and sandy dolomite, is more than 2,000 feet (600 m) thick, and probably ranges in age from Middle Ordovician to Middle Silurian.

RÉSUMÉ

On trouve trois formations du Paléozoïque inférieur qui ont reçu leur nom récemment dans la presqu'île de Boothia et cette série de strates recouvre en discordance les roches du Bouclier canadien. Ces nouvelles formations comprennent, dans cette région, les plus vieilles roches litées du plateau Intérieur. Les strates du Palézoïque inférieur sont préservées sur les flancs du soulèvement de Boothia et sous forme d'avant-buttes dans le terrain précambrien. Les avant-buttes sont surtout constituées des deux formations inférieures, alors que la formation supérieure repose sous de vastes secteurs est et ouest de la zone précambrienne de Boothia.

La formation de Boothia Felix, formation inférieure, comprend du grès et de la dolomie sableuse; elle a environ 350 pieds (110 m) d'épaisseur et contient des fossiles du Cambrien moyen. Elle est recouverte par la formation de Netsilik, constituée de dolomie silteuse et sableuse, de dolomie, de conglomérats et de brèches intraformationnels. Ce groupe a environ 500 pieds (150 m) d'épaisseur et a donné des fossiles de l'Ordovicien inférieur. La formation de Franklin Strait, qui est la plus récente, comprend de la dolomie et de la dolomie sableuse; elle a plus de 2,000 pieds (600 m) d'épaisseur, et son âge varie probablement de l'Ordovicien moyen au Silurien moyen.

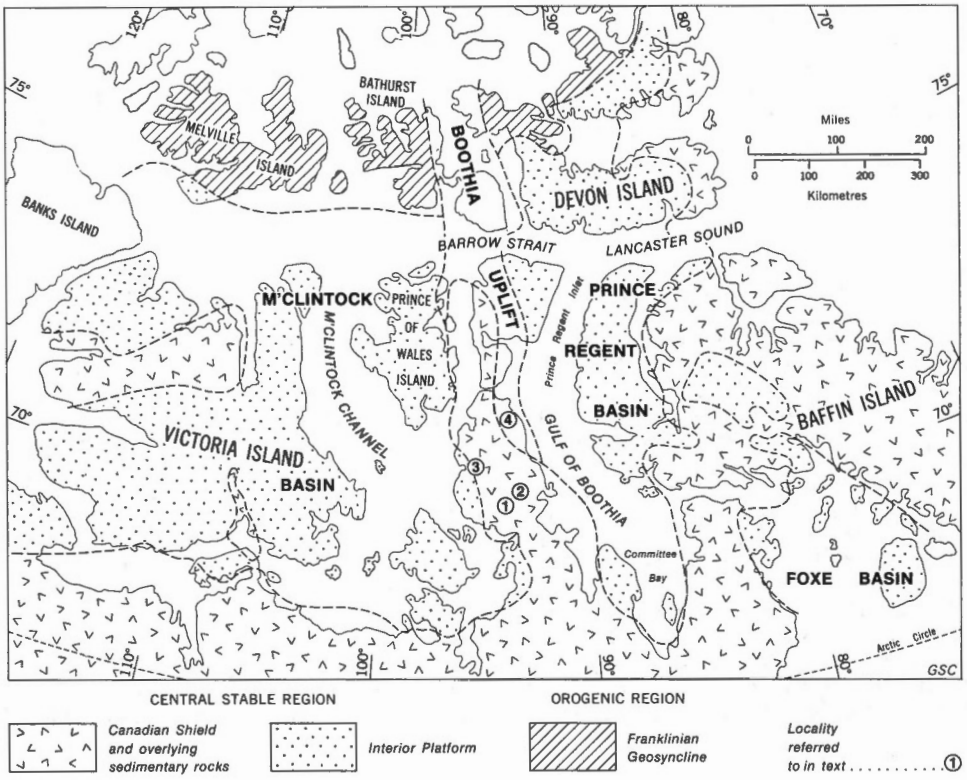

Figure 1. Index map showing stratigraphic-structural provinces of the central Canadian Archipelago

THREE NEW LOWER PALEOZOIC FORMATIONS OF THE BOOTHIA PENINSULA REGION, CANADIAN ARCTIC ARCHIPELAGO

INTRODUCTION

Boothia Peninsula is the northernmost extremity of the mainland of North America and extends more than 200 miles (340 km) into the southern part of the Canadian Arctic Archipelago. Neighbouring islands of the archipelago include King William and Prince of Wales Islands to the west, Somerset Island to the north, and Baffin Island to the east (Fig. 1). A narrow, topographically high belt of Precambrian basement rock trends north-northwest through the region, dominating the geology of Boothia Peninsula, eastern Prince of Wales Island, and western Somerset Island. Lowlands and plateaus to the east and west are underlain by moderately deformed lower Paleozoic[1] carbonate and clastic rocks (Fig. 1).

This report names and defines the three oldest Paleozoic rock units in the Boothia region[2], and discusses the distribution and correlation of these units.

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[1]The term "lower Paleozoic" is used in this report to include Cambrian, Ordovician, Silurian, and Devonian rocks.

[2]Boothia region, as used in this report, refers to the area covered by Operation Prince of Wales, namely: Boothia Peninsula, King William, Prince of Wales, and western Somerset Islands.

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FIELD WORK

This report is based on field work carried out in the summer of 1962 during Operation Prince of Wales, an air-supported project led by R. G. Blackadar (1967). The writer, a member of the project, was responsible for the study of the lower Paleozoic rocks of the Boothia Peninsula region, and his party was supported mainly by a Piper Super Cub aircraft equipped with oversize, low-pressure tires to allow landings on unprepared terrain. In the course of Operation Prince of Wales, the writer's studies ranged over Boothia Peninsula and King William, Prince of Wales, and Somerset Islands (Christie, 1963, 1967a).

Access to the region is generally by aircraft via Cambridge Bay in the western Arctic. The small settlement of Spence Bay, on the west side of Boothia Isthmus, includes a Hudson's Bay store, a nursing station, a Royal Canadian Mounted Police detachment, Territorial government offices and school, and church missions. Heavy freight from the south for Spence Bay usually is carried by ship via the Mackenzie River and coastal shipping route.

EARLY GEOLOGICAL WORK

Boothia Peninsula was discovered and named by Capt. John Ross (1835) of the Royal Navy during one of the early attempts to find the Northwest Passage. From 1829 to 1831, Ross wintered his ship Victory in harbours on the east coast of Boothia Peninsula. It was during this time that Ross' nephew, James Ross, made an extended overland journey to the west coast of the peninsula where he discovered the north magnetic pole and gathered considerable geological data. Other contributions to the geology of the region in the nineteenth century include that of Leopold M'Clintock (1857, 1859). Observations made by the Rosses and by M'Clintock formed a significant contribution to the Reverend Samuel Haughton's classical account (Haughton, 1857, 1859) of the geology of the Arctic Islands.

Virtually no new geological information was obtained from the Boothia region until the Geological Survey of Canada began systematic studies in the Arctic Islands in 1947.

RECENT GEOLOGICAL STUDIES

Recent studies in the Boothia region began in 1947. In that year, Y. O. Fortier of the Geological Survey of Canada accompanied a Dominion Observatory party that carried out a geomagnetic reconnaissance of much of the northern mainland and some of the southern islands of the archipelago in an R.C.A.F. amphibious Canso aircraft. A landing was made at Agnew River, on the east side of Boothia Peninsula (about Lat. 70°38'N, Long. 92°40'W), and the rocks and glacial features were examined. Fortier (1948, p. 8-10) provided a general description of the geological structure and the physiography of the region.

A reconnaissance study of the physiography of Boothia Isthmus was carried out by J. K. Fraser in 1953. The distribution of the crystalline Precambrian basement and the overlying Paleozoic rocks was described in some detail, as were many glacial features and deposits (Fraser, 1958).

The geology of the northern parts of Prince of Wales and Somerset Islands was examined during Operation Franklin, an airborne reconnaissance project of the Geological Survey of Canada. Ordovician and Silurian fossils

were collected from beds flanking the Boothia Precambrian belt, and it was noted that these beds apparently predate the Boothia Uplift. A latest Silurian or Early Devonian date for the start of tectonism in the Boothia region was established, as was the synorogenic nature of the clastic Peel Sound Formation (Thorsteinsson and Tozer, 1963, p. 120, 121, 125).

In 1962, as noted earlier, the Geological Survey of Canada extended its program of geological reconnaissance into the Boothia region as Operation Prince of Wales. The general geology of the region derived from this and earlier field work has been described in the following publications: the basement complex, by R. G. Blackadar (1967); the surficial geology of the Boothia region, by B. G. Craig (1964); and the general stratigraphy and tectonic history, by J. Wm. Kerr and R. L. Christie (1965). Two of the formations named in the present report were noted, and some characteristics described, by Christie (1963, 1967a).

Paleozoic formations of Boothia region were studied on Somerset and Prince of Wales Islands in the course of petroleum exploration in 1959 and subsequent years. Ordovician and Silurian fossils were collected from the zone of upturned beds on the west flank of the Precambrian belt; these beds tentatively had been assigned a Proterozoic age, during Operation Franklin, because of the presence of (adjacent) layered rocks with basic dykes.

Field parties from the University of Ottawa, headed by D. L. Dineley, have carried out geological work on Somerset and Prince of Wales Islands on a continuing basis since 1964 (see Dineley, 1965, 1966). Considerable petrological, paleontological, and structural data on the Precambrian and lower Paleozoic rocks were collected by this group. Interpretation of the Precambrian and early Paleozoic tectonic history of the Boothia Uplift was achieved through study of the geometry, both macroscopic and microscopic, of structural cross-sections of the basement rocks (Brown *et al.*, 1969). The origin and tectonic relationships of the overlying upper Precambrian and lower Paleozoic clastic and carbonate rocks were considered by Tuke, Dineley, and Rust (1966). They favoured an early Paleozoic age assignment for sill- and dyke-bearing units (Aston and Hunting Formations; previously considered to be of Proterozoic age) and correlated these with the basal Paleozoic beds of Boothia Peninsula. Sections of the Aston Formation on Prince of Wales Island were measured by O. A. Dixon, S. R. Williams, and J. Dixon (1971) and, based on the lithology, they concluded that the detritus was derived from contemporary land areas on the site of the present Boothia Uplift. The youngest of the lower Paleozoic units, the Peel Sound Formation, was studied by A. D. Miall (1970a, b), who described in detail the alluvial and deltaic characteristics of the unit.

The nature and relationships of all the cover rocks, ranging in age from possible Proterozoic to Cretaceous-Tertiary, were outlined by B. R. Rust (*in* Brown *et al.*, 1969). A limited area of Cretaceous-Tertiary beds on Somerset Island, described by Dineley and Rust (1968), provides evidence for relatively late tectonic subsidence in the Boothia region.

ACKNOWLEDGMENTS

The writer wishes to express appreciation for skilled piloting by John Pridie (47 G 2A helicopter) of Spartan Air Services and by Ken MacLennan (Piper Super Cub) of Bradley Air Services. W. W. Nassichuk assisted in the field and later, on the Survey staff, provided valuable advice in the office. Fossils were determined by: G. W. Sinclair, A. W. Norris, and T. E. Bolton, Geological Survey of Canada; J. W. Cowie, University of Bristol; and A. J. Rowell, University of Nottingham.

STRATIGRAPHY

GENERAL STATEMENT

Boothia Peninsula and the nearby islands lie within the Interior Platform structural-stratigraphic province, a region characterized by generally horizontal or gently dipping lower Paleozoic strata and by relatively thin formations. The Paleozoic beds in the Boothia region form two basinal areas that are separated by an uplifted belt. The basins are the M'Clintock Basin to the west, and the Prince Regent Basin to the east (*see* Christie, 1972, p. 50-53). The intervening tectonic high is the Boothia Uplift, a belt of Precambrian, mainly gneissic rocks and flanking Cambrian to Devonian disturbed sedimentary rocks that extends northward from the Canadian Shield into the Paleozoic lowlands of the Arctic Archipelago (*see* Christie, 1972, p. 73-77; Thorsteinsson, 1970, p. 549; Kerr and Christie, 1965). Cambrian clastic and carbonate beds, the oldest known rocks of the cratonic basins flanking the Boothia Uplift, are exposed along the margins of the basins and as downfaulted outliers on the uplift (*see* Fig. 1). Overlying Ordovician to Silurian dolomitic beds are exposed widely both in basinal regions and in outliers. The Silurian Read Bay Formation of thin-bedded limestones overlies the dolomites and is widely exposed in the basinal regions. The Peel Sound Formation of latest Silurian or younger age, consisting of conglomerate and sandstone, overlies the Read Bay Formation on Prince of Wales and Somerset Islands to form the youngest lower Paleozoic unit.

The clastic and carbonate beds underlying the Read Bay Formation of the Boothia region are recognized here as three new units. The lowermost unit consists of clastic and carbonate beds containing Middle Cambrian fossils, and is named here the Boothia Felix Formation; overlying clastic and carbonate beds with Early Ordovician fossils are named the Netsilik Formation; and light grey weathering dolomite beds form the uppermost of the new units, here named the Franklin Strait Formation.

Because of the general similarity of beds here assigned to the Boothia Felix and Netsilik Formations, they were regarded earlier as one map-unit: unit 8 of Geological Survey of Canada Map 36-1963 (Christie, 1963). Subsequent determination of fossils of Early Ordovician age in the upper part of the map-unit indicates, however, that two lithological units are involved (*see* Table 1). Moreover, the absence of Late Cambrian fossils in a thin sequence of beds containing both Middle Cambrian and Early Ordovician fossils suggests that the units are separated by a profound hiatus.

The Franklin Strait Formation was recognized and mapped during Operation Prince of Wales as map-unit 9 of GSC Map 36-1963 (Christie, 1963).

PRECAMBRIAN

The 'crystalline basement' of the Boothia region is a varied assemblage of gneisses and granitoid rocks of the Churchill Structural Province (*see* Stockwell, 1970). Rocks characteristically present include: banded *lit-par-lit* gneisses, migmatite, amphibolite, pyroxene- and biotite-rich gneisses, quartz-microcline gneisses with garnet, and granite. Potassium-argon age determinations of 1,635 ± 50 and 1,670 ± 50 m.y. were obtained for gneisses, and 1,660 m.y. for a specimen of granite. An Aphebian age (closing with the Hudsonian Orogeny, mean K-Ar age: 1,735 m.y.) for the latest period of metamorphism is indicated (Blackadar, 1967).

	Christie, 1963	This report	Lithology and thickness
SILURIAN AND ? DEVONIAN	*PEEL SOUND*	*PEEL SOUND*	*conglomerate, sandstone*
SILURIAN	*READ BAY*	*READ BAY*	*limestone, limy dolomite, shaly dolomitic limestone, silty limestone*
ORDOVICIAN AND SILURIAN	*Map-unit 9*	*FRANKLIN STRAIT*	*dolomite, sandy dolomite, dolomitic sandstone*
LOWER ORDOVICIAN	*Map-unit 8*	*NETSILIK*	*silty and sandy dolomite, dolomite, intraformational conglomerate and breccia*
Disconformity ?			
MIDDLE CAMBRIAN		*BOOTHIA FELIX*	*sandstone, sandy dolomite shaly dolomite, intraformational conglomerate*
PROTEROZOIC			*diabase dykes and sills*
	HUNTING ASTON	*HUNTING ASTON*	*dolomite, sandy dolomite quartzite*
ARCHEAN AND PROTEROZOIC			*gneiss, schist, granite, ultrabasic rock*

GSC

Table 1. Table of formations

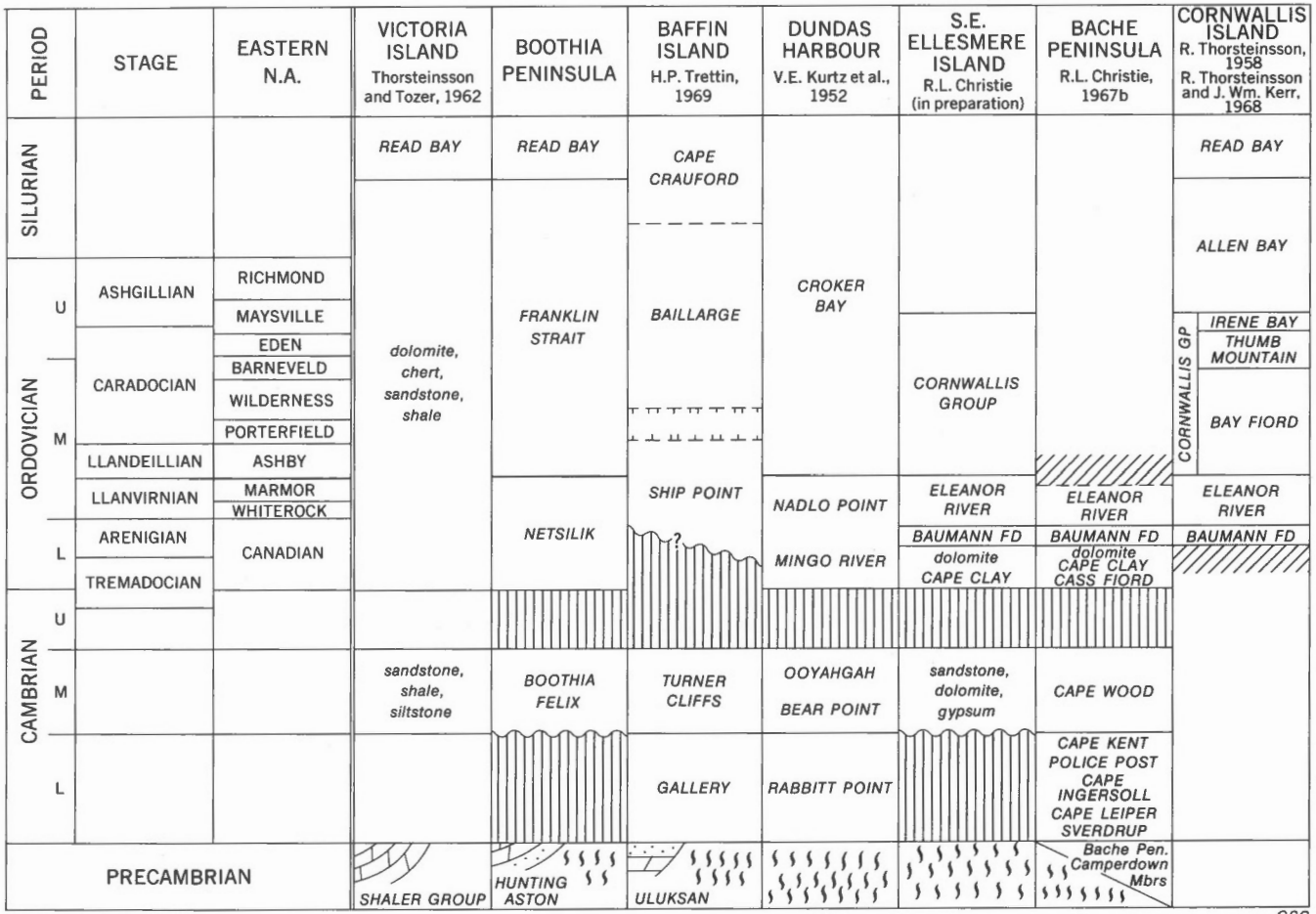

Table 2. Correlation of lower Paleozoic formations of the Arctic Interior Platform

A strong northerly structural trend is apparent in the Precambrian rocks, the 'grain' being due primarily to modified compositional banding. The internal structure of the gneisses seems uniform and simple, and was described thus from a reconnaissance study (*see* Blackadar, 1967, p. 32-36). A more detailed study by Brown and Dalziel (Brown *et al.*, 1969, p. 527, 528) on Somerset Island confirmed an essential unity of metamorphic grade and homogeneity of structural style. Detailed structural traverses also revealed, however, the presence of numerous macroscopic folds with axes sub-horizontal and consistent in trend.

The Precambrian gneisses of the Boothia region are nonconformably overlain at scattered localities by unfossiliferous quartzites and dolomites, which have been mapped and described as the Aston and Hunting Formations, respectively (*see* Blackadar, 1967, p. 26, 27; Tuke *et al.*, 1966; Dixon *et al.*, 1971). The lower sequence, called the Aston Formation, includes mainly light to dark grey, yellow, and red quartzites, while the overlying Hunting Formation comprises mainly light grey to yellow dolomite. The total thickness of the two units may be 10,000 feet (3,000 m). On northern Somerset Island this sequence of beds is overlain by dolomites containing Ordovician fossils, and no evidence of a sedimentary discontinuity was observed during studies of the contact (Tuke *et al.*, 1966). The Aston and Hunting Formations usually are assigned a Precambrian age because of their similarity to presumed upper Precambrian rocks elsewhere in the Arctic Islands and because of the presence of intruded diabasic sills and dykes, which nowhere in the Arctic Interior Platform region are known to intrude Paleozoic rocks. However, Tuke and others (op. cit., p. 710) concluded that a Middle Cambrian to Ordovician age is possible for the Aston-Hunting sequence, and they tentatively correlated the beds with the Middle Cambrian and younger units described in this report.

Sills and dykes of tholeiitic diabase cut the basement gneisses and granites and the overlying Aston and Hunting Formations. The dykes trend northwest on Boothia Peninsula (Blackadar, 1967, p. 27-31, and *see* Map 2-1967). A whole-rock K-Ar age determination of 607 ± 75 m.y. was obtained from the "chilled basalt" margin of a diabase dyke; this is thought to represent the approximate age of intrusion (Determination Number: GSC 67-53 *in* Wanless *et al.*, 1970, p. 31). The diabase dykes thus represent a relatively late period of intrusion in the Canadian Shield, and are correlated, tentatively, with younger diabases of northwestern Baffin Island (639 ± 25 m.y. and younger; *see* Blackadar, 1970, p. 68-78) and Victoria Island (635 m.y. and 640 m.y.; *see* Christie, 1964). The younger diabases may have been contemporaneous with Hadrynian extrusive rocks such as those of the Natkusiak Formation of Victoria Island (Thorsteinsson and Tozer, 1962; Christie, 1964).

MIDDLE CAMBRIAN

Boothia Felix Formation

Definition

Boothia Felix, now a disused name, was given by Sir John Ross (1835, p. 733, 734, and chart facing p. xxv) to the isthmus and peninsula, now known as Boothia Peninsula, in honour of his friend and the patron of the expedition, Sir Felix Booth. This original name, Boothia Felix, is proposed for a thin assemblage of mainly clastic beds that rests nonconformably on the basement gneissic rocks. The clastic unit is overlain with structural conformity by

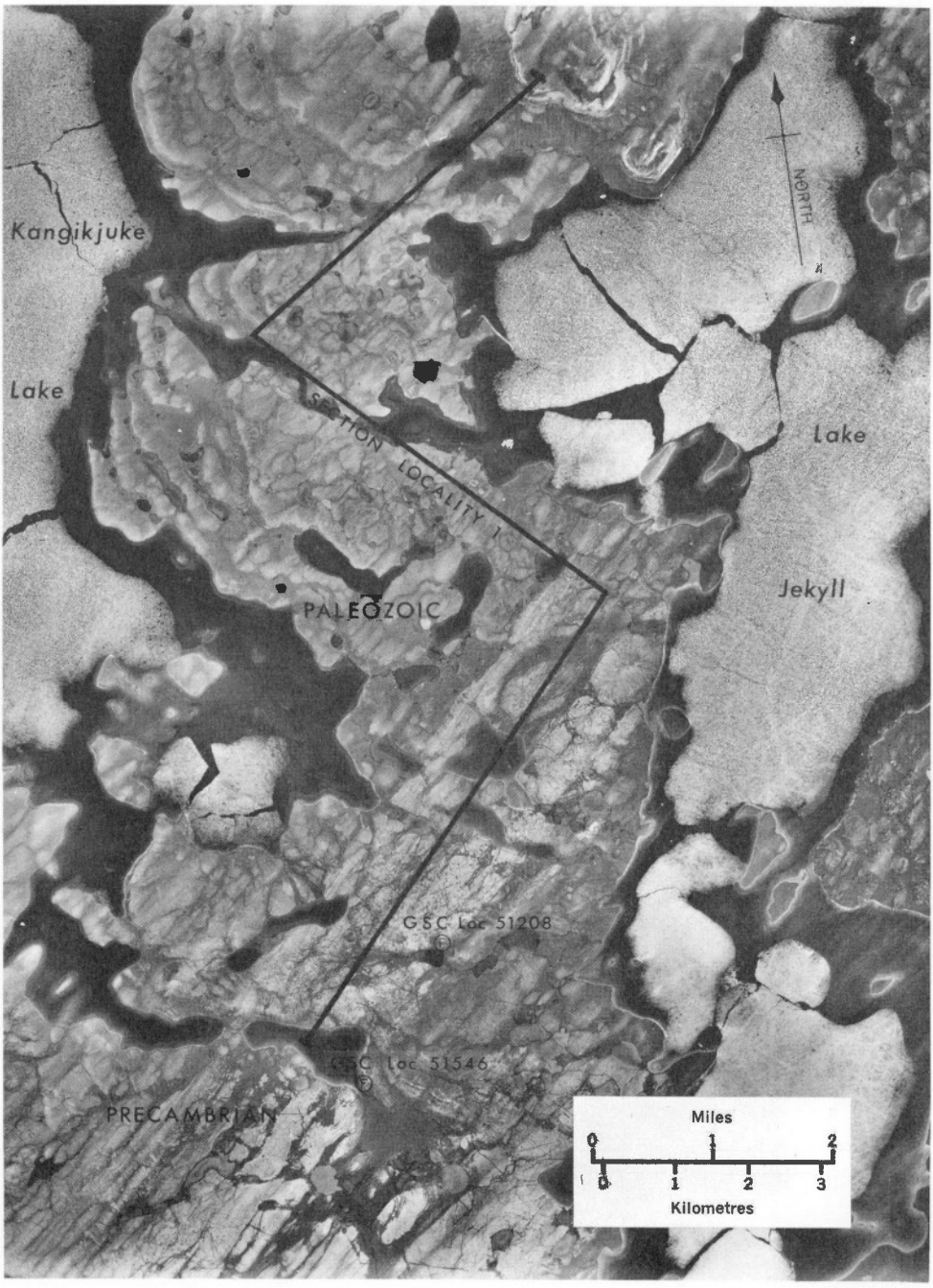

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Plate I. Vertical aerial photograph of Kangikjuke and Jekyll Lakes, showing the type section of the Boothia Felix Formation

the Ordovician Netsilik Formation. Good exposures of the Boothia Felix Formation occur in outliers on the Boothia Uplift and in river canyons along the eastern border of the Boothia Precambrian belt.

Distribution and thickness

About 350 feet (110 m) of Boothia Felix strata were measured at the type locality (Locality 1, Fig. 1; and *see* Pl. I), which is the irregular strip of land separating Kangikjuke and Jekyll Lakes (approx. Lat. 69°50'N, Long. 93°45'W). Beds of this basal Paleozoic formation make up the lower parts of the sedimentary outliers of southern Boothia Peninsula. Basal clastic beds exposed along the western margin of the Boothia Precambrian belt presumably are correlative, as are similar beds exposed in a narrow zone along the entire eastern Precambrian margin.

The basal contact of the Boothia Felix Formation nowhere was observed. However, debris from the lowermost beds was evident in the section measured at 'Lost River'[1]; the basal rock there is impure, fine-grained, thinly laminated sandstone with fucoid traces and ripple-marks on some bedding surfaces.

The upper beds of the formation appear conformable with overlying Ordovician beds at the type section. The top of the unit, not exposed, is presumed to lie at the base of scarp-forming, brown-weathering dolomite beds containing inarticulate brachiopods.

During field work in 1962, the basal clastic beds were distinguished as a separate map-unit (*see* maps *in* Christie, 1963). No fossils were obtained from sections of these beds exposed along the eastern flank of the Boothia Precambrian belt, and lithological variation from section to section makes correlation difficult. It is not clear whether Cambrian or Lower Ordovician beds, or both, are represented by the basal map-unit of the eastern flank. The problem is further complicated by the fact that at each measured section there appear to be only 400 to 500 feet (120 - 150 m) of basal clastic beds, whereas the aggregate thickness of the Boothia Felix and Netsilik Formation is evidently at least 800 feet (240 m) thick.

Detailed study may demonstrate the presence of both formations in the basal map-unit, or the presence of the Netsilik Formation in the overlying beds. In the writer's opinion, both the Boothia Felix and the Netsilik Formations are present, though perhaps thin compared to the type sections.

Lithology

The Boothia Felix Formation consists mainly of sandy dolomite and sandstone with thin beds of dolomite intraformational conglomerate or breccia[2]. The unit is characteristically thinly bedded, and is brown when weathered.

---

[1]Proposed geographic name, not yet approved.

[2]In this report, 'conglomerate' contains relatively rounded fragments, while the fragments in 'breccia' are mainly angular. There is a continuous gradation, in the Boothia region, between conglomerates and breccias, and the two names apply to rocks of the same origin; that is, to rocks derived from the breakup and re-deposition of penecontemporaneous beds.

These features contrast with the greys and green-greys of the overlying Netsilik Formation, and the thick-bedded, light grey weathering dolomites of the Franklin Strait Formation.

The overall lithological character of the Boothia Felix Formation is uniform throughout its areal extent but, in detail, the formation varies from section to section. In general, a three-fold subdivision appears to characterize most exposures of the formation. From the base up these subdivisions are: basal sandstone or dolomitic sandstone beds, in places fossiliferous; dark, thin-bedded, shaly carbonate rocks; and sandy dolomite, dolomite, and dolomite intraformational breccia.

The sandstones of the Boothia Felix Formation are fine to coarse grained, with well-rounded grains. Bluish quartz grains were observed in some basal beds. Some beds are pure sandstone, brownish on a fresh surface but weathering white. A carbonate matrix is characteristic of the unit.

The dolomites are normally thinly laminated, silty, and brown weathering. Sandy varieties of dolomite grade into dolomitic sandstone. Massive dolomite is grey to brown on the fresh surface, medium to fine grained, and sugary in texture. Thin beds of dolomite- or sandy dolomite-matrix intraformational conglomerate or breccia are present in all sections. The thin fragments are usually flat and angular, although rounded 'corners' also were observed. Fragment diameter is normally about 3 inches.

Shale beds are greenish and crumbly. Some silty and sandy beds have shaly partings and these rocks, too, crumble to fine debris at the outcrop.

The type section of the Boothia Felix Formation, between Kangikjuke and Jekyll Lakes (Locality 1, Fig. 1; and *see* Pl. I), is in a region of low relief with light overburden; the section is moderately well exposed. The more resistant beds stand out as scarps; bedding dips gently northeast.

In the following description of the type section, brachiopod fossil determinations are by A. J. Rowell of the University of Nottingham, England; other fossils were determined by J. W. Cowie, University of Bristol, England, and by A. W. Norris, Geological Survey of Canada. This section, as others reported in this paper, was measured using a graduated staff and aneroid altimeter. Some intervals were estimated by eye.

Type section of Boothia Felix Formation at Kangikjuke Lake: approximate location, latitude 69°50'N, longitude 93°43'W; aerial photograph A16204-20 (Locality 1, Fig. 1).

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	Netsilik Formation		
	Top of section: eroded		
17	Dolomite; pale grey-brown, pale brown weathering, with some purplish mottling; fine-grained[1], in some beds silty or sandy; thick-bedded; inarticulate brachiopods preserved	20	378

[1]In this text, the "grain" of a crystalline rock refers to the fineness or coarseness of the crystallinity (Udden-Wentworth scale).

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
16	Dolomite, sandstone, intraformational breccia: mainly dolomite; grey-brown, light brown weathering, fine to medium grained; some beds of brown, medium-grained sandstone with dolomite matrix; in about mid-unit, a bed of light grey intraformational breccia with flat dolomite fragments up to 8 cm in diameter	25	358
	Boothia Felix Formation		
15	Covered interval: in mid-unit, float of light grey dolomite with bioclastic debris	50	333
14	Dolomite, sandy dolomite: grey-brown, grey-brown weathering; medium to fine grained; silty and sandy banding	25	283
13	Covered interval	50	258
12	Shale: crumbly, green-grey. In uppermost part, thin beds of pale brown, buff-weathering, fine, intraformational breccia; fragments sharp, up to 20 mm in diameter; fragments of reddish brown dolomite; matrix green flecked (glauconite?), green-grey, sandy	30	208
11	Covered interval	10 (est.)	178
10	Dolomite: brown, light brown weathering, medium grained	3	168
9	Covered interval	15 (est.)	165
8	Sandstone: brown and white weathering coarse grained, with fossil fragments; dolomite matrix. Fossils reported by A. W. Norris include (GSC loc. 51208): *?Hyolithes* sp. undet. genal spines cf. *Glossopleura* sp. cf. *Elrathia* sp. age: Middle Cambrian	20 (est.)	150
7	Covered interval	10 (est.)	130
6	Dolomite intraformational breccia; sharp, thin fragments up to 3 cm in diameter of dark grey and light brown dolomite in a grey, sandy dolomite matrix	5	120

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
5	Dolomite: mottled pale green-grey, light brown weathering; very fine grained; silty	10	115
4	Sandstone: pale brown, brown weathering; fine grained, finely laminated; carbonate matrix; thin bedded	5	105
3	Dolomite: pale grey-brown, brown weathering; medium crystalline; some beds vuggy	20 (est.)	100
2	Sandstone: dolomitic, pale brown, white weathering; medium grained; well-rounded grains in white dolomite matrix. Fossil trilobite cephala (GSC loc. 51536) reported by J. W. Cowie to be very similar to those indicated as cf. *Elrathia* sp. at GSC loc. 51208 and almost certainly conspecific	20	80
1	Sandstone: grey and white, fine grained, with carbonate matrix. Upper beds only well exposed; basal beds determined from float	60 (est.)	60
	An exposure of this unit about 10 miles south-southwest of the type section displays broad ripple-marks and some contorted, slumped bedding.		
	Formation is underlain by crystalline rocks of the Canadian Shield		

Origin and environment

The Boothia Felix Formation evidently represents a marine transgression on a stable platform. The presence of ripple-marks and intraformational breccia, and conglomerate indicates shallow-water conditions. The faunas, carbonate-rock, and carbonate matrix of the clastic rocks suggest a marine environment. The abundance of clastic material suggests a source at moderate distance, presumably the exposed Canadian Shield to the south. The uniform sorting of the sand fraction, the rounding and frosting of the larger sand grains, and the thinness of the unit indicate very stable conditions, characteristic of an interior, cratonic locale.

Age and correlation

The fossil collections (GSC locs. 51208 and 51546) from the type section of the Boothia Felix Formation were identified by A. W. Norris, who states that the trilobites *Glossopleura* and *Elrathia* indicate a Middle Cambrian age. According to Norris, a correlation is indicated with the Bear Point Formation of Dundas Harbour (*see* Kurtz, McNair, and Wales, 1952).

A middle Cambrian fauna (GSC loc. 51550) also was obtained from a sandstone bed in an outlier about 10 miles (16 km) southwest of Kangikjuke Lake (Locality 1, Fig. 1). This collection was estimated to occur about 50 feet (15 m) above the base of the section. The fossils were reported as "hyolithid indet. and cf. *Elrathia* sp." by J. W. Cowie, and assigned a Middle Cambrian age.

The Boothia Felix Formation evidently is correlative with Middle Cambrian beds, or beds tentatively identified as such, at many localities of the Arctic Interior Platform (Table 2). Sandstone, siltstone, and dolomite beds of this age are widespread and represent a major transgression of the early Paleozoic seas. Beds of late Early or Middle Cambrian age are present in southern Ellesmere Island (Christie, in preparation); beds of Early and Middle Cambrian age are present in southern Devon Island (Kurtz, McNair, and Wales, 1952); and formations on Baffin Island are tentatively assigned to the Early and Middle Cambrian (Trettin, 1969, p. 20). Also, trilobite fossils from basal Paleozoic beds in northern Victoria Island (collected by Bernard Plauchut and identified by W. H. Fritz, Geological Survey of Canada) have been assigned an age of late Early Cambrian. It appears that the Boothia region remained positive, possibly as a north-trending peninsula of Canadian Shield rocks, while flanking areas of the Arctic Interior Platform were inundated by late Early Cambrian seas.

LOWER ORDOVICIAN

Netsilik Formation

Definition

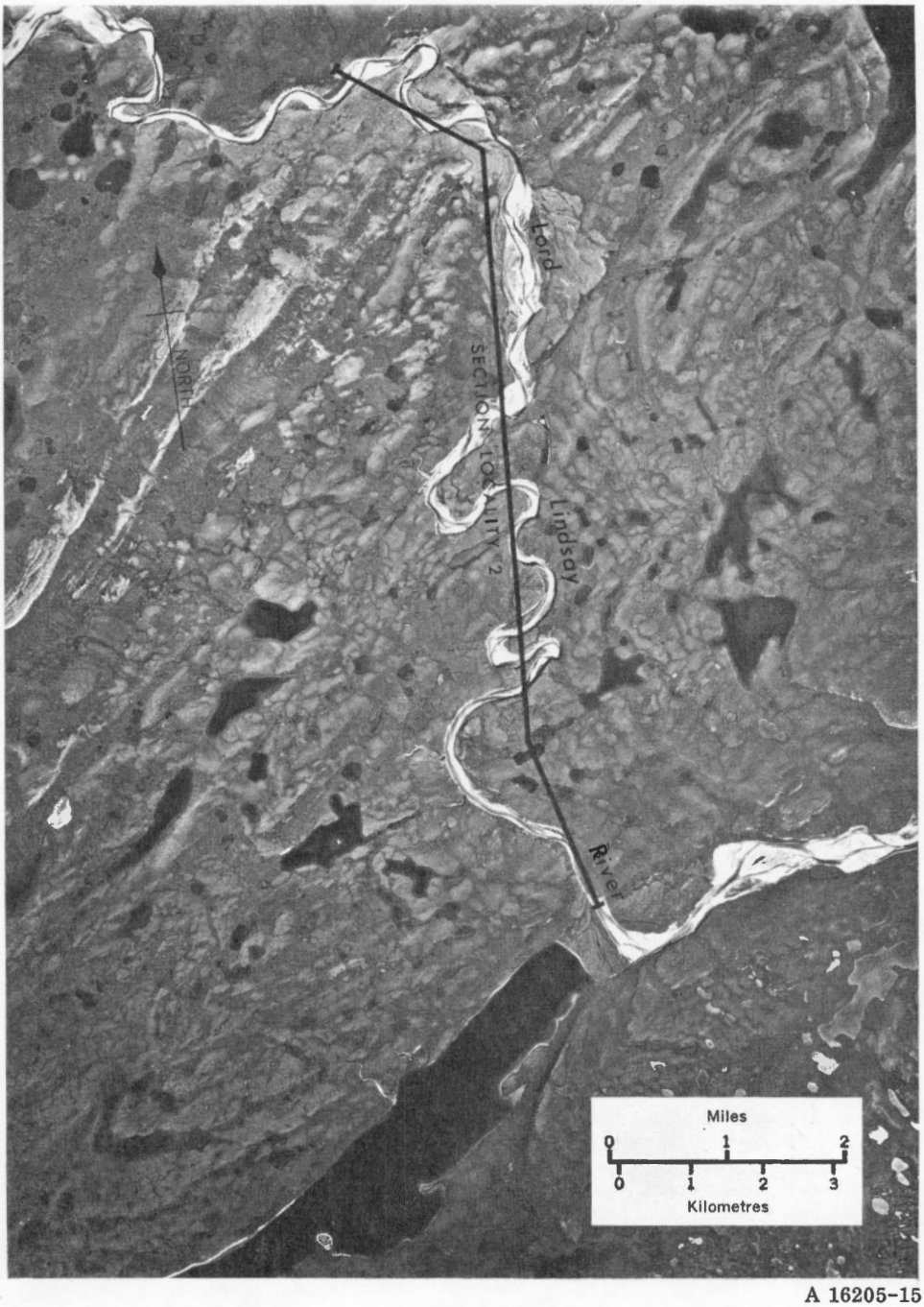
Dark grey to green-grey clastic and carbonate beds overlying the Boothia Felix Formation on Boothia Peninsula are named here the Netsilik Formation. The name is taken from Netsilik Lake and River, which lie on Boothia Isthmus south of the type section. The Boothia and surrounding regions are the home of the Netsilingmiut Eskimos - 'people of the seal'.

The Netsilik Formation is dominated by grey- or green-grey weathering rocks. There is a superficial resemblance to the Boothia Felix Formation in the presence of sandy and silty beds and in the brownish weathering colour of some beds. The overlying Franklin Strait Formation differs in lithology and is pale weathering and thick bedded to massive.

The Netsilik Formation is well exposed in a shallow canyon on Lord Lindsay River on Boothia Peninsula, and this is chosen as the type section. The section was measured from about latitude 73°02'N, longitude 93°23'W up river to latitude 73°07'N, longitude 93°25'W (Locality 2, Fig. 1; and *see* Pl. II).

At both the lower and the upper contacts, the Netsilik Formation appears conformable with adjacent beds. The lower contact is tentatively and arbitrarily placed (in the type section of the Boothia Felix Formation) at the base of the lowest beds containing Early Ordovician fossils. A major disconformity and hiatus, representing much of Late Cambrian time, must be represented by a surface near that separating the Netsilik and the Boothia Felix Formations.

The upper contact is placed at the base of thick, scarp-forming dolomite beds characteristic of the Franklin Strait Formation. The lithological



A 16205-15

Plate II. Vertical aerial photograph of part of Lord Lindsay River, showing the type section of the Netsilik Formation

change from thin-bedded, green-grey carbonates to thick-bedded, light grey or yellow-grey weathering dolomite is abrupt.

Distribution and thickness

The Netsilik Formation is established, at present, only on the inliers in the vicinity of Kangikjuke Lake and Lord Lindsay River on Boothia Peninsula. About 400 feet (120 m) of beds were measured at the type section on Lord Lindsay River where, however, the base of the unit is not exposed. At least 100 feet (30 m) of strata in adjacent outliers are included in the unit and are assumed to underlie the lowest beds of the type section, so that a total thickness of at least 500 feet (150 m) may be present.

Grey- and green-grey weathering shale beds characteristic of the Netsilik Formation were observed in a section near Mount Oliver, southern Somerset Island. It is probable that the Netsilik Formation is present in the eastern Paleozoic belt of the Boothia region but, as explained above, further field study will be required to separate the underlying, basal Paleozoic unit and the overlying, somewhat similar clastic unit.

Lithology

The Netsilik Formation consists mainly of thin-bedded, dark to green-grey weathering sandy and shaly dolomites. Grey sandstone with dolomite matrix is prominent in the lower parts of the type section, whereas recessive, dark, argillaceous, carbonate-rock is prominent in the upper parts. Interbeds of thicker bedded, more resistant dolomite occur throughout, but are more prominent near the middle. Intraformational breccia occurs as thin and thick beds throughout the section. Nodules of iron sulphide are present in some beds. Ripple-marks and crossbedding are evident in thin beds overlying the lower, sandy units.

The type section of the Netsilik Formation on Lord Lindsay River (Locality 2, Fig. 1; and *see* Pl. II) is described below. Bedding at the type section is gently undulating, but with an overall slight northwestward dip so that successively higher beds are encountered as one follows the river upstream. Brachiopod fossil determinations in the following description are by A. J. Rowell; other fossils were determined by J. W. Cowie.

Type section of Netsilik Formation on Lord Lindsay River: approximate location, between latitude 73°02'N, longitude 93°23'W and latitude 73°07'N, longitude 93°25'W; aerial photograph A16205-15 (Locality 2, Fig. 1).

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	Franklin Strait Formation		
12	Dolomite: basal 40 feet medium bedded, less resistant than unit 11; abrupt basal contact; colour variable: brown, grey-brown, whitish; uniform crystallinity but vague bands apparent. The lower beds pass gradationally into an upper 50 feet of competent, dark grey, medium-grained dolomite; weathers dark brown. The uppermost beds form a prominent scarp	90	527

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
11	Dolomite: scarp-forming, pale yellowish grey, massive; medium crystalline; medium to thick bedded; weathers light yellow in canyon walls. Uppermost bed is distinctive, whitish to brownish, medium grained, with abundant large white patches of earthy material	100	437
	Netsilik Formation		
10	Dolomite and limestone: the basal 25 feet are resistant, pale brown dolomite alternating with recessive, dark shaly limestone with abundant dark markings; chert lenses up to 4 inches in diameter are present, and some lenses nearly coalesce to form chert beds. The lower beds pass upward without sharp break into about 60 feet of recessive, very thin bedded, yellow-grey weathering, green-grey shaly carbonate. Minor thin competent carbonate beds and beds of intraformational breccia are present; some channels underlying breccia beds are breccia-filled. Iron sulfide pods are scattered in some beds about 50 to 65 feet above the base. The sulfide (pyrite or marcasite) occurs as rounded forms and as streaks or bars up to 2 mm in diameter	85	337
9	Dolomite: thin bedded, nearly massive, fine grained; weathers pale brown; some very closely spaced parting; characterized by round and slit-shaped vugs up to 3 mm in diameter, and by dark (carbonaceous?) specks and streaks. The uppermost bed contains some white-weathering flint nodules up to 2 inches in diameter	35	252
8	Dolomite: medium to thick bedded, massive, fine grained, pale brown, weathers yellowish grey. The uppermost beds are marked by thin bedding or horizontal parting	37	217
7	Covered interval	10	180
6	Intraformational breccia: tabular carbonate-rock fragments in a light		

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	grey-brown sandy dolomite matrix; fragments range from 1/4 to 4 inches in diameter, but generally are about 1/2 to 2 inches; bedding surfaces are undulating, suggesting broad ripple-marks with an amplitude of 2 inches and a wave-length of 10 to 14 inches	25	170
5	Dolomite: medium to thick bedded, grey-brown weathering, massive, with nodular bedding surfaces; small mud cracks and ripple-marks evident; thin intraformational conglomerate and breccia layers form some bedding surfaces; marcasite nodules up to 2 mm in diameter are evident. Articulate and inarticulate brachiopods and graptolites collected (GSC locs. 51567, 51553, 51554): *Schizambon* sp. articulate brachiopod indet. - probably orthid anisograptid indet. *Dendrograptus* sp.	30	145
4	Sandstone and dolomite: thin bedded, interbedded. Lower 3 feet are fine-grained grey sandstone with thin, platy interbeds of grey, fine-grained dolomite; ripple-marks and lensoid bedding evident. Upper 7 feet are fine-grained silty dolomite with iron sulfide nodules and disseminated specks; some crossbedding. Dolomite intraformational conglomerate beds with maximum fragment size varying from 1/4 inch to 3 inches in diameter are present. One trilobite collected (GSC loc. 51547): ptychopariid (? cf. *Hardyoides*)	10	115
3	Sandstone: dolomitic, medium grained, light grey-brown, medium to thick bedded; well-rounded quartz grains in dolomite matrix; crossbedding common, with direction of transport evidently extremely varied; some lensoid interbeds of sandy dolomite and dolomite; minor porous sandstone without carbonate matrix	30	105
2	Sandstone: dolomitic or sandy dolomite; fine to coarse grained, pale brown;		

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	medium bedded; well-rounded quartz grains in pale dolomite matrix. Lower 15 feet are well sorted and medium to fine grained; upper 15 feet are coarser, impure sandstone with intraformational conglomerate containing dolomite and sandstone fragments; uppermost bed contains whole and fragmented inarticulate brachiopods (GSC loc. 51551): *Schizambon* sp. cf. *S. pennsylvanicum*, Ulrich and Cooper ?obolid indet	45	75
1	Sandstone: dolomitic; medium bedded, medium grained, dark grey to brown; well-rounded grains in a grey carbonate matrix: scattered nodules of a dark green mineral; also present are some thin beds of sandy dolomite; inarticulate brachiopod fossils observed	30	30
	Lower beds not exposed		

The uppermost beds (units 16, 17) of the section at Kangikjuke Lake are assumed to be part of the Netsilik Formation from paleontological evidence. These beds include dolomite, sandstone, and intraformational conglomerate. Fossil inarticulate brachiopods were found (GSC loc. 51549) in light grey, grey- to buff-weathering, finely crystalline dolomite about 70 feet (20 m) above the presumed base of the formation.

Origin and environment

The numerous fossils and the carbonate lithology indicate a marine environment. From the abundance of clastic material and the underlying, deduced hiatus, it may be assumed the unit represents a second early Paleozoic marine transgression following a widespread regression. The clastic material is probably a mixture of reworked Cambrian sediment and material derived, during Early Ordovician time, from exposures of the Canadian Shield. The ripple-marks and intraformational breccia are evidence of shallow-water deposition. Like the Boothia Felix Formation, the Netsilik Formation evidently represents stable platform conditions of sedimentation: thin sedimentary units with abundant reworked sediment. The grey and green-grey colours of some beds suggest incorporation, with little reworking, of chloritic and other dark debris from a terrain such as that of the Canadian Shield.

Age and correlation

Several small collections of Early Ordovician fossils were obtained from the type section of the Netsilik Formation. J. W. Cowie identified the graptolites and trilobites and his age assignments are as follows: GSC

locality 51567, Early Ordovician; GSC locality 51533, Late Cambrian to Early Carboniferous?; GSC locality 51554, probably post-Cambrian; GSC locality 51547, ?Early Ordovician; GSC locality 51551, Early Ordovician.

The fossil collection (GSC Loc. 51549), mentioned above, from the uppermost beds of the section at Kangikjuke Lake (the fossil locality lies just north of the edge of the photograph, Plate I) was studied by A. J. Rowell, who reports: "*Schizambon* sp., and *Lingulella* sp.; Early Ordovician".

The Netsilik Formation is approximately the same age as several other formations in the Arctic Interior Platform province. Confident correlation with any of them cannot be made; however, there are reasonable lithological similarities with the Ship Point Formation of Baffin Island (Trettin, 1969, p. 20-25). The Ship Point Formation is thought to span both Early and early Middle Ordovician ages.

Some significant lithological features shared by the Netsilik and the Ship Point Formations are: predominantly dolomitic; grey and green weathering colours; presence of authigenic pyrite; and presence of dolomitic intraformational conglomerate or breccia. Trettin (1969) notes that the Ship Point Formation is relatively rich in sandy dolomite, dolomitic quartz sandstone, and intraformational conglomerate in the southern part of the field area examined (i.e. toward Foxe Basin). This region is about the latitude of the type section of the Netsilik Formation.

On Jens Munk Island, also at the same latitude as southern Boothia Peninsula, R. G. Blackadar (1963, p. 16) collected two species of *Didymograptus* from limestone with shaly interbeds. The graptolites were thought to be of Early Ordovician (Arenigian) age. These beds appear to be correlatives of the Netsilik Formation.

MIDDLE AND UPPER ORDOVICIAN, SILURIAN

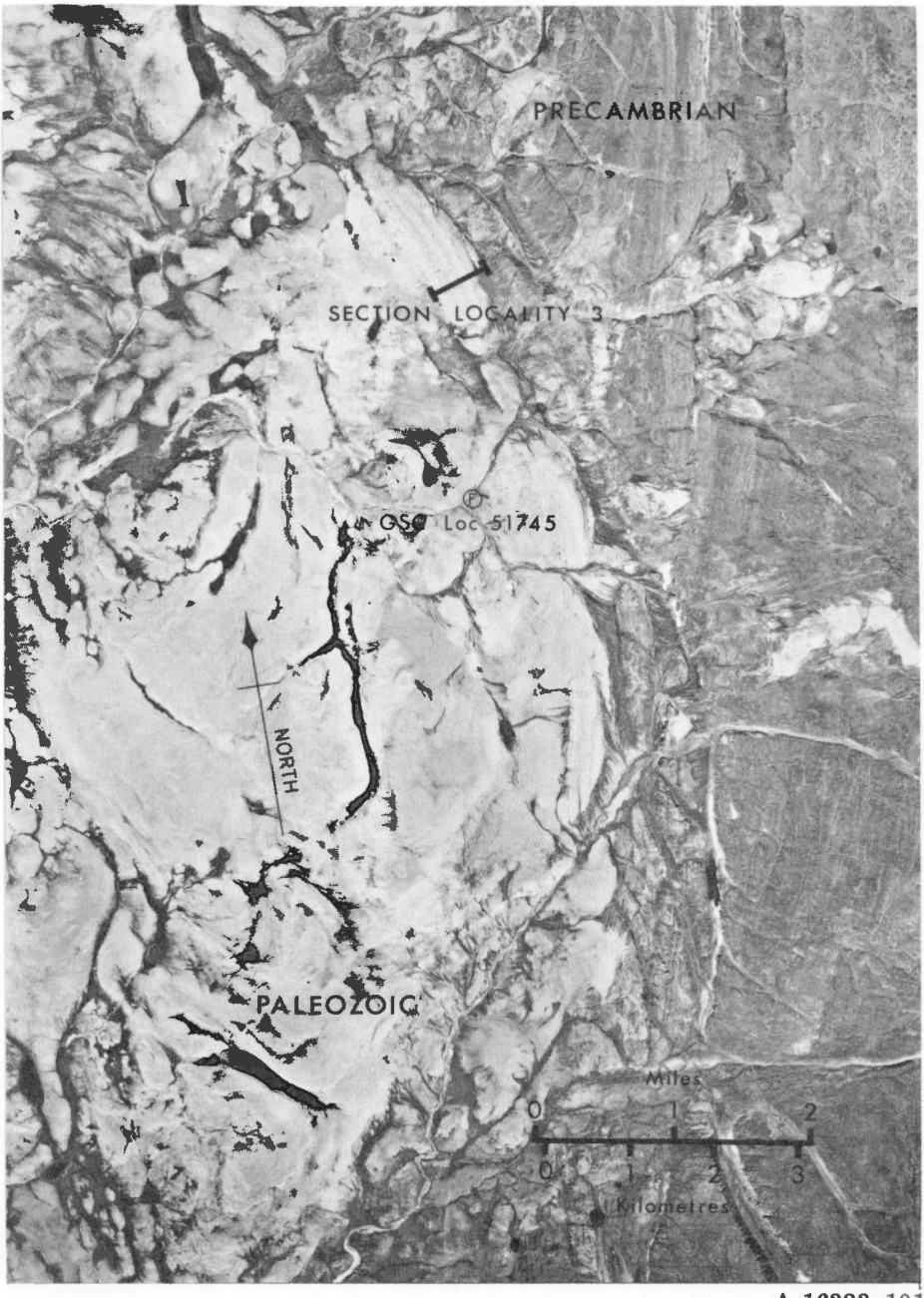
Franklin Strait Formation

Definition

A sequence of dolomite and calcareous dolomite, at least 2,200 feet (670 m) thick, that overlies the Netsilik Formation and underlies the Read Bay Formation is named herein the Franklin Strait Formation after the prominent strait that separates Prince of Wales Island and Boothia Peninsula. Rocks of the Franklin Strait Formation are typically medium to thick bedded and topographically prominent.

The significance of the Ordovician-Silurian dolomite beds of the Arctic Interior Platform was recognized by Samuel Haughton at the earliest stage of geological exploration, and the succinct description given by him (Haughton, 1860, p. 54) might serve almost as a definition of the Franklin Strait Formation:

> One of the most remarkable facts brought to light by M'Clintock's geological exploration of the Arctic regions during the Voyage of the "Fox", is the occurrence of dolomite or magnesian limestone, covering large areas in almost horizontal beds. It abounds in fossils; and is an almost pure dolomite, or union of carbonates of lime and magnesia, in equal atomic proportions. To my mind this



A 16323-101

Plate III. The western half of vertical aerial photograph showing the type section of the Franklin Strait Formation. The dark rocks to the east are Precambrian gneisses

> fact is of as much, if not more, importance in identifying the Silurian strata of Boothia Felix, King-William's Land and Prince-of-Wales Land, as any identification of fossils could possibly be . . . . . .

It should be noted that the Silurian as used by Haughton predated Lapworth's introduction, in 1879, of the term Ordovician for the lower part of the former 'Silurian' sequence.

Distribution and thickness

The Franklin Strait Formation is widespread in the Boothia region, where it is exposed in broad, north-northwest trending belts both east and west of the Boothia Uplift. On the east, the formation is separated from the Precambrian terrain by a narrow belt of darker grey and brown-weathering basal units, but on the west the basal beds generally are absent due to faulting related to the uplift. The formation was described and mapped as Map-unit 9 during Operation Prince of Wales (Christie, 1963).

The Franklin Strait Formation underlies large areas of neighbouring Victoria Island, where it constitutes Map-unit 10b of Thorsteinsson and Tozer (1962).

The thickness of the Franklin Strait Formation is uncertain: 2,200 feet (670 m) or more are present at Young Bay on eastern Prince of Wales Island, and about 1,300 feet (400 m) were measured at the type section on the west side of Boothia Peninsula. None of the measured sections is complete.

The type section of the Franklin Strait Formation is near Pasley Bay on western Boothia Peninsula (approx. Lat. 70°36'N, Long. 95°32'W; Locality 3, Fig. 1; and *see* Pl. III). Neither the basal nor the upper contacts are exposed at Pasley Bay: the lowest beds are missing due to faulting, and the upper beds, though probably present, are poorly exposed. From study of the several stratigraphic sections measured, it appears that an interval of more than 400 feet (120 m) but less than 1,000 feet (300 m) of strata lies between the top of the type section and the base of the overlying Read Bay Formation.

A second, moderately well exposed section was measured on 'Lost River', on the east side of Boothia Peninsula (approx. Lat. 71°25'N, Long. 93°40'W; Locality 4, Fig. 1), and is designated here as a reference section. The Franklin Strait Formation at 'Lost River' appears to overlie conformably basal Paleozoic beds, but the upper contact may be a fault or an unconformity.

The Franklin Strait Formation rests with apparent conformity on the uppermost unit of the Netsilik Formation on Lord Lindsay River. The basal beds of the Franklin Strait Formation are generally thick and form scarps that contrast sharply with the underlying, relatively recessive units.

The Read Bay Formation conformably overlies the Franklin Strait Formation. The upper contact was examined in only one section, on Lang River, on the eastern side of Boothia Uplift. There a zone about 100 feet (30 m) thick, comprising silty, thin-bedded dolomite and limestone, appears to be transitional between the thick-bedded, massive Franklin Strait dolomites and the thin-bedded, silty-argillaceous limestones with irregular bedding surfaces characteristic of the Read Bay Formation. Fish remains were found at three levels in the upper 80 feet (24 m) of the transition zone, and this part is assigned to the Read Bay Formation.

Lithology

The Franklin Strait Formation comprises mainly pale brownish or yellowish grey to grey, medium- to thick-bedded dolomite with some sandy dolomite and sandstone. The formation is characterized by its resistance to weathering and its pale weathering colours. The weathered surfaces are, in places, nearly white to pale yellow-brown, and lumpy and breccia-like, though breccia structure rarely is apparent on the fresh surface. Many beds are vuggy, and others contain scattered chert nodules or irregular chalky white dolomite patches. Many beds are conspicuously stromatolitic, dominated by undulating and domal layered structures. The dolomites characteristically give off a petroliferous odour on breaking. Sand grains typically are very well rounded.

The type section of the Franklin Strait Formation near Pasley Bay was measured by W. W. Nassichuk. The section crosses vertical to steeply dipping, north-northwest trending beds which were up-ended during Silurian-Devonian movement along a major fault bordering the Precambrian rocks to the east. Tops, as determined from graded bedding nearby, are to the west. Fossil determinations listed in the following section are by G. W. Sinclair, formerly of the Geological Survey of Canada.

Type section of Franklin Strait Formation near Pasley Bay: approximate location, latitude 70°36'N, longitude 95°32'W; aerial photograph A16323-101 (Locality 3, Fig. 1; and *see* Pl. III).

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	Franklin Strait Formation		
	Top of section: rubble-covered upland; present erosion surface		
12	Dolomite: a remarkably large and homogeneous unit; brownish grey to grey, weathering buff to light grey; finely to medium crystalline; mainly thick bedded. Beds with scattered small to scattered large chert nodules occur in the lower 150 feet of the unit. Fossiliferous beds occur about 280 feet above the base of the unit, and higher. At 280 feet (GSC loc. 51761): *Calapoecia* sp., *Streptelasma* sp., *Omospira* sp.; *Diestoceras* sp., and orthoceroconic cephalopods occur. About 300 feet above the base, an interval about 42 feet thick of distinctive, light grey weathering, microcrystalline dolomite beds are richly fossiliferous (GSC loc. 51783: fossils from this locality are listed separately). Within the fossiliferous beds, cephalopods occur only in a 3-foot interval about 30 feet above the base, whereas the other fossils occur throughout the 42-foot interval.		

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	Fossils are present, but scattered above GSC loc. 51783. About 500 feet above the base of the unit (GSC loc. 51768): *Calapoecia* sp., *Streptelasma* sp., *Maclurites* sp., *Cyclendoceras* sp.	508	1,285
11	Dolomite: silty, light brown, weathering greyish yellow; fine to medium grained; thin bedded, with silty laminae visible on the weathered surface; upper 17 feet recessive	47	777
10	Covered interval	22	730
9	Dolomite: silty, light brown, weathering greyish yellow; fine grained, thin bedded, with distinct silty laminae visible on the weathered surface; recessive	13	708
8	Dolomite: light brownish grey, weathering light grey with brown streaks, finely crystalline, with scattered chert nodules; thick bedded, but with bedded parting providing platy debris and producing a thin-bedded appearance; about 10 feet of silty and shaly dolomite about 150 feet above the base of the unit; siliceous fragmental beds at the top of the unit	230	695
7	Dolomite: light grey, weathering light grey with buff mottling and streaks; siliceous; ovoid to irregular nodules of yellow- to buff-weathering chert are 5 to 25 mm in diameter; poorly exposed	50	465
6	Dolomite: brownish grey, weathering light grey; finely crystalline, thick bedded, slightly siliceous; poorly exposed	40	415
5	Covered interval	45	375
4	Sandy dolomite, dolomitic sandstone, dolomite: mainly sandy dolomite; light brownish grey, weathering light grey to buff; grain of both dolomite and sand fine to medium; sand grains well rounded, uniform in size; bedding indistinct to massive; sand ratio increases upward; some stromatolitic beds about middle of unit; stromatolitic dolomite is micro- to finely crystalline	130	330

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
3	Covered interval	110	200
2	Sandy dolomite and dolomitic sandstone: buff weathering; some intraformational breccia; fragments of dolomite 5 to 10 mm in diameter in dolomite matrix	30	90
1	Dolomite: brownish grey, buff weathering; finely crystalline; slightly silty; sandy in upper part; thick, indistinct beds	60	60
	Base of section faulted		0

An exposure of light brownish grey, fossiliferous dolomite was examined at a locality south of the measured section described above. The dolomite weathers irregularly to whitish grey with grey patches to give a brecciated appearance. The rock is partly fragmental, mainly finely crystalline, and breaks into platy slabs. Fossils from this locality (GSC loc. 51745) are listed below. Bedding at this locality is inconspicuous, but appears to dip gently (less than 5°) to the west. A low angle of dip is in marked contrast to the steep dips of the measured section, and evidently a zone of abrupt flexure lies immediately east of the fossiliferous locality. GSC locality 51745 is about 1,000 feet (300 m) west of the projected strike of the uppermost beds of the measured section, but is probably only a few hundred feet higher in the stratigraphic section.

The reference section of the Franklin Strait Formation at 'Lost River', measured by W. W. Nassichuk, in part crosses rounded hills adjacent to 'Lost River' and in part follows the shallow river canyon. The beds dip northeastward at angles ranging from nearly flat to about 15 degrees. The section is designated because of the relatively simple structural style of the east flank of the Boothia Uplift; it may be possible to obtain a complete stratigraphic section in the vicinity. A description of the section follows. Collected fossils were determined by G. W. Sinclair, formerly of the Geological Survey of Canada, and by B. S. Norford, Geological Survey of Canada.

Section of the Franklin Strait Formation at 'Lost River': approximately between latitude 71°24'N, longitude 93°45'W and latitude 71°30'N, longitude 93°27'W; (Locality 4, Fig. 1).

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	Overlying beds: Read Bay Formation		
	Franklin Strait Formation		
17	Covered interval: fault zone or unconformity	70	1,080

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
16	Dolomite: light grey; finely crystalline; well bedded, beds 2 inches to 2 feet thick, from appearance of weathered surface, may be fragmental; greenish weathering in upper part	40	1,010
15	Dolomite: very light grey; finely crystalline; mainly well bedded, beds less than 1 foot thick	170	970
14	Covered interval	30	800
13	Dolomite: light grey; some thin bedding in lower part, in upper part thick bedded	60	770
12	Dolomite: light grey, weathering light grey; some soft, white nodules; some beds are fine dolomite breccia, the breccia structure evident on a nearly white weathered surface. Fossil brachiopod, echinoderm, gastropod, and aseptate solitary coral remains were collected (GSC loc. C24149)	110	710
11	Dolomite: very light grey; thin silty laminae; well bedded, beds 2 inches to 1 foot thick	100	600
10	Dolomite: medium grey, weathering buff-grey; vuggy, but otherwise massive; resistant and cliff forming	40	500
9	Dolomite: light grey, weathering buff-grey; beds 4 inches to 2 feet thick	60	460
8	Fragmental dolomite: light grey and chalky, weathering light grey; thick bedded; abundant soft, white nodules; poorly preserved brachiopod fossils present	30	400
7	Covered interval	20	370
6	Dolomite: light grey to whitish, weathering very light grey; finely crystalline, massive. Contains *Maclurites* and scattered long orthoceroconic cephalopods. Fossils collected include (GSC loc. 50720):		

Unit	Lithology	Thickness (feet)	Height Above Base (feet)
	Armenoceras sp. *Bumastus* aff. *B. billingsi* Raymond and Narraway (identified by G. W. Sinclair)	55	350
5	Fragmental dolomite: light brownish grey, weathering light grey; distinctive 'graphic' pattern on weathered surface due to fragments in the rock; interbedded, thin-bedded, pale yellow-grey calcareous dolomite with nodules and irregular stringers of porous white dolomite. Fossils collected (GSC loc. C24148) from the top of the unit, identified by B. S. Norford) include: *Maclurites* sp. *Grewingkia* sp. *Receptaculites* sp. In the field, orthoconic nautiloids were recognized by W. W. Nassichuk	30	295
4	Dolomite: poorly exposed; rubble light grey, weathering light grey and blocky	180	265
3	Silty dolomite: light grey, weathering light grey; finely crystalline; thick bedded and topographically prominent; distinctive, yellow-weathering irregular to ovoid chert nodules 1/4 inch to 1 inch long, and abundant, occur in lower 20 feet	50	85
2	Covered interval	25	35
1	Dolomite: light grey, very finely crystalline, homogeneous; weathers light grey; slightly sandy and forms sharp talus	10	10
	Underlying beds: stromatolitic dolomite, shaly dolomite weathering light grey		

Origin and environment

The dominance and uniformity of carbonate rocks and the associated sandy rocks with well-rounded quartz grains suggest deposition in a stable marine platform environment. Extreme uniformity of conditions and rate of subsidence is indicated by the thick, massive beds; occasional floods of quartz debris presumably reflect tectonic events in distant source areas of the Canadian Shield, the sand derived from the granitoid rocks and from elevated, upper Precambrian sandstones. Absence of evaporites in the strati-

graphic column indicates open circulation with the oceans. Intraformational breccias are present as thin, uniform beds but in minor amounts. Because of the absence of associated ripple-marks, mud-cracks, or other subaerial features it is suggested that the breccias were storm-derived, and that shallow, but not intertidal, depths of deposition prevailed.

Age and correlation

Fossils collected from beds between 330 and 372 feet above the base of unit 12 of the measured section east of Pasley Bay were examined by G. W. Sinclair, and include (GSC loc. 51783):

Streptelasma cf. *trilobatum* Whiteaves
S. cf. *rusticum* Billings
Calapoecia sp.
Catenipora sp.
favositid coral
stromatoporoid
Dalmanella sp.
Fusispira cf. *inflata* Meek and Worthen
Maclurites sp.
Trochonema sp.
Ephippiorthoceras sp.
Oncoceras sp.
Probillingsites sp.
Cyrtogomphoceras sp.

To these beds (GSC loc. 51783), and to those of GSC localities 51761 and 51768 of unit 12 of the type section, and to GSC locality 50720 of unit 6 of the reference section, Sinclair assigns an age equivalent to the Red River Formation of Manitoba. Thus, the fauna is representative of the 'Arctic Ordovician' fauna, which occurs in the upper part of the Cornwallis Group (Thumb Mountain and Irene Bay Formation) and the basal part of the Allen Bay Formation of Cornwallis and Ellesmere Islands (Thorsteinsson, 1958, p. 38-42; Kerr, 1968, p. 47-56). 'Arctic Ordovician' is the name commonly given to the assemblage characterized by abundant and large-size *Maclurites*, *Receptaculites*, nautiloids, halysitid corals, and certain other forms. The term is applied broadly to American Ordovician faunas considered to be of boreal origin and is especially typified by the faunas of the Red River Formation of Manitoba, Cape Calhoun Formation of Greenland, and Bighorn Formation of Wyoming (Thorsteinsson, 1958, p. 39, 40). These fossils range through several hundred feet of strata, and the precise age, or ages, of the fossils in terms of the type sections of Europe or even of the standard North American sections of the Ordovician is in considerable doubt. There are reasons to believe they are late Caradocian and/or Ashgillian in age. Thorsteinsson (1958, p. 90) has suggested that the contact of the Cornwallis Group and the Allen Bay Formation may be accepted tentatively as corresponding to the Caradocian/Ashgillian boundary until a better basis for dating them has been obtained, and this convention has been followed here (*see* Table 2).

Fossils collected at GSC locality 51745, south of the section at Pasley Bay, were examined by T. E. Bolton, Geological Survey of Canada, and include:

cup coral indet.
Favosites sp.
cf. '*Reticularia?*' *undulata* Poulsen from Rowley Island and Greenland
"*Schuchertella*" sp.

Brachyprion sp. cf. *B. philomena* (Billings) from Southhampton Island
gastropod indet. - low spired
Calymeme sp. - fragment
Phacops (*Portlockia*) sp.

A Silurian age is indicated for this collection.

From structural considerations it appears that the beds of GSC locality 51745 represent an upper part of the Franklin Strait Formation. Thus, the Franklin Strait Formation clearly includes beds equivalent to at least part of the Allen Bay Formation of Cornwallis Island (*see* Table 2).

Fossils from unit 5 of the reference section on 'Lost River' (GSC loc. C24148) are assigned an Ordovician, approximately late Caradocian (Eden-Maysville) age by Norford, who suggests a probable correlation with the Bad Cache Rapids Group of northern Manitoba. A late Middle Ordovician to Silurian, probably Silurian age is suggested for fossils from GSC locality C24149, unit 12 of the same section.

REFERENCES

Blackadar, R. G.
1963: Additional notes to accompany Map 3-1958 (Fury and Hecla Strait Map-area) and Map 4-1958 (Foxe Basin North Map-area); Geol. Surv. Can., Paper 62-35.

1967: Precambrian geology of Boothia Peninsula, Somerset Island, and Prince of Wales Island, District of Franklin; Geol. Surv. Can., Bull. 151; includes Map 2-1967.

1970: Precambrian geology northwestern Baffin Island, District of Franklin; Geol. Surv. Can., Bull. 191.

Broad, D. S., Dineley, D. L. and Miall, A. D.
1968: The Peel Sound Formation (Devonian) of Prince of Wales and adjacent islands: a preliminary report; Arctic, v. 21, p. 84-91.

Brown, R. L., Dalziel, I. W. D. and Rust, B.
1969: The structure, metamorphism, and development of the Boothia Arch, Arctic Canada; Can. J. Earth Sci., v. 6, no. 4, p. 525-543.

Christie, R. L.
1963: The Paleozoic rocks; Part II *in* Geological reconnaissance, Boothia Peninsula, and Somerset, King William, and Prince of Wales Islands, District of Franklin; Geol. Surv. Can., Paper 63-19, p. 9-12; includes Map 36-1963.

1964: Diabase-gabbro sills and related rocks of Banks and Victoria Islands, Arctic Archipelago; Geol. Surv. Can., Bull. 105.

1967a: Stratigraphic sections of Paleozoic rocks on Prince of Wales and Somerset Islands, District of Franklin, Northwest Territories; Geol. Surv. Can., Paper 67-24.

1967b: Bache Peninsula, Arctic Archipelago; Geol. Surv. Can., Mem. 347.

1972: Central Stable Region; *in* The Canadian Arctic Islands and Mackenzie Region; XXIV Inter. Geol. Congr., Montreal, Canada, Guidebook, Excursion A 66.

Craig, B. G.
1964: Surficial geology of Boothia Peninsula and Somerset, King William, and Prince of Wales Islands, District of Franklin; Geol. Surv. Can., Paper 63-44.

Dineley, D. L.
1965: Notes on the scientific results of the University of Ottawa expedition to Somerset Island, 1964; Arctic, v. 18, p. 54-56.

1966: Geological studies in Somerset Island, University of Ottawa expedition, 1965; Arctic, v. 19, p. 270-277.

Dineley, D. L. and Rust, B. R.
1968: Sedimentary and paleontological features of the Tertiary-Cretaceous rocks of Somerset Island, Arctic Canada; Can. J. Earth Sci., v. 5, p. 791-799.

Dixon, O. A., Williams, S. R. and Dixon, J.
1971: The Aston Formation (?Proterozoic) on Prince of Wales Island, Arctic Canada; Can. J. Earth Sci., v. 8, no. 7, p. 732-742.

Fortier, Y. O.
1948: Flights in 1947 over the region of the North Magnetic Pole and the mainland between the Arctic Coast, Great Slave Lake, and Hudson Bay, Northwest Territories; Geol. Surv. Can., Paper 48-23.

Fraser, J. K.
1958: Physiographic regions of Boothia Isthmus, N.W.T.; Geograph. Bull. (Canada), v. 3, no. 12, p. 19-37.

Haughton, S.
1857: Geological notes and illustrations, *in* M'Clintock, F. L., 1857: Reminiscences of Arctic ice-travel in search of Sir John Franklin and his companions; J. Roy. Dublin Soc., v. 1, p. 183-250, Pls. 1-7.

1859: Geological account of the Arctic Archipelago; *in* M'Clintock, F. L., 1859: The voyage of the Fox in the Arctic Seas; a narrative of the discovery of the fate of Sir John Franklin and his companions; Appendix IV, p. 372-399.

1860: Geological results of the voyage of the "Fox"; notes and appendices accompanying M'Clintock's "Reminiscences of Arctic ice-travel" etc.; J. Roy. Dublin Soc., v. III, p. 53-58.

Kerr, J. Wm.
1968: Stratigraphy of central and eastern Ellesmere Island, Arctic Canada, Part II, Ordovician; Geol. Surv. Can., Paper 67-27, Part II.

Kerr, J. Wm. and Christie, R. L.
1965: Tectonic history of Boothia Uplift and Cornwallis Fold Belt, Arctic Canada; Am. Assoc. Petrol. Geologists, v. 49, no. 7, p. 905-926.

Kurtz, V. E., McNair, A. H. and Wales, D. B.
1952: Stratigraphy of the Dundas Harbour area, Devon Island; Am. J. Sci., v. 250, p. 636-655.

M'Clintock, F. L.
1857: Reminiscences of Arctic ice-travel in search of Sir John Franklin and his companians; J. Roy. Dublin Soc., v. 1, p. 183-250.

1859: The voyage of the Fox in the Arctic Seas; a narrative of the discovery of the fate of Sir John Franklin and his companions; John Murray, London.

Miall, A. D.
1970a: Devonian alluvial fans, Prince of Wales Island, Arctic Canada; J. Sediment. Petrol., v. 40, p. 556-571.

1970b: Continental marine transition in the Devonian of Prince of Wales Island, Northwest Territories; Can. J. Earth Sci., v. 7, no. 1, p. 125-144.

Ross, J.
1835: Narrative of a second voyage in search of a north passage, and of a residence in the arctic regions during the years 1829, 1830, 1831, 1832, 1833; London, A. W. Webster; v. 1, Narrative, and v. 2, Appendix.

Stockwell, C. H.
1970: Structural provinces and subprovinces of the Canadian Shield; Fig. IV-1, *in* Geology of the Canadian Shield, Ch. IV *in* Geology and Economic Minerals of Canada, Geol. Surv. Can., Econ. Geol. Rept. No. 1, fifth ed., p. 44-150.

Thorsteinsson, R.
1958: Cornwallis and Little Cornwallis Islands, District of Franklin, Northwest Territories; Geol. Surv. Can., Mem. 294 (1959).

1963: Ordovician and Silurian stratigraphy; *in* Geology of the north-central part of the Arctic Archipelago, Northwest Territories (Operation Franklin), Geol. Surv. Can., Mem. 320, p. 31-50.

1970: Precambrian and Paleozoic; *in* Geology of the Arctic Archipelago, Ch. X *in* Geology and Economic Minerals of Canada, Geol. Surv. Can., Econ. Geol. Rept. No. 1, fifth ed., p. 548-590.

Thorsteinsson, R. and Kerr, J. Wm.
1968: Cornwallis Island and adjacent smaller islands, Canadian Arctic Archipelago; Geol. Surv. Can., Paper 67-64.

Thorsteinsson, R. and Tozer, E. T.
1962: Banks, Victoria, and Stefansson Islands, Arctic Archipelago; Geol. Surv. Can., Mem. 330.

1963: Geology of northern Prince of Wales Island and northwestern Somerset Island; *in* Geology of the north-central part of the Arctic Archipelago, Northwest Territories (Operation Franklin); Geol. Surv. Can., Mem. 320, p. 117-129.

Trettin, H. P.
1969: Lower Palaeozoic sediments of northwestern Baffin Island, District of Franklin; Geol. Surv. Can., Bull. 157.

Tuke, M. F., Dineley, D. L. and Rust, B. R.
1966: The basal sedimentary rocks in Somerset Island, N.W.T.; Can. J. Earth Sci., v. 3, p. 697-711.

Wanless, R. K., Stevens, R. D., Lachance, G. R. and Delabio, R. N.
1970: Age determinations and geological studies: K-Ar isotopic ages, Rept. 9; Geol. Surv. Can., Paper 69-2A.