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STRATIGRAPHY OF THE DUNDAS HARBOUR AREA, DEVON ISLAND, ARCTIC ARCHIPELAGO

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ABSTRACT. Cambrian and Ordovician sediments at least 3,660 feet thick overlie Precambrian gneisses along the southeastern shore of Devon Island. The rocks have a very gentle northwest dip and are broken by a few minor north and northwest trending high-angle normal faults.

Six new formations are described. They range from Lower Cambrian to Middle or possibly early Upper Ordovician in age. The longest hiatus in the stratigraphic sequence is represented by the absence of Upper Cambrian strata. Numerous intraformational conglomerates are present in both Cambrian and Lower Ordovician rocks. A thin bed of gypsum occurs in the Middle Cambrian.

The faunas at Dundas Harbour show many similarities to the Cambro-Ordovician rocks of the Kane Basin which lies between West Greenland and central Ellesmere Island. Stratigraphic and faunal evidence suggests that the marine transgressions of both the Lower Cambrian and the Lower Ordovician spreading from the Franklinian geosyncline reached Kane Basin earlier than they did the Dundas Harbour area.

INTRODUCTION

THE discovery of Middle Cambrian fossils on the west shore of Dundas Harbour in 1948 by D. B. Wales and R. P. Nickelsen indicated that a relatively thick stratigraphic section of Lower Paleozoic sediments could be studied at that place (Wales, 1949, p. 330). A grant-in-aid to McNair from the Arctic Institute of North America with funds furnished by the United States Government permitted Wales and Kurtz to spend twelve days in the Dundas Harbour area during the summer of 1949. The present paper summarizes the geological results obtained during the field work in 1949. A report is in preparation by Kurtz on the Cambrian and Ordovician trilobites and brachiopods collected from the Dundas Harbour area.

Aid to the field party was generously given by many persons. We are particularly indebted to Captain B. N. Rittenhouse, USN, and other officers and men of the *USS Edisto;* to the late Charles J. Hubbard, Chief of the Arctic Section of the U. S. Weather Bureau; to Dr. A. L. Washburn, Director of the Arctic Institute of North America; and to the members of the Royal Canadian Mounted Police stationed at Dundas Harbour.

Dundas Harbour (Lat. 74° 45′ N., Long. 82° 30′ W.) is located on the southeast coast of Devon Island, Northwest Ter-

ritories, in the Eastern Arctic (fig. 1). No previous stratigraphic investigation had been made along the southeast coast of the island. The nearest place in which any comprehensive work had been done is southeastern Ellesmere Island, where Schei measured sections of Paleozoic rocks during the second Norwegian Arctic expedition of the *Fram* in 1898-1902. The stratigraphic and paleontologic results of the *Fram* expedition have been presented by Holtedahl (1913, 1914, 1917), Loewe (1913), Meyer (1913), and Schei and Holtedahl (1926). In 1941 Bentham described the geologic structures and glaciers of southern Ellesmere Island. Scattered geological observations have been made on Devon Island by McClintock (1859) of the Cape Warrender area on the east coast; by H. Woodward (1878) of the Silurian fossils from Beechey Island, a peninsula forming the southwest coast of the island; and on raised marine beaches by Nichols (1936). The nearest area in the Arctic Archipelago in which comprehensive stratigraphic and paleontologic work has been done is Kane Basin on the central east coast of Ellesmere Island and northwest Greenland. In this area Poulsen (1946) and Troelsen (1950) reported on the Cambrian and Ordovician rocks and their fossils.

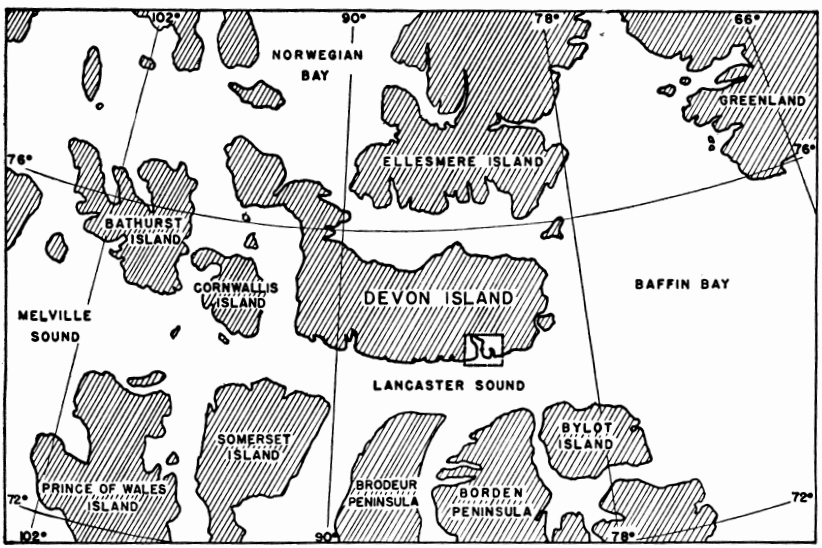

Fig. 1. Index map, showing location of the Dundas Harbour area.

PHYSICAL GEOLOGY

Dundas Harbour, approximately five miles long and one mile wide, occupies an abandoned north trending glacial valley (fig. 2). The western shore is bordered by steep cliffs, approximately 1700 feet high, consisting of Precambrian gneisses unconformably overlain by Cambrian and Ordovician sediments. The southern part of the eastern shore of the harbor is a low-lying peninsula extending to Nadlo and Walrus Point and consisting of Precambrian gneisses overlain by glacial deposits. The northern part of the shore is bordered by steep talus slopes and cliffs which range up to 1700 feet in elevation. The head of the harbor is formed by a broad outwash plain, four and one half miles long and approximately one and one half miles wide, that terminates at three ice tongues of the Devon Island ice cap.

The southern shore of the island west of Dundas Harbour is bordered by a strip of low lying ground one and one half to two miles wide covered by mantle and containing a conspicuous set of raised beaches.

The ice-free part of the island north of the coastal strip between Dundas Harbour and Croker Bay consists of a relatively flat erosion surface that truncates the gently northwest dipping Cambrian and Ordovician sediments. Both stream and glacial carved valleys are incised in this surface. Glacially deposited materials are restricted to abandoned glacial valleys and immediate margins of the ice cap and glaciers.

Except for cliff faces, rock exposures showing undisturbed relationships are not abundant. Frost-shattered outcrops, active stone polygons and stone stripes are common throughout the area, particularly in places having gentle slopes.

FAULTING

The depression occupied by Dundas Harbour and the alluvial filled valley at its head is structurally controlled, in part, by a north trending fault. The east side is the upthrown side as indicated by the elevation of the Cambrian-Precambrian contact on the east side of the valley. Maximum vertical displacement appears to have been approximately 400 feet.

Smaller northwest trending faults of limited displacement occur west of Dundas Harbour. The conspicuous structural control of the stream courses throughout the area appears to be

due to strong northwest trending joints and minor normal faults. The strike of both the joints and faults is parallel to the strike of the Precambrian diabase dikes. This suggests that the post-Ordovician structural adjustments took place along a Precambrian "grain." A strong structural control of topography by northwest and northeast trending joints and minor faults has been noted in southern Ellesmere Island by Bentham (1941, p. 37).

PRECAMBRIAN

Precambrian rocks crop out beneath the Paleozoic sediments along the coast a short distance west of Dundas Harbour and they form most of the surface rocks east of the harbor, where the Paleozoic rocks have been eroded except for scattered outliers. The Precambrian rocks consist of pinkish gray, coarse-grained granites having little foliation, dark gray, medium-grained, garnetiferous gneisses with conspicuous banding, and dull red, fine-grained, thinly banded, gneissoid quartzites.

Several vertical northwest trending diabase dikes cut the metamorphic and granitic rocks. The most conspicuous dike is exposed from Walrus Point to Nadlo Point. This dike ranges from 60 to 120 feet wide. On the west side of Dundas Harbour and on strike with the dike are two thinner dikes which cut through the older Precambrian rocks and extend to the Cambrian unconformity.

STRATIGRAPHY

The limited time available for field work in 1949 did not permit a study to be made of the youngest Paleozoic rocks exposed in the area. Approximately 3,660 feet of strata were measured from the Precambrian unconformity on the west side of Dundas Harbour in the area north of Rabbit Point. Three overlapping sections were studied. The location of the measured sections is shown on figure 2. Section I extended from the upper part of the Ooyahgah formation to the upper part of the Nadlo Point limestone. Section II extended from the upper part of the Nadlo Point limestone into the Croker Bay limestone. Section III extended from the Precambrian to the lower part of the Mingo River limestone. Key beds were used in the short distance between sections to determine the continuity of the stratigraphic sequence.

The stratigraphic sequence is shown diagrammatically on figure 3. All of the formational names are new. Except for the Croker Bay limestone, the formational names were taken from local names near Dundas Harbour and are shown on figure 2. Croker Bay is a broad fiord which lies immediately west of Dundas Harbour.

Description of Formations

The lower Paleozoic rocks can be divided into six lithologic units, ranging from the Middle Ordovician Croker Bay limestone to the Lower Cambrian Rabbit Point sandstone. The type sections are given below.

Middle Ordovician

Croker Bay limestone. Type section measured along northern three-quarters of line 2, figure 2.

	Thickness in feet
Limestone, light brownish gray, fine-grained, medium- to thin-bedded. This unit extends to the top of the ridge immediately west of Mingo River. Abundant loose blocks show strong lithologic similarity to underlying beds. *Maclurites* and *Receptaculites arcticus* found at the summit of the ridge appear to have been derived from beds forming the top part of the ridge. Bottom few feet probably shaly. Unit forms steep slopes....	1100.0
Limestone, light brownish gray, very fine-grained, thin- to medium-bedded. Weathers yellowish gray and has a petroliferous odor. Top of unit forms structural terrace at locality of measured section	24.0
Covered, appears to consist of limestone and shaly limestone	28.0
Limestone, light brownish gray, fine-grained, mottled with silt, coarsely crystalline in upper part. Thin and irregularly bedded, weathers yellowish gray. Basal part contains several thin conglomerate layers of well rounded limestone pebbles. A limestone bed 6 feet thick containing chert nodules occurs 60 feet above the base	83.5
Limestone, light brownish gray, fine-grained, thin-bedded, weathers brownish gray. Contains two thin conglomerate layers of well rounded limestone pebbles	2.5
Limestone, light brownish gray, fine-grained, thin-bedded. Contains two flat pebble conglomerate layers approximately .5 feet thick, and two algal limestone beds each approximately 2 feet thick	23.5
Covered, appears to be calcareous shale	3.5

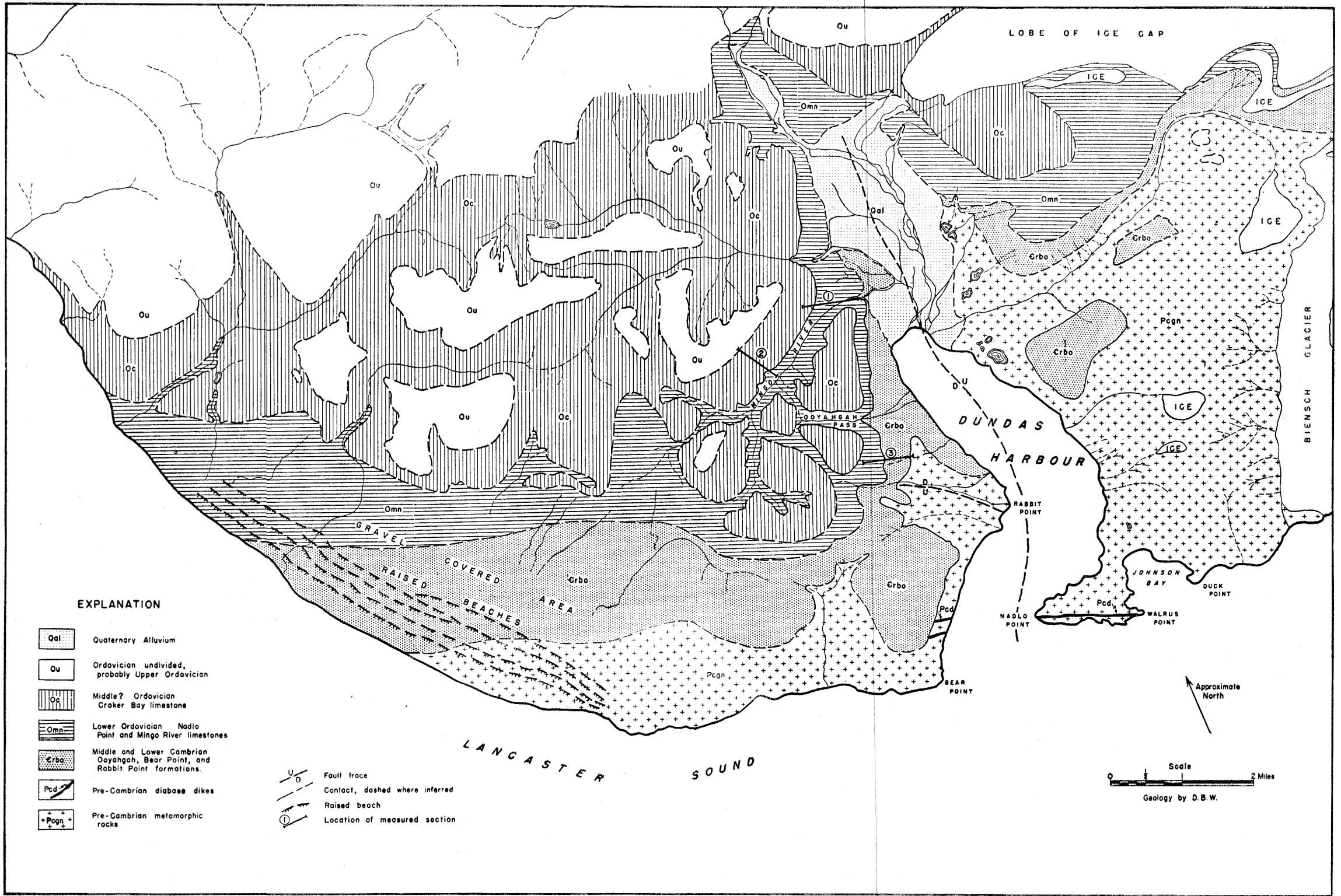

Fig. 2. Geologic map of Dundas Harbour area.

	Thickness in feet	
Conglomerate-breccia, brownish gray, contains flat limestone pebbles, angular chert fragments, whole and broken chert nodules embedded in a calcareous matrix. The upper part is relatively free of chert and contains broken and bent shaly limestone layers. Lower contact is irregular	4.5	
Shale, medium gray, slightly calcareous. Contains prominent algal colonies of fine-grained, dense, reddish brown limestone which have a petroliferous odor. Weathers light brownish gray	32.5	
Limestone, brown, finely-crystalline, silty, medium-bedded. Weathers light yellowish gray	5.5	
Limestone, light gray to brown, fine-grained, medium- to thin-bedded. Contains layers of laminated limestone with a petroliferous odor, shaly limestones, and in the basal part a thin flat pebble conglomerate	15.0	
Covered, appears to be underlain by gray, platy dolomitic limestone	4.0	
Limestone, brownish gray, fine-grained, crystalline, thin and irregularly bedded, has petroliferous odor. Weathers grayish brown	5.5	
Limestone, brown, fine-grained, mottled with silt, nodular, medium-bedded. Weathers light brownish gray. Contains scattered chert nodules in upper part	14.5	
Limestone, brownish gray, fine-grained, nodular, medium-bedded with silty partings. Weathers brown and forms subdued slope. Contains *Maclurites* in *fossil collection 2.4*	6.0	
Limestone, dolomitic in part, brownish gray, medium- to thin-bedded. Contains a thin green shale bed near the base and a 5.5 foot limestone conglomerate bed containing *Isotelus* approximately 10 feet above the base	38.0	
Total measured thickness Croker Bay limestone		1390.5

The Croker Bay limestone forms a prominent set of cliffs that can be traced westward at least as far as Croker Bay. The limestones forming the upper half of the section form the strongest cliffs. The top of the formation was not studied and therefore the description given above refers only to the lower part of the formation. The formation contains numerous minor diastems as indicated by thin flat pebble limestone conglomerates. Characteristic fossils are *Receptaculites arcticus*, *Maclurites* and *Isotelus*. These indicate a Middle Ordovician or possibly early Upper Ordovician age for the formation.

Lower Ordovician

Nadlo Point limestone. Type section measured along middle point of line 1, figure 2.

The Nadlo Point limestone conformably underlies the Croker Bay limestone. The two formations are similar lithologically but the Nadlo Point contains appreciably larger amounts of dolomitic limestone than the Croker Bay, and many beds have a reddish brown color.

	Thickness in feet
Limestone, dolomitic, gray, platy with silty partings. Forms talus covered slope	11.0
Limestone, light brown, fine-grained, thin-bedded, fossiliferous, contains a few mud cracks. Weathers light yellowish brown	7.0
Limestone, brownish gray, fine-grained, massive, dense, fossiliferous. Probably algal in origin. Weathers light brownish gray and is resistant to erosion	4.5
Limestone, brownish gray, nodular, with silty partings. Middle part contains chert nodules. Weathers light brownish gray	5.0
Limestone, grayish brown, nodular and irregularly bedded with silty partings. Weathers light grayish brown with irregular yellowish brown bands	2.0
Limestone, brownish gray, finely crystalline, irregularly bedded, contains algal structures and has a petroliferous odor. Weathers light brownish gray	8.5
Limestone, light to dark brown, nodular, mottled with silt, fine-grained, thin- and irregularly bedded with alternating light and dark layers. Upper part has a purple-brown cast	7.0
Conglomerate-breccia, light gray, consists of flat limestone pebbles and angular chert fragments and rounded chert nodules up to 6 inches long embedded in a limestone matrix. Weathers light yellowish brown.	0.5
Limestone, light yellowish brown, fine-grained, thin-bedded with silty partings. Weathers light brownish gray.	1.0
Limestone, reddish brown, fine-grained, laminated toward base, massive toward top. Weathers light brownish gray	4.5
Limestone, light yellowish brown, fine-grained, nodular with silty partings. Weathers light olive gray	0.5
Limestone, dark brown, nodular with silty partings, weathers light gray	6.0
Limestone, light grayish brown, fine-grained, silty, thin-bedded, weathers grayish brown	1.5
Limestone, brownish gray, fine-grained, nodular, medium- and irregularly bedded with silty partings. Weathers brownish gray. *Fossil collection 2.3* (*Hystricurus crassilimbatus*)	1.0
Limestone, light brownish gray, arenaceous, thin-bedded, weathers whitish gray	11.0

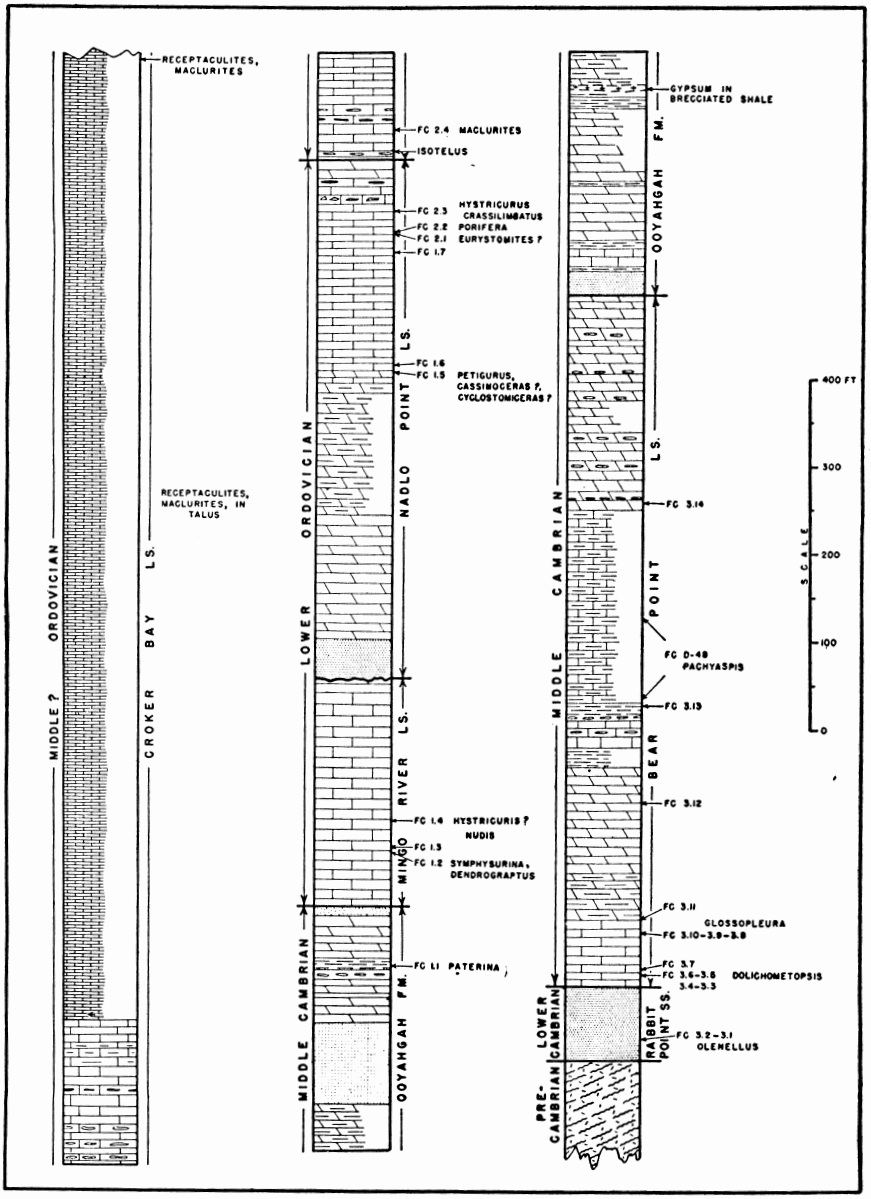

Fig. 3. Diagram showing sequence of Cambrian and Ordovician formations at Dundas Harbour.

	Thickness in feet	
Limestone, dolomitic, light brown, fine-grained, medium- to thick-bedded. Weathers light gray	4.5	
Limestone, dolomitic, dark yellowish brown, nodular, thin- and irregularly bedded becoming platy toward top. *Fossil collections 2 and 2.1* (*Ceratopea* and *Eurystomites?*) made 3.3 and 4.0 feet respectively below top of unit	10.0	
Limestone, light brownish gray, fine-grained, massive, weathers light gray	5.0	
Limestone, reddish brown, fine-grained, thin-bedded, nodular. Contains alternating bands of siltstone and dolomitic limestone. Forms subdued slope	13.5	
Breccia, yellowish gray, consisting of angular chert fragments in a calcareous silty matrix. Weathers brownish gray	1.0	
Limestone, light brownish gray, fine-grained, massive, mottled with silt, weathers brownish gray. *Fossil collection 1.7* from upper 2 feet	30.0	
Limestone, reddish brown, fine-grained, medium-bedded to massive, has petroliferous odor. Weathers gray. Chert nodules in basal 3 feet. Flat pebble conglomerates scattered throughout unit	99.0	
Limestone, reddish brown, fine-grained, petroliferous odor. Weathers brownish gray. *Fossil collection 1.6* (*Petigurus* and *Cassinoceras?*)	4.2	
Limestone, light brownish gray, silty, fine-grained, thin-bedded, fractured, has petroliferous odor. Weathers yellowish brown	1.5	
Limestone, reddish brown, dolomitic, fine-grained, has petroliferous odor, weathers light gray. *Fossil collection 1.5* (*Petigurus, Cyclostomiceras?, Ceratopea*)	3.5	
Limestone, grayish brown, silty, fine-grained, mottled with silt, weathers light olive gray	3.0	
Limestone, light olive gray, silty, fine-grained, mottled with silt patches, has petroliferous odor. Weathers light yellowish brown	6.0	
Covered, appears to consist of shaly dolomitic limestone.	150.0	
Limestone, yellowish gray, silty, fine-grained, porous, weathers light gray	5.0	
Limestone, dolomitic, brownish gray, porous, weathers light gray and forms moderately gentle slopes	72.5	
Limestone, dolomitic, light brownish gray, silty, fine-grained, shaly. Weathers orange gray	63.5	
Sandstone, greenish gray, calcareous, fine-grained, thin-bedded, weathers light olive gray. Contains glauconite in middle part and marcasite in the lower 8 feet	47.0	
Total thickness Nadlo Point limestone		590.0

The upper 250 feet of the Nadlo Point limestone forms three conspicuous cliffs separated from each other by relatively thin, less resistant limestones. The cephalopods collected from the Nadlo Point limestone were examined by Professor A. K. Miller, who reports that some of the specimens are reminiscent of the genera *Cassinoceras*, *Cyclostomiceras*, and *Eurystomites*. These genera occur in the Lower Ordovician Cassin limestone of the Lake Champlain region. The presence of *Petigurus* and *Ceratopea?* also suggest a Lower Ordovician and probably upper Canadian age for the formation. A prominent sandstone marks the base of the formation and separates it from the cliff-forming limestones of the Mingo River formation.

Lower Ordovician

Mingo River limestone. Type section measured along eastern quarter of line 1, figure 2.

	Thickness in feet	
Limestone, dolomitic, arenaceous, light brownish gray, fine-grained, mottled with silt, weathers yellowish gray. Upper contact irregular with evidence of solution activity, indicating disconformity between this unit and the overlying sandstone	13.0	
Limestone, brownish gray, crystalline, fine-grained, massive, weathers yellowish brown. Broad light colored bands, discernible from a distance, occur in the middle part of the unit. The lower 5 feet are less resistant than the cliff-forming upper part. *Fossil collection 1.4*, 28 feet above base, contains *Hystricurus? nudus*	176.0	
Shale, calcareous, light greenish gray, nodular, irregularly bedded, weathers greenish gray. *Fossil collection 1.3*	2.0	
Limestone, light brownish gray, fine-grained, mottled with silt, weathers yellowish brown	4.5	
Shale, greenish gray, irregularly bedded, weathers yellowish green. *Fossil collection 1.2* contains *Symphysurina*, and *Dendrograptus gracilis?*	0.5	
Limestone, light brownish gray, crystalline, medium-grained, mottled, massive, weathers light yellowish brown	7.0	
Shale, greenish gray, irregularly bedded, contains limestone nodules, weathers yellowish green	1.5	
Limestone, yellowish brown, fine-grained, irregularly bedded. Contains several lenticular conglomerate beds consisting of rounded flat dolomitic limestone pebbles. Separated from underlying sandstone by an abrupt contact. Forms steep cliffs	56.0	
Total thickness Mingo River limestone		260.5

The thick-bedded limestones of the Mingo River formation weather into conspicuous cliffs that are steeper than the interrupted cliffs of the Nadlo Point limestone. The formation is a distinct lithologic unit, separated from the Nadlo Point by a disconformity at the top and from the Middle Cambrian by an abrupt change in lithology. The age of the formation is probably lower Canadian, as shown by *Symphysurina* and *Hystricurus*, and by its position below the Nadlo Point limestone.

Middle Cambrian

Ooyahgah formation. Type section measured along middle part of line 3, figure 2.

	Thickness in feet
Sandstone, calcareous, medium gray, coarse-grained, firmly cemented. Weathers light brownish gray. Contains shaly sandstone as a thin stringer 1.5 feet above the base. Has gradational contact with underlying limestones	9.0
Limestone, dolomitic, medium gray, medium- to thin-bedded, fine-grained, weathers whitish yellow and forms cliffs	20.0
Limestone, dolomitic, light medium gray, partly arenaceous, fine-grained, weathers whitish gray	27.5
Shale, dolomitic, very light to medium gray, arenaceous, contains a thin chert nodule zone and mudcracks and ripple-marks. Upper part contains cryptozoan colonies. *Fossil collection 1.1* was made 2.3 feet above base of unit and contains *Paterina* representing highest Middle Cambrian fossils obtained in the section	12.5
Sandstone, slightly calcareous, light gray, medium-grained, equigranular, medium-bedded with thin shaly partings. A greenish-gray shale layer 0.5 feet thick occurs at the base. Weathers light olive gray	3.5
Sandstone, highly calcareous, light gray, medium- to fine-grained, equigranular, irregularly bedded. The basal part is poorly cemented and contains large flat shale pebbles. The upper 2 feet contains thin flat limestone pebble conglomerates. Weathers light greenish gray	7.5
Limestone, dolomitic, light brownish gray, arenaceous, medium-grained, thick-bedded, weathers yellowish brown	4.0
Covered	12.5
Sandstone, dolomitic, light gray, medium- to fine-grained, thin-bedded, fractures easily, weathers greenish gray.	3.0
Limestone, dolomitic, medium gray, very fine-grained, weathers light greenish gray	3.0
Shale, medium gray, fractures easily, weathers medium gray	2.5

	Thickness in feet
Covered	12.5
Limestone, dolomitic, light brownish gray, arenaceous, medium- to fine-grained, irregularly bedded at base.	10.5
Sandstone, light brownish gray, medium-grained, cross-bedded, upper part is ferruginous and weathers dark brown	17.0
Shale, dolomitic, medium-grained	3.0
Sandstone, light gray, medium-grained	2.5
Shale, dolomitic, arenaceous, light brownish gray	1.0
Sandstone, dolomitic, whitish gray, medium-grained, firmly cemented. Contains thin conglomerates of dolomitic limestone pebbles	22.0
Sandstone, whitish gray, medium-grained, weathers light, yellowish brown. Forms poor exposures. Contains linguloid brachiopods near top	48.5
Shale and dolomitic limestone, forms talus-covered slopes. Massive and crystalline gypsum approximately 2 feet thick in brecciated shale 92 feet above base of unit. Six feet below gypsum is an 11-foot bed of greenish-gray micaceous shale	185.0
Limestone, dolomitic, medium gray, fine-grained, thin- and irregularly bedded. Contains thin flat pebble conglomerates and a 3-foot edgewise conglomerate 15 feet above base. A 5.5-foot bed of shale occurs 9.5 feet from top. Unit weathers brownish gray and forms moderate cliffs	79.5
Limestone, dolomitic, medium gray, fine-grained, thin-bedded, grading upward into dark gray, fissile, purplish weathering shale	3.5
Shale, dark gray, fissile, weathers purplish gray, interbedded with medium gray dolomitic limestone	7.0
Limestone, dolomitic, medium gray, fine-grained, thin-bedded. Contains a dark gray, fissile shale bed one foot thick near middle	4.5
Shale, medium gray to purplish gray, contains several thin dolomitic limestone beds	7.5
Limestone, dolomitic, fissile gray shale, and limestone conglomerate. Most beds have a purple cast and weather olive gray	11.5
Shale, gray with purple banding, fissile, contains thin beds of gray dolomitic limestone	4.5
Sandstone, medium gray, weathers light olive gray. Contains two thin layers of dark gray thin-bedded dolomitic limestone. Unit is very resistant to erosion and forms a steep slope	29.5
Total thickness Ooyahgah formation	554.5

The Ooyahgah formation is separated from the overlying Mingo River limestone by a distinct disconformity. A cliff-forming sandstone approximately 30 feet thick permits recognition of the base of the formation. The characteristic lithol-

ogy of the unit consists of dolomitic limestones alternating with calcareous sandstones and shales. Many of the beds contain flat pebble conglomerates. The presence of Middle Cambrian brachiopods 58 feet below the unconformity between it and the Lower Ordovician Mingo River suggests that upper Cambrian rocks are missing from the Dundas Harbour area.

Middle Cambrian

Bear Point limestone. Type section measured along middle part of line 3, figure 2.

	Thickness in feet
Limestone, shaly and dolomitic, medium gray, thin-bedded, weathers yellowish gray	10.0
Limestone, dolomitic, dark gray, medium- to thin-bedded, contains thin gray shale beds and flat pebble conglomerates. Forms poor exposures	95.5
Limestone, dolomitic, light olive gray, medium- to thin-bedded, fine-grained. Weathers light gray. Contains layers of nodular dolomitic limestone with green shaly partings and several thin flat pebble conglomerates	12.5
Covered	37.0
Limestone, dolomitic, dark gray, silty, nodular, thin and irregularly bedded. Contains a 0.4 foot conglomerate at the top	8.0
Covered	64.0
Limestone, dolomitic, medium gray, fine-grained, medium-bedded at the base becoming thin-bedded toward top. A 0.1 to 1.0 foot thick flat pebble conglomerate occurs at top of unit. *Fossil collection 3.14*	16.0
Covered, appears to be underlain by gray limy shale. *Fossil collection D-48* (not in measured section) occurs somewhat below middle of unit. Contains *Pachyaspis* faunule	217.5
Shale, calcareous, dark greenish gray, nodular, fissile, contains flat pebble limestone conglomerate layers. *Fossil collection 3.13* from upper 14 feet of unit	20.5
Limestone, dolomitic and dark gray fissile shale, weathers greenish gray and contains several flat pebble conglomerates	21.0
Limestone, dolomitic, medium gray, medium- to thin-bedded, contains a thin flat pebble conglomerate with pebbles up to 5 inches in diameter at top. Lower part consists of greenish gray, fissile, micaceous shale	9.5
Covered	22.0
Sandstone, dolomitic, yellowish gray, fine-grained, shaly, thin- and irregularly bedded. Weathers pale yellowish brown. Prominent fucoid markings	3.5
Limestone, dolomitic, pale brown to brownish gray, crystalline, silty, thin- and irregularly bedded, fine-grained. *Fossil collection 3.12*	37.5

	Thickness in feet	
Limestone, dolomitic, pale brown, crystalline, silty, thick-bedded, fine-grained. Weathers grayish orange	13.0	
Covered	54.5	
Limestone, dolomitic, pale brown, fine-grained, crystalline, silty in upper part. Weathers grayish orange	13.0	
Limestone, pale brown, massive, thin- and irregularly bedded, with silty partings. Weathers greenish brown.	16.0	
Covered	36.5	
Limestone, grayish brown, mottled, silty, nodular, thin- and irregularly bedded, has petroliferous odor on fresh fracture. Weathers yellowish gray. *Fossil collection 3.11* was made from upper part of unit, contains *Glossopleura* faunule	4.5	
Covered	6.0	
Limestone, grayish brown, nodular, medium- to thin-bedded, with silty partings. A bed containing abundant marcasite occurs near the base. *Fossil collection 3.10* was made from the upper two-thirds of the unit. *Collections 3.9* and *3.8* were made from the basal third of the unit. *Glossopleura* faunule	9.0	
Covered	23.0	
Limestone, pale brown, nodular, medium- to thin-bedded, with silty partings. Upper part contains chert	2.0	
Limestone, brownish gray, fine-grained, mottled with silt, has petroliferous odor on fresh fracture	4.0	
Covered	5.0	
Limestone, brownish gray, nodular, irregularly bedded, fine-grained. *Fossil collection 3.7* was made from the uppermost 6.4 feet of the unit. *Collections 3.6, 3.5, 3.4* and *3.3* were made 18.5, 10, 6.9, 4.2 feet respectively above the base of the unit. The collections contain the *Dolichometopsis* faunule	25.0	
Total thickness Bear Point limestone		786.0

The Bear Point limestone contains numerous thin, flat, pebble conglomerates and clastic zones indicating a shallow water depositional environment with numerous periods of non-deposition. The formation forms moderate slopes in contrast to the younger cliff-making limestones. The fossils indicate an early Middle Cambrian age for the formation.

Lower Cambrian

Rabbit Point sandstone. Type section measured above Precambrian contact, eastern end of line 3, figure 2.

	Thickness in feet
Covered, appears to consist of gray, fine-grained sandstone	50.0

	Thickness in feet	
Sandstone, calcareous, light greenish gray, fine-grained, contains abundant vertical tubes of *Scolithus* which range from 1 to 2 mm. in diameter and contain glauconite grains around the periphery of the tubes. Unit weathers light grayish brown	2.5	
Covered, apparently consists of gray sandstone	6.0	
Sandstone, glauconitic, light grayish green, medium-grained, with numerous white calcareous fossil fragments. Weathers light greenish brown. *Fossil collection 3.2*	1.0	
Covered	2.5	
Sandstone, calcareous, glauconitic, pale red, mottled with grayish green, medium-grained. Contains worm borings. *Fossil collection 3.1* contains *Olenellus* and linguloid brachiopods	0.5	
Covered, appears to consist of red and gray sandstone. Rests with angular discordance on Precambrian crystallines	23.5	
Total thickness Rabbit Point sandstone		86.0

The Rabbit Point sandstone consists of clastics deposited during the Lower Cambrian transgression over an essentially peneplaned Precambrian surface. The formation is not resistant to erosion and forms poor exposures. The presence of *Olenellus* indicates a Lower Cambrian age for the formation.

Stratigraphic Summary

The geographical remoteness of Dundas Harbour from other areas that have been studied in the Canadian Arctic does not permit detailed comparison of its stratigraphic section with other areas. The nearest place in which even reconnaissance work has been done is southwestern Ellesmereland. Here Schei (1904, pp. 457-460) described a generalized section of Lower Paleozoic rocks. Apparently Schei had little opportunity to study in detail the lower part of his section and as a result no accurate comparison can be made except to suggest that the Cambrian and Ordovician rocks described in the present paper are apparently the stratigraphic equivalents of the lower half of Schei's Series A.

The works of Poulsen (1946, pp. 299-337) and Troelsen, 1950, pp. 37-60) bring together much information on the Cambrian and Ordovician rocks bordering Kane Basin, where relatively good sections are exposed on Inglefield Land in northwest Greenland and in the vicinity of Bache Peninsula

in east Central Ellesmere Island. Although Kane Basin is approximately 300 miles north of Dundas Harbour, many similarities can be noted in the fossil zones, and to a lesser extent, in the lithology of the Cambro-Ordovician rocks of the two areas. A comparison of the rocks and faunal assemblages are shown in table 1.

The Lower Cambrian Rabbit Point sandstone is regarded as the basal clastic deposit of advancing seas that reached the Dundas Harbour area shortly before the close of Lower Cambrian time. This basal sandstone is not considered to be either the lithologic or age equivalent of the thin Police Post limestone and Wulff River formation of Kane Basin. The Cape Kent oolitic limestone best developed on Inglefield Land contains both the *Olenellus* and *Dolichometopsis* faunas. Whether the two faunas occur together or are stratigraphically separated is not evident. At Dundas Harbour the two faunas are distinct. The *Dolichometopsis* fauna is restricted to the basal 80 feet of the Bear Point limestone and contains representatives of the *Albertella* zone (Lochman, 1948) and is therefore considered lower Middle Cambrian in age. Thus the Rabbit Point sandstone containing *Olenellus*, and the *Dolichometopsis*-bearing beds of the Bear Point limestone are correlated with the Cape Kent limestone. The *Glossopleura* and *Pachyaspis* faunas from the succeeding 400 feet of the Bear Point limestone represent the *Glossopleura-Kootenia* zone of Lochman (1948). Poulsen (1946) reported the *Glossopleura*, *Elrathiella*, and *Blainiopsis* faunas from the Cape Wood formation. The latter two faunas were not found in the Dundas Harbour area and just where they fit into the faunal succession is not known at the present time.

The Ooyahgah formation can be subdivided into five lithologic units: a basal sandstone, an alternating series of shales and limestones of a cyclical nature, limestones, a series of shales and shaly dolomitic limestones with gypsum near the middle part, and sandstones with interbedded limestones at the top of the formation. The occurrence of gypsum is most significant in indicating an environment such as to permit the deposition of evaporites. Apparently the Ooyahgah formation and the upper part of the Bear Point limestone, representing approximately 940 feet of section, have no age correlatives in the Kane Basin area unless there is considerable conver-

TABLE 1

Table showing comparisons of formations and faunas of N. W. Greenland-Ellesmere Island and Devon Island

	N. W. Greenland - Ellesmere Island (Troelsen, 1950) and (Poulsen, 1927, 1946)		Devon Island Dundas Harbour	
	Formations	Faunal Assemblages	Formations	Faunal Assemblages
Middle Ordovician	Gonioceras Bay ls.	*Receptaculites* *Bumastus* *Gonioceras* *Maclurites*		*Receptaculites*
	Cape Webster fm.		Croker Bay ls.	*Maclurites* *Isotelus*
Lower Ordovician	Nunatami fm.	*Phyllograptus augustifolius*		*Hystricurus crassilimbatus*
	Cape Weber ls.	*Petigurus-Bathyurellus*	Nadlo Point ls.	*Petigurus*
	Nygaard Bay ls.	*Protocycloceras*		
	Poulsen Cliff sh.			
	Cape Clay ls.	*Symphysurina*	Mingo River ls.	*Hystricurus? nudus* *Symphysurina*
	Cass Fjord fm.			
Middle Cambrian			Ooyahgah fm.	*Paterina*
	Cape Wood fm.	*Blainiopsis* *Elrathiella*	Bear Point ls.	*Pachyaspis*
	Cape Kent ls.	*Glossopleura* *Dolichometopsis*		*Glossopleura* *Dolichometopsis*
Lower Cambrian		*Olenellus*	Rabbit Point ss.	*Olenellus*
	Wulff River fm.	*Olenellus-Kurtogonia-Salterella*		
	Police Post ls.	*Bonniopsis-Paedumius*		
	Thule Group		Precambrian crystallines	

gence of sediments between it and Dundas Harbour. It is postulated that the Dundas Harbour area was an enclosed or partially enclosed basin during the deposition of evaporites.

The Upper Cambrian sediments appear to be very thin or missing at Dundas Harbour as well as other areas bordering on the Franklinian geosyncline. The occurrence of Middle Cambrian brachiopods approximately 58 feet below the base of the Ordovician Mingo River formation and about 132 feet below the lowest occurrence of Lower Ordovician fossils suggests strongly that Upper Cambrian rocks are not present at Dundas Harbour.

The Mingo River limestone may be divided into two lithologic units, a lower part, predominately of irregularly bedded limestones with flat pebble conglomerates, and a thick upper unit of very massive limestones. The upper limestones agree in lithology and faunal content with the Cape Clay formation of Washington Land. The lower beds are probable correlatives of the uppermost beds of the thick Cass Fiord formation. This relationship suggests that a parallel condition existed in Lower Ordovician and in the Lower Cambrian, with the seas reaching Dundas Harbour later than they did the Kane Basin area.

The lower part of the Nadlo Point limestone may correspond to the Poulsen Cliff shale and Nygaard Bay limestone, as the overlying beds, the Cape Weber formation of Kane Basin and lower part of the massive limestones of the Nadlo Point formation are similar and contain a similar fauna. The upper part of the Nadlo Point limestone would then correspond to the Nunatami formation, also of Lower Ordovician age.

Apparently the Cape Webster formation corresponds to the lower part of the Croker Bay limestones as the upper part of the Croker Bay limestone and the Gonioceras Bay limestone contain some of the same diagnostic Middle Ordovician fossils.

Both areas show moderate thicknesses of sediment that reflect a foreland shelf environment with varying degrees of stability. Marked stability must have been the case when the massive homogeneous limestones of the Mingo River formation were laid down. Such was also the rule with massive beds in the Nadlo Point limestone. The blanket sands in the upper part of the Ooyahgah formation are considered to have been deposited under relatively stable conditions. On the other

hand, flat pebble conglomerates from the lower part of the Mingo River limestone and other formations indicate short periods of sea level fluctuation and many short diastems. Certainly the most profound break in the stratigraphic record is the absence of Upper Cambrian sediments.

A clue to the origin of much of the Cambro-Ordovician limestones lies in the algal colonies in the lower part of the Croker Bay limestone and upper part of the Nadlo Point limestone. The algal colonies are a reddish brown, very fine-grained, dense limestone with a petroliferous odor. This type of limestone is found in all formations with the exception of the Mingo River limestone. The percentage of algal limestone to the total amount of limestone ranges from 0 to 100. The highest percentage of algal material is in the lower part of the Croker Bay limestone and upper part of the Nadlo Point limestone with decidedly lesser amounts in the other formations. The algal colonies are generally less than a foot thick, have a smooth bottom and undulating top, and a typical algal structure. In cross section they vary from several feet to an undetermined length. Layers of shale butt up against the sides of the colonies and show a slight amount of differential compaction over them.

The relatively thin Lower Cambrian rocks indicate proximity to the Franklinian geosyncline. In the Appalachian and Cordilleran geosynclines the troughs proper contain thick Lower Cambrian rocks that thin out rapidly on the foreland. From this comparison, the thinner Lower Cambrian rocks of Dundas Harbour indicate that the area is farther from the geosyncline than the thicker Lower Cambrian section in the Kane Basin area.

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