GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SERIES

SHEET 26 (Part of)

LEGEND

PRECAMBRIAN

- 11 — *Diabase*
- 10 — *Fine-grained and coarse-grained granite*
- 9 — *Undivided gneisses and granites*
- 8 — *Stratified gneisses in part garnetiferous; biotite, granitic gneisses with biotite, amphibole, and amphibole-scapolite rich bands*
- 7 — *Sillimanite-garnet gneisses and schists in part with pyroxene or amphibole or biotite; garnetiferous granitic gneisses; crystalline limestones and skarn; minor spinel-sillimanite gneiss; minor pyroxene-cordierite granitic gneisses*
- 6 — MISTY ISLAND GNEISSES — *Epidote-biotite gneisses, mainly granitic*
- 5 — FINGER LAND GNEISSES — *Epidote-amphibole-biotite gneisses, mainly granitic*
- 4 — CHIDLIAK GNEISSES — *Amphibole gneisses, mainly granitic*
- 3 — *Perthitic pyroxene-amphibole gneisses, mainly granitic*
- 2 — *Pyroxene-bearing granulites, mainly granitic*
- 1 — *Charnockite (perthitic hypersthene-diopside granitic rocks)*

Note: Age relationships 1-10 uncertain; 11 probably youngest

Bedding (inclined, vertical, top of bed unknown)
Gneissosity, including banding (horizontal, inclined, vertical, dip unknown)
Lineation (horizontal, inclined)
Drag-fold
Trend lines of banding derived from parallel lineaments on air photographs and from topographic lines observed in the field
Fault and fault zone with noted displacement inferred from lineament on air photographs and from topographic features observed in the field (defined, approximate, assumed)
Anticline
Syncline
Glacial striæ, chatter marks and grooves

Geology by G.C. Riley, 1951

Cartography by the Geological Cartography Unit, 1958

Base-map prepared by the Surveys and Mapping Branch

Settlement ■ *with post office* ■P
Trading post ■Tr
Wireless station
Royal Canadian Mounted Police
Astronomical observation monument
Braided stream
Rapids
Marsh
Glacier
Sand or mud
Cliff
Height in feet above mean sea-level (approximate) 3500

Air photographs covering this map-area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

Approximate magnetic declination, 48°36' West

INDEX MAP

DESCRIPTIVE NOTES

Cumberland Sound, in southeastern Baffin Island, is 190 miles long between its head and Cape St. David on the southwest shore. It has an average width of 40 miles. In addition to the main settlement Pangnirtung, occupied by both white and native inhabitants, ten native villages are scattered along the coast of the Sound.

At present two ships visit Pangnirtung in the late fall, otherwise transportation to the area is by air. Ski-wheel aircraft can land on sea ice until May and with floats by July. Transportation in the area is by dog teams during the winter, and by small boats along the coast during open-water season. The times of break-up and freeze-up vary.

A five fold topographic division of the Cumberland Sound shoreline and adjacent interior is as follows:

1. The eastern side of Cumberland Sound, from Usualuk south to the edge of the area, has a steep shoreline and the interior rises to over 7,000 feet above sea-level.
2. In the Clearwater, Shark and Kangilo Fiord districts, as well as in the area north of Usualuk, the shorelines are far less steep and the total relief is not over 2,000 feet.
3. The area between Iglunga and Brown Imlet, including the entrance to Nettilling Fiord, is characterized by a low, rolling shoreline and a relief of less than 500 feet.
4. The coast between Brown Inlet and Blacklead Island is similar to that of the Clearwater Fiord region but islands are more numerous.
5. The area between Blacklead Island and the 64th parallel has a steep coast-line and the interior rises to over 3,500 feet above sea-level.

The Cumberland Sound land form thus resembles a low trough decreasing in height to the northwest, and bounded on the southwest and northeast by the higher ground of Hall and Cumberland Peninsulas.

A recent and youthful cycle of river erosion has carved narrow valleys in a broad, rolling, old erosion surface in most of the Cumberland Sound region. The expression of the recent youthful cycle of river erosion depends on the topographic features of any given district. In the eastern part of Cumberland Sound, glacial valleys are greatly overdeepened and hold small youthful streams, whereas in the uplands other streams have merely cut through light overburden. The preglacial surface evidently had a dendritic drainage pattern with a mature to old-age landscape.

The present-day topography was initiated before the beginning of glaciation by rejuvenated streams and was then modified by alpine and continental glaciation.

Both continental and alpine glaciation affected the eastern side of Baffin Island, and the area surrounding Cumberland Sound provides good examples of topographic modification by those erosional agents. A large ice-cap is still present in the Penny Highland north of Pangnirtung, and a smaller one lies in the highland west of Popham Bay.

The adjustment of the Cumberland Sound district to varying base-levels, since deglaciation commenced, is indicated by such features as bay head terraces, terraced deltas and outwash fans, and raised beaches. Some of these forms are as much as 200 feet above sea-level.

The area is underlain by Precambrian rocks of the Cumberland Sound complex which are almost entirely granitic gneisses. The complex is composed of rocks of different metamorphic facies. The highest grade of metamorphism is represented by charnockite (1) near the head of Cumberland Sound. The intensity of metamorphism decreases with zonal arrangement to the south where the Misty Island gneisses (6) exhibit the lowest grade of metamorphism.

The charnockite rocks (1) of Cumberland Sound are characterized by their olive-green colour, massive texture, and brownish weathering. Quartz has a pronounced vitreous luster and a bluish colour. Feldspar insets are commonly olive-green. The group is divided into two mineralogical varieties depending on the presence or absence of garnet. They are commonly massive, coarse- to fine-grained, metacrystic aggregates of quartz, feldspar and ferromagnesian minerals. Graphite has been identified in samples from Quickstep Harbour. Perthite, hypersthene and ilmenite are diagnostic minerals.

Mafic and felsic fine-grained inclusions are scattered here and there through the charnockite rocks. Diffuse contacts with the country rock are most common, but some are sharp and some gradational.

Some rocks of the second group (2) show the normal structural features of gneisses, such as banding. Some show textural and mineralogical features of special gneisses, such as granoblastic texture, perthite and pyroxene, and some show structural and textural features not ordinarily seen in gneisses, such as a lack of mineral segregation and presence of platy quartz.

All rock units within the group are called granulites whether they have the characteristics of gneisses or not, because their field and mineralogical associations set them apart as special metamorphic occurrences. Most are olive-green in colour, but vary from white to black. Their weathered surfaces are commonly rusty and crumbly. They contain pyroxene to the exclusion of primary amphibole, and perthite and ortho- and clino-pyroxene are characteristic minerals.

The group is divided into five varieties: granitic granulites, granodioritic granulites, quartzitic granulites, mafic granulites with feldspar and quartz, and mafic granulites with little or no quartz.

The granodioritic granulites constitute the most common and probably the youngest variety. In many areas they are noticeably banded though normally they exhibit only slight colour and compositional variations. Although planar structure ordinarily imparted by banding is a dominant feature, some outcrops of the granodiorite units possess intense mineral lineation and lack planar structure. Banding is commonly a discontinuous feature that fades out in many areas, through a stage marked by many small elongated lenses, into a non-banded unit.

The quartzitic granulites are fine grained, commonly light coloured, and here and there are banded. This variety contains some gneisses with inferred sedimentary origin. A band of dark-coloured rock consisting of elongated and rounded pebble-like forms was observed near the entrance to Pangnirtung Fiord, on the south shore. Some bands have structures that resemble original bedding. A band of quartzitic granulite, about 40 feet wide with a thin layer of sillimanite-bearing gneiss, occurs on the southwest shore of Freshwater Lake.

The character of the contact between the charnockites (1) and group 2 is variable. In some areas south of Kudjak Island, an arbitrary line was drawn on a basis of increasing gneissosity. Near Nunatak Island both gradational and sharp contacts were observed.

Pyroxene-amphibole bearing gneisses (3), though somewhat greyer in colour, are similar in appearance to the granulitic rocks (2). They have the same characteristic minerals but are distinguished from rocks of group 2 by the presence of water-deficient amphibole. These gneisses have pronounced foliation and commonly mineral lineation. Granitic, granodioritic, and basic varieties are present.

The contacts between groups 2 and 3, commonly vaguely defined, are for the most part conformable. The two groups may be sharply defined or a gradual transition may result from an increase in the number of pyroxene-amphibole bands and lenses to the point where pyroxene granulites are absent. The position of the latter type of contact is arbitrarily defined.

The pyroxene-bearing rocks (2, 3) pass into amphibole-bearing gneisses lacking pyroxene (Chidliak gneisses,4) over a wide contact zone.

The Chidliak gneisses (4) are divided into three general varieties: rocks rich in felsic minerals; those with predominant mafic constituents; and those composed almost entirely of ferromagnesian minerals. These varieties commonly are interbanded with each other, and the component bands are in sharp contact. Microcline, amphibole, biotite, and sphene are diagnostic minerals. Perthite is not found in rocks of this group.

Chidliak gneisses (4) grade almost imperceptibly into the Finger Land gneisses (5) and the Misty Island gneisses (6). All have essentially the same appearance and mineralogy except that the Finger Land gneisses contain epidote in addition to amphibole and the Misty Island gneisses contain epidote but no amphibole.

The amphibole-epidote bearing gneisses are light grey, slightly banded, but well foliated, and have prominent salt-and-pepper appearance. They are commonly granitic. Amphibole and epidote are characteristic minerals of this group. Perthite is not present.

The change from group 5 to group 6 is gradual as one proceeds southward beyond Finger Land.

The Misty Island rocks (6) include banded and vein granite-gneisses as well as scattered occurrences of banded and metacrystic mafic gneiss. This group was found to overlie conformably the Finger Land gneisses (5) in the southern part of the area.

Rocks of sedimentary and possible sedimentary origin (7) occur in small isolated outcrops. They are of two main types: one with calcite, the other with sillimanite.

Bands of crystalline limestone from 2 inches to about 40 feet wide occur singly or grouped together in zones up to 200 feet wide. They can be traced up to several hundred yards along strike. Skarn rocks are associated with crystalline limestones whereas other lime-silicate schists and gneisses are remote from them. Contacts between skarn rocks and enclosing gneisses are either sharp or gradational. Generally, the greater the area of crystalline limestone the less the area of skarn.

Sillimanite-bearing gneisses are part of a group of banded granite-gneisses that include conformable interbands of felsic and mafic material. Sillimanite-rich bands vary in thickness from ½ inch to over 4 feet and in some areas extend for more than several hundred yards along strike. Sillimanite is found in some crenulated mica-garnet granitic-gneisses.

A group of rocks (8), folded into an overturned closed syncline, occur in the high country above the coast, and apparently lie unconformably above the Chidliak gneisses (4). Their debris in talus contains biotite, garnet, and scapolite bearing schists and gneisses.

Vertical or steeply dipping diabase dykes, up to 150 feet thick and traceable along strike for a few hundred yards, were observed in scattered localities. These dykes are unaffected by metamorphism and are composed predominantly of labradorite and augite.

The region is divided in four structural areas or types, each related to one or more rock groups.

A first type of structure is found in massive unfoliated charnockitic rocks (1). It consists of fractures and faults of unknown displacement, some of which have dislocated glacial grooves and smoothed rock surfaces. The indicated post-glacial movement possibly took place along pre-existing zones of weakness. No folded structures have been seen in the main charnockitic mass.

A second type of structure is found in the area of pyroxene and pyroxene-amphibole bearing rocks (2, 3). It comprises folds of simple and complex outlines on a horizontal surface. The fold axes and lineations trend and plunge either northwesterly or northeasterly with reversals of plunge where axes and lineations have gentle plunges or at intersections of the two trends, as in the vicinity of Shark Fiord. In this structural unit major northwesterly and easterly faults are cut by northerly and northeasterly ones.

The third structural division is in the Chidliak gneisses (4), and consists of gneissosity and lineation with a more or less uniform northwesterly orientation, although variations from that orientation are found along the southeastern section of Chidliak Bay. The northern half of the region is homoclinal with westerly dips, but southward the gneisses become gradually more contorted.

A fourth and final structural division is in the epidote-bearing gneisses (6) where folding is generally open and the fold axes trend east or southwest. Reversals of plunge are present.

Economic mineral occurrences in the Cumberland Sound area are not common. A lens of graphite, about 6 feet long and 1 foot wide was examined at Blacklead Island. Fifteen tons of this material was mined in 1875 by Lieut. William Mentzer. Mica and graphite have been reported at Niante Harbour. Sparsely disseminated flakes of molybdenite were found on the mainland 7 miles southeast of Nunatak Island.

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MAP 1061A

CUMBERLAND SOUND

BAFFIN ISLAND
DISTRICT OF FRANKLIN
NORTHWEST TERRITORIES

Scale: One Inch to Eight Miles = 1/506,880

Miles 8 4 0 8 16 24

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1061A

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