Photo: M. H. W. Ritchie

Norseman at Camp M2, Eglinton Fiord: Cockscomb, 5,330 feet, in centre.

BAFFIN ISLAND EXPEDITION, 1950: A PRELIMINARY REPORT

By **P. D. Baird* and other members of the expedition**

THIS expedition carried out a program of geological, glaciological, and biological investigations near Clyde settlement on the east coast of Baffin Island. The coastal mountains and fiord scenery in this region are spectacular and inland there is an isolated ice cap, some 3,700 square miles (6,000 sq. km.) in area. Scientifically this region was little known. The Wordie expedition[1] explored certain of the fiords in 1934, and M. H. W. Ritchie and the writer, who were both members of that expedition, saw the ice cap at a distance. In the winter of 1940 the Rev. Maurice Flint crossed from Piling to Clyde Inlet, passing round the southern edge of the ice cap, and this journey was twice repeated in the opposite direction, by Canon J. H. Turner in the winter of 1941 and by Cst. Webster and S/Cst. Kyak of the R.C.M.P. in the spring of 1945. These three journeys were carried out in the course of other duties and detailed exploration had not been possible. The area therefore seemed very promising both for geological studies in the coastal mountains and for glaciological studies on the ice cap.

The expedition had the support and assistance of the Arctic Institute of North America[2], the Royal Canadian Air Force, the Geological Survey of Canada, the Swiss Foundation for Alpine Research, the Canadian Geographical Society, and many private sources–universities, commercial companies, and individuals.

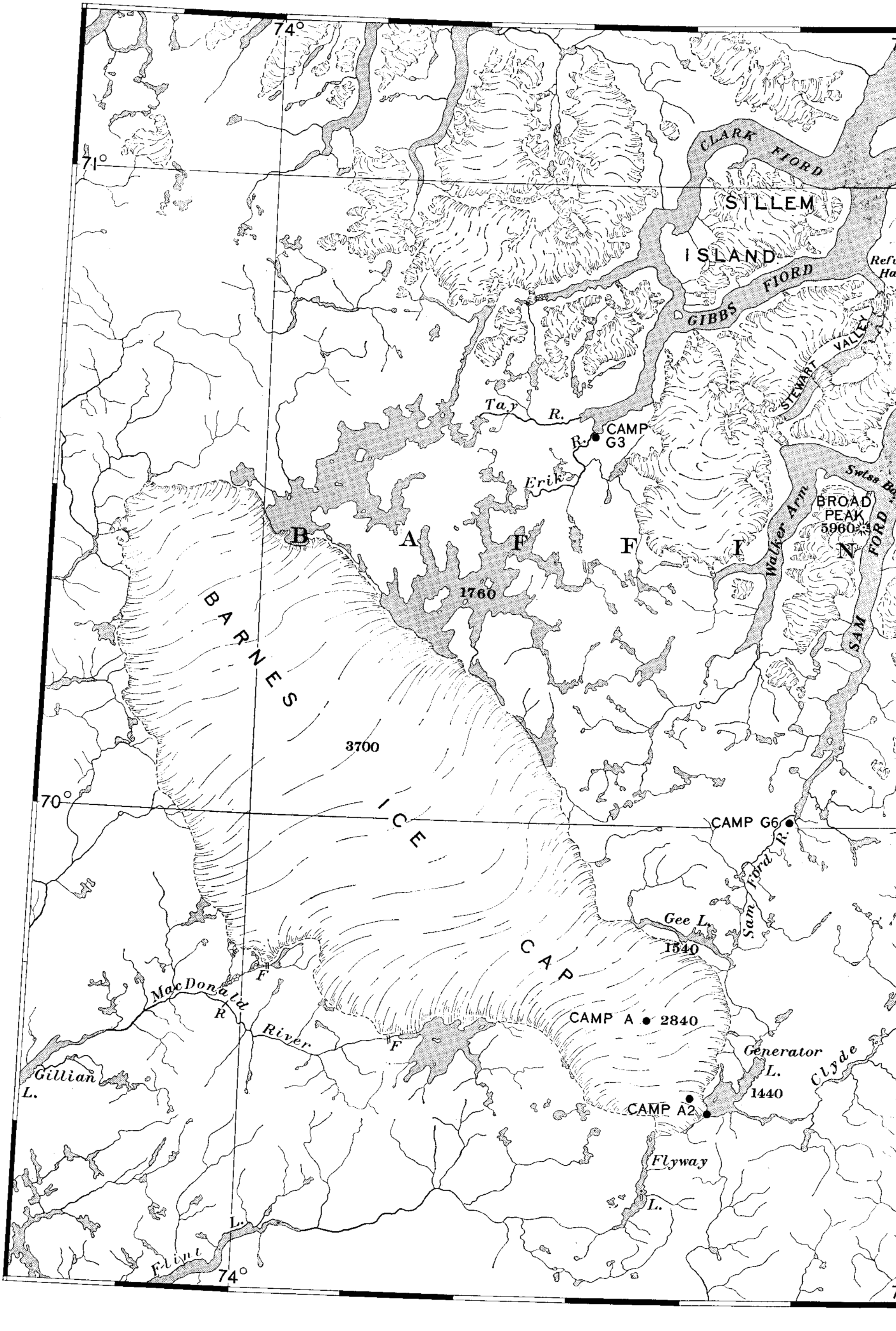
The party consisted of:

A. Anderson	Aberdeen University	Assistant Zoologist
P. D. Baird	Arctic Institute	Leader and Glaciologist
P. Dansereau	Université de Montreal	Botanist
Françoise Dansereau	Montreal	Artist and Quartermaster
K. E. Eade	McGill University	Geologist
F. Elmiger	Switzerland	Mountaineer and Physician
R. P. Goldthwait	Ohio State University	Geomorphologist
M. E. Hale	Yale University	Assistant Botanist
E. H. Kranck	McGill University	Petrologist
C. A. Littlewood	Dominion Observatory	Gravimetrist
Margaret R. Montgomery	McMaster University	Geographer
H. R. Mülli	Switzerland	Mountaineer and Mineralogist
S. Orvig	McGill University	Meteorologist
G. C. Riley	McGill University	Geologist
M. H. W. Ritchie	Texas	Photographer and Mountaineer
H. Röthlisberger	Switzerland	Mountaineer and Geologist
J. D. C. Waller	McGill University	Mechanical Engineer
W. H. Ward	U.K. Dept. of Scientific and Industrial Research	Glaciologist
V. C. Wynne-Edwards	Aberdeen University	Zoologist
J. M. King	Alaska	Pilot

*Director Montreal Office of the Arctic Institute.

[1]Wordie, J. M. "An expedition to Melville Bay and north-east Baffin Island", *Geogr. J.* Vol. 86(1935) pp. 297-316.

[2]With funds provided through the U.S. Government.



74°
71°
CLARK FIORD
SILLEM
ISLAND
GIBBS FIORD
STEWART VALLEY
Tay R.
CAMP G3
Erik R.
Swiss Bay
BROAD PEAK 5960
Walker Arm
SAM FORD
B A F F I N
1760
BARNES ICE CAP
3700
70°
CAMP G6
Sam Ford R.
Gee L.
1540
MacDonald R
River
CAMP A 2840
Generator L.
1440
Clyde
CAMP A2
Gillian L.
Flyway L.
L.
Flint
74°

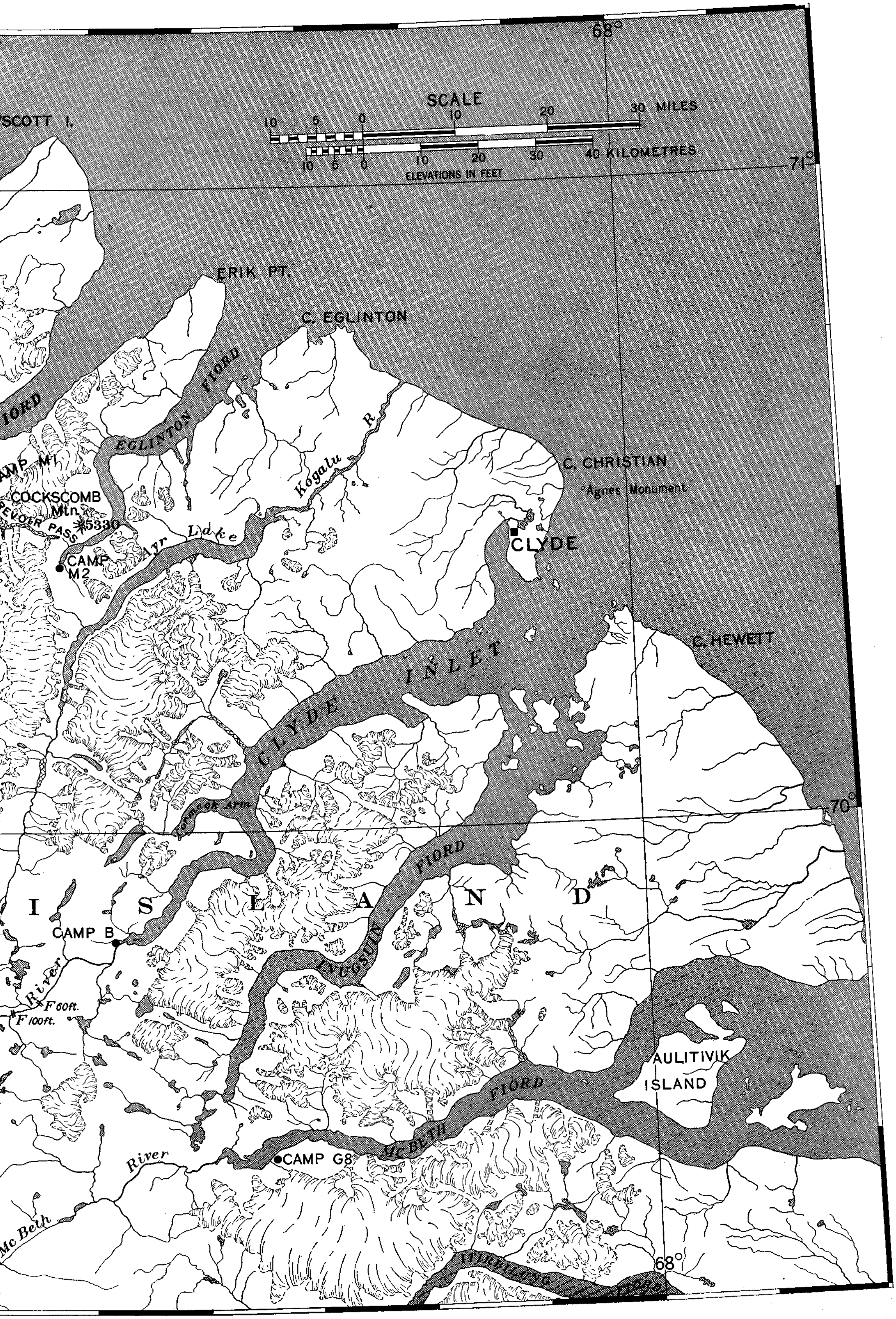

68°
SCALE
10 5 0 10 20 30 MILES
10 5 0 10 20 30 40 KILOMETRES
ELEVATIONS IN FEET
71°
SCOTT I.
ERIK PT.
C. EGLINTON
EGLINTON FIORD
Kogalu R.
C. CHRISTIAN
Agnes Monument
CLYDE
COCKSCOMB Mtn.
5330
CAMP M2
Ayr Lake
C. HEWETT
CLYDE INLET
Cormack Arm
70°
I S L A N D
CAMP B
River
F 60ft.
F 100ft.
INUGSUIN FIORD
AULITIVIK ISLAND
McBETH FIORD
CAMP G8
River
Mc Beth
ITIRBILUNG FIORD
68°

Photo: R.C.A.F.

Southeast part of the Barnes Ice Cap from the air, looking west. Gee Lake is in the centre right side and the lake from which MacDonald River flows in the left upper corner of the photograph.

For transportation in the field the expedition depended almost completely on the use of the Arctic Institute's Norseman aircraft, fitted initially with ski-wheels and later with floats. This was the aircraft which had been used on the two Snow Cornice expeditions of 1948 and 1949 (*Arctic*, Vol. 1(1948) pp. 107-12, and Vol. 2(1949) pp. 118-9) and was flown by the same pilot, Maurice King. The Norseman with King and two other members left Montreal May 9 and reached Clyde, the base of operations, ten days later. The remainder of the party went north by R.C.A.F. airlift and all arrived by May 20 in fine spring weather with the snow cover on the land just beginning to go at the sea coast.

Three main camps were established by air, each with portable radio transceivers for intercommunication. Camp A, the glaciological and meteorological station, was on the Barnes Ice Cap 100 miles inland from the settlement at Clyde; Camp B, the biological headquarters, was at the head of Clyde Inlet; and Camp M (for the mountaineers) was first established on Swiss Bay of Sam Ford Fiord and later moved to the head of Eglinton Fiord. In addition to these main camps there was Camp A2, an important subsidiary of Camp A, which was originally situated on the southeast edge of the ice cap and later moved just off the ice cap. The geologists remained mobile, working in Gibbs Fiord, Sam Ford Fiord, and McBeth Fiord.

These camps were stocked till at least the end of July during the first thirteen days of operations. By June 4 ten tons of personnel and equipment had been moved inland in 35 flying hours, and for twenty days the aircraft was available to make two flights around the ice cap and a "mail run" to all the camps before leaving to have floats fitted at Frobisher Bay.

The ice broke up at the head of Clyde Inlet early in July but the aircraft was unable to return till July 17 owing to conditions at Frobisher. By July 19 it was possible to land at Clyde settlement where the main fuel supplies were located. Gibbs Fiord and the lakes around the ice cap did not clear until later but by the end of July all the camps had been restocked for the rest of the expedition and the geologists transported to new locations. During August two longer flights were made, the first to Lake Gillian and Bray Island near the west coast of Baffin Island and the second to Cape Searle near Padloping Island.

Photo: P. D. Baird

Swiss Bay: site of Camp M1 just to the left of the photograph.

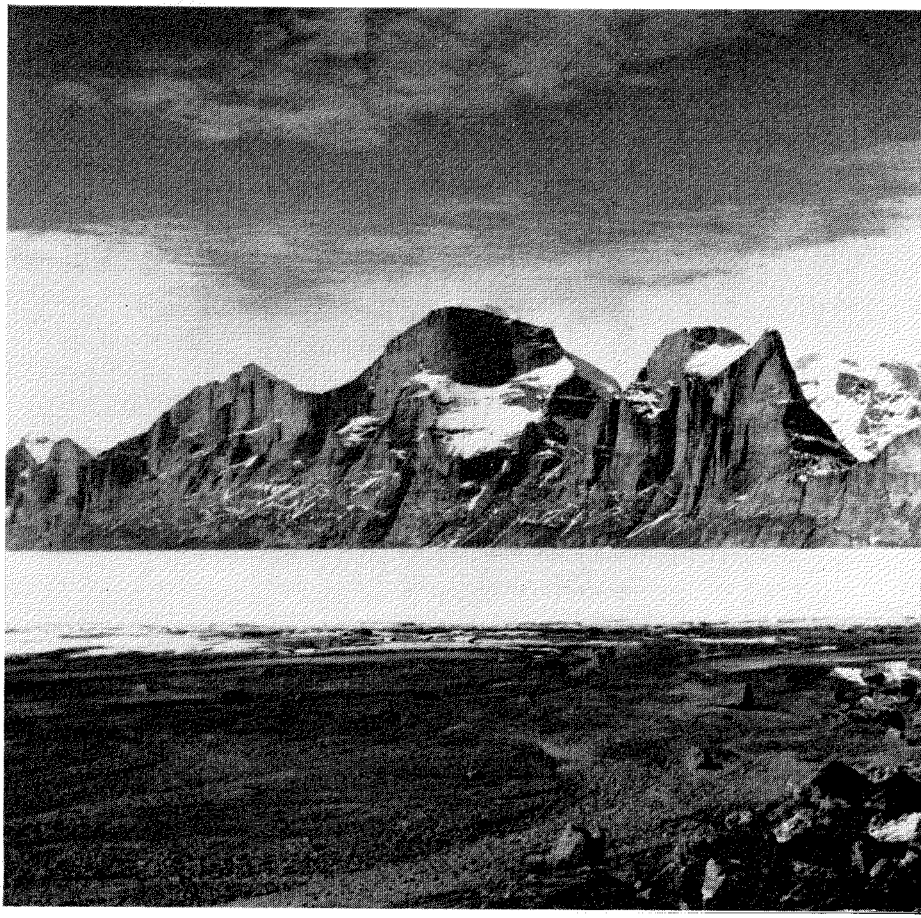


Photo: M. H. W. Ritchie
View from Camp M1 looking across Sam Ford Fiord to Broad Peak, 5960 feet, climbed 28 June 1950.

Evacuation of camps was planned to begin on September 1 but the progress ahead of schedule of the Canadian Government vessel *C. D. Howe* and an early onset of wintry conditions necessitated a change. Camp A on the ice cap was evacuated August 27 and by September 1 the whole party was back at Clyde. The Norseman and the ship both left on September 5. The former was back in Montreal on September 10, the latter reached Quebec on September 22 after visiting three posts north of Clyde and Frobisher Bay.

There follow brief initial reports on the progress of some of the scientific studies. Dr. Wynne-Edwards states that it is too early yet to report in any detail on the zoology other than to say that: (1) We collected a varied assortment of animals, especially birds, insects, and fresh water organisms; (2) we studied the breeding biology of the small passerine birds, in particular the Lapland longspur, and (3) we visited in August the fulmar colony at Cape Searle, estimating the number of birds present

Photo: M. H. W. Ritchie

Looking northwest from the summit of Broad Peak.

to be between 100,000 and 500,000. This colony had never previously been visited by scientists and may be the largest yet known.

The Swiss mountaineering group climbed some seventeen peaks, ranging up to nearly 6000 feet in altitude, including the spectacular Cockscomb (5330 feet) above the head of Eglinton Fiord. In addition they carried out geological and glaciological investigations and spent some time working on or around the ice cap.

GEOLOGICAL RECONNAISSANCE. *By K. E. Eade and G. C. Riley*

The first geological field camp was set up in Refuge Harbour, Gibbs Fiord, on May 30. The bedrock in this area consists of gneiss, as do the shores of Gibbs Fiord to its head. A few basic dykes were seen cutting both gneiss and pegmatite veins. The second camp was set up at a small island, above Sillem Island, on June 3. G3, the camp at the head of Gibbs Fiord, was reached on June 9 when work was held up by a five-day storm.

The Norseman arrived on June 17 bringing in Dr. Kranck. The break-up period was spent in making a detailed study of a section of gneiss. The weather was exceptional in this part and we encountered winds up to 70 miles per hour and there were several rainfalls of over 2 inches.

After two unsuccessful attempts, the aircraft landed on floats on July 24 and we moved to the north shore of Walker Arm. Here we started to make use of our 17-foot freight canoe, powered with a 5 H.P. Johnson engine. Moving camp by canoe proved to be difficult because of the high average wind velocity and the canoe was adequate only as long as the wind was less than 15 miles per hour. The geology of the outer parts of Sam Ford Fiord is similar to that of Gibbs Fiord.

On August 1 the party was flown from Camp M1 in Sam Ford Fiord to the head of McBeth Fiord, where a camp was set up on the south shore. Inland metamorphosed schists occur but seaward the geology of the fiord is similar to that of the more northern areas. More bad weather was experienced; one of the gusts of wind twisted the aluminium alloy pole of our Mount Logan tent into a spiral and our canoe was made unserviceable.

On August 26, after air transportation from McBeth Fiord to the head of Cormack Arm, Clyde Inlet, the last trip was begun. From Cormack Arm to Clyde settlement, which was reached on August 31, the geology is again similar to the other seaward areas.

Bedrock Geology. *By E. H. Kranck*

Bedrock surveys were made from the following base camps: head of Clyde Inlet, May 24-June 17; head of Gibbs Fiord, June 17-July 24; head of Eglinton Fiord, July 24-7; head of Sam Ford Fiord, July 27-August 2; head of McBeth Fiord, August 3-20; and at the southeast end of the ice cap, August 23-8. Investigations were also carried out around the settlement at Clyde. During flights between base camps a fairly good picture of the general bedrock geology of the whole area was obtained.

The region studied by the writer comprises parts of the coastal range with its fiord area and the interior plateau between the high mountains and the inland ice. The central parts of the mountain range and the plains along the coast consist, so far as is known, of gneiss. The foliation of the rock, often accentuated by amphibolitic sills parallel to the schistosity, is in general very flat, often horizontal. The gneisses are evidently paragneisses; mica- and garnet-rich inclusions are abundant.

In the westernmost parts of the coast range from the heads of Sam Ford Fiord and Clyde Inlet westwards, metamorphic sediments represented by marble, micaschist, and altered quartzitic schists are found. Although highly folded and faulted, they seem to form one continuous flat-lying horizon, that can, with certain interruptions, be followed westward to the ice cap. The same succession of white, glassy quartzite (lowermost) and marble interbedded with argillaceous layers altered into lime-silicate rock occurs. Both the top and the bottom of the series consist of grey banded gneiss, or granite gneiss.

Another horizon of sedimentary schists was found at the head of McBeth Fiord. Except for a thin horizon of limestone on the north shore of the fiord, this series consists of mica-gneisses, micaschists, and quartzitic rocks invaded by granite in the form of dykes and stocks. Granites of this type were not found in the gneiss areas of the high mountains. The sedimentary schists of McBeth Fiord strike about north-west-southeast. The schists are rich in sulphides and show a strong rusty weathering.

What was evidently the same formation was found at the southeast end of the ice cap, consisting here of phyllitic micaschists and quartzitic schists. The series contains an iron formation consisting of a low grade banded magnetic ore, some 200 to 300 feet in thickness, which could be followed for about one mile. North of the iron formation, a great pegmatite dyke cutting a gabbro was found. It contains abundant tourmaline, forming crystals up to two feet in length, and some columbite.

Geomorphology. *By Richard P. Goldthwait*

The geomorphic studies aimed at discovering two things, the activity of the margin of the southern half of the Barnes Ice Cap as it related to the formation of moraines, and the glacial history of the area between the ice cap and the coast.

The ice cap is advancing on some fronts into moderately weathered drift and established plant associations. Some of this growth is by perennial snow-drift accumulation along the steep ice margins. On the other hand where there is no net snow accumulation slow retreat is producing end moraines. Along the shear planes clay till in small quantities is brought up to the ice surface, 50 to 200 feet above the ground. This material creeps and oozes down the steep ice edge as fast as it is exposed, but where it piles up to more than a foot deep on the ice toe it prevents summer ablation. At the same time the dirt sliding down the active ice above absorbs and transmits the sun's energy, thus accelerating the melting which forms a hollow between the ice-cored moraine and the dirty active ice above. Meltwater helps to enlarge this hollow in places during the summer, but also deposits sand in pools which become dirt cones in subsequent years. Ice buried as a core in the moraine becomes inactive as it is severed from the main glacier but it melts away slowly as it is exposed from time to time where slump or stream transection occur. Thus finally the moraine is "let down" in hummocks on solid ground[1].

[1]In this respect the writer and W. Ward differ as Ward identifies ice in the ground in areas surrounding the "apparent" ice edge as glacier ice. The writer believes it to be of frost-derived origin.

Photo: M. H. W. Ritchie
Diamond drill near Generator Lake (second Camp A2): ice cap in the background.

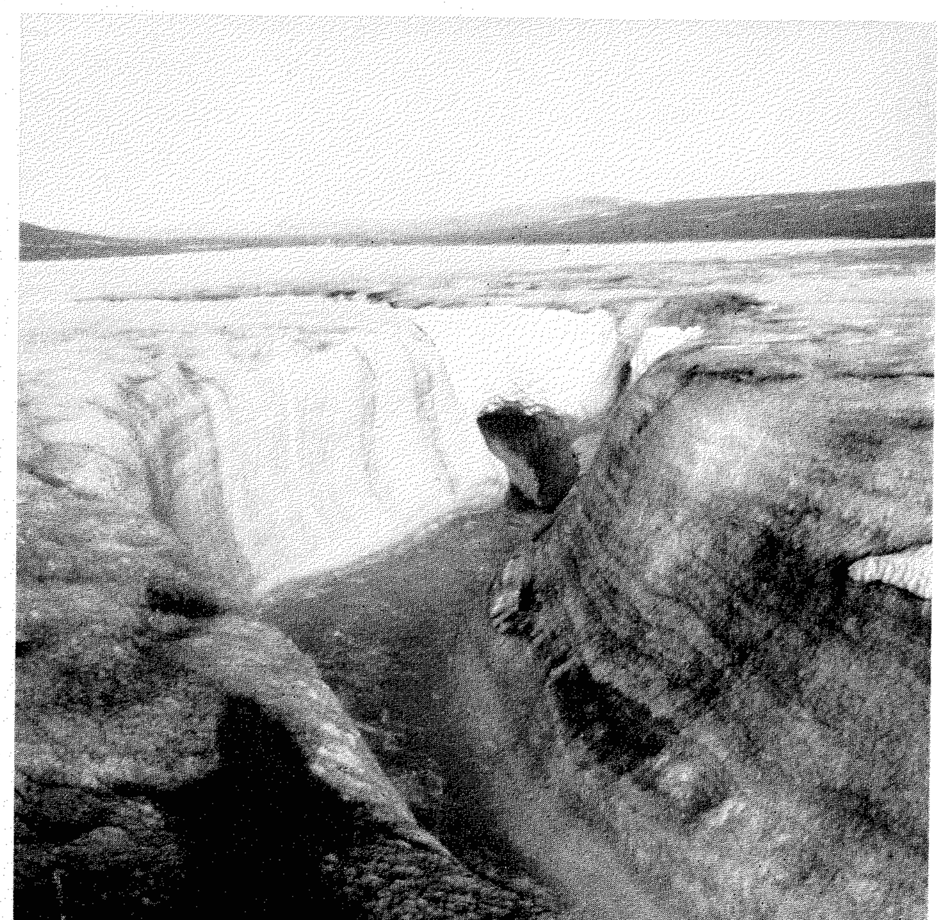


Photo: M. H. W. Ritchie
River in gorge, approximately 20 feet deep, near the edge of the ice cap.

The oldest geomorphic record is a prominent erosion surface preserved as accordant hilltops across the southwestern part of central Baffin Island. To the northeast these rise to subdued mountains near the former drainage divide. This surface was tilted highest at the extreme northeast so that peaks in this region now reach 5000 to 6000 feet in altitude. The system of dendritic and parallel valleys cut into this upraised surface shifted the drainage divide westward. The divide was shifted still farther west by intense Pleistocene glacial erosion emanating from centres southwest of the divide. High peaks so concentrated the erosion as to produce a complicated interconnected network of deep outlet valleys through the mountains. As deglaciation occurred (presumably after the last substage of Wisconsin time) the ice still flowed from the hill lands of central Baffin Island rather than from local mountain glaciers in the east (as shown by indicator rocks). Regular stages of thinning of the ice tongues are marked by many lateral moraine benches on fiord walls, and a few of these connect from the head of one fiord to another suggesting simultaneous stages. The lowest and best marked level consists of gravel kame terraces which terminate in the upper part of each fiord on a 200-foot strandline interbedded with marine silts. An association of molluscs fully as warmth-loving as those in Baffin Bay today suggests that this final great recession occurred at the beginning of the climatic optimum 4000 to 6000 years ago. As broad ice tongues retreated westward, braided streams built valley trains at the head of each fiord into seawater some 120 feet higher than today. As soon as the ice edge retreated over the watershed (nearly to its present position) marginal lakes impounded the bulk of glacial sediments, thus streams draining from each lake to a fiord became unloaded and began to dissect the outwash in meandering curves. Many stages in this dissection are evident in the cut-and-fill terraces in the valleys and continuing uplift is indicated as each terrace ties directly to one of a series of raised sea beaches in the fiord.

Glaciology. *By W. H. Ward*

The glaciological work was mainly devoted to a study of the large ice cap which lies approximately in the centre of the island and west of the fiord-mountain region. It is about 145 kilometres long in a northwest-southeast direction, up to 56 kilometres wide, and rises from an altitude of about 460 metres to 1130 metres. It appears to be a blanket of ice about 600 metres in thickness overlying rolling topography similar to the land to the west. In some places the edge of the ice cap is but a nominal one, as glacier ice covered with only about 1 metre of till or sediments extends for at least several kilometres from the apparent edge of the ice.

The whole ice cap consists of dense glacier ice, fairly evenly covered with not more than 1.3 metres of current snow, a third of which fell in

Photo: M. H. W. Ritchie

Camp A1 in June from the top of the meteorological tower.

Photo: M. H. W. Ritchie

Orvig and Ward reading temperatures at Camp A1 in rough weather.

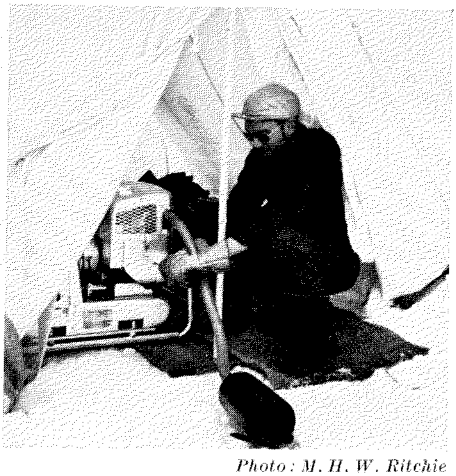


Photo: M. H. W. Ritchie

Waller with the generator at Camp A1.

mid-June. The uniformity of the snow cover is believed to be due to blowing of the snow, which continued at intervals during our stay. From mid-June until early August, apart from one blizzard, steady melting occurred. The meltwater trickled down, part of it froze on to the old impervious ice surface and the rest became slush or flowed laterally into hollows to form lakes and into old river channels from which the slush suddenly discharged in great torrents to the edge. This made travelling and camp sites wet and adventuresome at increasing altitudes during the summer.

Above an altitude of about 760 metres several centimetres of newly-formed ice or very coarse crystalline snow remained, when persistent snow fell again during August. It is not known whether this is a regular accumulation or due to the poor summer, but comparison of the organic material from the older ice with that from the air may give some clues. This form of ice accumulation, however, is likely to have been regular at an earlier stage. Below about 760 metres old ice melting occurred and resulted in a maximum loss of about 2 metres at the apparent edge. In places new moraines to this height were formed out of debris from the shear planes.

The ice crystals both on the ice cap and on the mountain glaciers varied commonly from about 0.5 to 2.0 centimetres in size, and no significant change in size was noted near the surface at different altitudes.

The ice cap temperature 30 centimetres below the ice surface was about -13°C late in May and it increased almost to freezing point in early August. The ice temperature at a depth of about 9 to 10 metres remained constant at about -10.7°C, a reasonable value in relation to the mean annual air temperature. Few open crevasses were seen either on the ice cap or on the mountain glaciers. As soon as the meltwater started to flow, any crevasses filled and became frozen up by long hexagonal crystals growing outwards from the cold walls. Many such frozen crevasses were seen.

Movement of the ice near the edge of the ice cap, both adjacent to moraines and above a cliff about 30 metres high bordering Generator Lake, was small.

METEOROLOGY. *By S. Orvig*

The ice cap meteorological station was established on May 27, and from June 1 to August 26 the following observations were made every 2 hours, from 0800 to 2200 daily: pressure (mercury barometer); temperature and humidity at 2 feet and at 23 feet above the surface; temperature at 12 feet; wind speed and direction at 7 and at 23 feet; also cloud, fog, visibility, and ceiling. At 0800, 1400, and 2000 hours maximum and minimum temperature and precipitation were measured. Sunshine was recorded by a Campbell-Stokes recorder, and barograph and thermograph records were kept for the 87 days with a few short interruptions caused by drifting snow.

Reports from Arctic Bay and Pond Inlet in northern Baffin Island seem to indicate an unusually bad summer this year. The nearest weather-reporting station was Clyde, some 100 miles northeast of the ice cap station. There the precipitation in June, July, and August of this year was above normal for the period 1942-7: 1.04 inches higher in June, 0.35 inches in July, and 0.73 inches in August. The altitude of the ice cap station was close to 2840 feet (870m.), which is approximately the normal height of the 900-millibar level. A comparison of temperatures and humidities at this level recorded on the twice daily radiosonde ascents at Clyde in the summers of 1949 and 1950 shows that all three months were slightly colder this year, and the humidity was markedly higher. It seems, therefore, that the humidity in the area was well above normal, but the temperatures probably not far from normal, though on the ice cap possibly a little lower than usual.

The most striking thing on the ice cap was the short "summer". Only 35 days had mean temperatures above freezing, the first being June 23, and the last August 10. Also unexpected was the heavy precipitation: 2.3 inches of rain and 49.9 inches of snow in 87 days. In spite of this, the 42 inches of snow found at the camp-site on arrival disappeared, and the ice surface was bare for four days in the beginning of August. On departure there was 14 inches of new snow, of greater density than the winter snow found in May.

The temperature and humidity measurements at the 2-, 7-, and 23-foot levels showed an almost permanent gradient, the air at 23 feet being warmer and drier than the surface layer, except in foggy weather.

Ablation of the snow in the first half of the summer was mainly caused by radiation, in spite of the low surface temperatures. June had the maximum sunshine, 184 hours, not counting the night-sunshine from 2015 to 0345 hours. Convection played a greater part later in the season. The evaporation was greatest early in the season, when the water-vapour pressure decreased most sharply with height. The amount of fog increased considerably in August, when some, or continuous, fog was recorded on 22 days out of 26. August had only 54 hours of sunshine. It is probable that the very short period when the ice was snow-free is unusual. The results of this summer's ablation studies should not be considered normal, other summers will almost certainly be more favourable for ablation of the ice surface.

CLIMATE. *By Margaret R. Montgomery*

Camp B lay at the head of Clyde Inlet and about 40 to 45 miles east of the ice cap meteorological station. Apart from three brief interruptions during June weather observations were taken daily from May 25 to August 31, the following elements being recorded: pressure, by barograph trace; temperature, both maximum and minimum, dry and wet bulb, and thermograph trace; precipitation, the number of occurrences only as there were no adequate facilities for measuring amounts, although some approximate estimates were made during the "heavier" rains in August with instruments improvised from general camp equipment; cloudiness, the percentage cover and the height, judged by eye estimate; and wind, both direction and strength, the latter was measured by anemometer until mid-July when the instrument was broken, after that estimates were made according to the Beaufort scale—this presented certain difficulties in a treeless, uninhabited land where such limitations as "whole trees in motion: whistling heard in telegraph wire: umbrellas used with difficulty" hardly seemed to apply.

It might have been expected that weather conditions at Camp B would be intermediate between those of the coast and those prevailing in the low, rolling interior. Comparison with reports from camps on neighbouring fiords, however, suggests that conditions at Camp B were decidedly more favourable than at the heads of the more exposed fiords and the station appears to represent a climatic "soft spot" reminiscent of similar protected areas in rift valleys and fiords along the Labrador.

Although still within the western fringe of the mountain zone of the east Baffin coast, Camp B, situated in an area surrounded by mountains 2000 to 3000 feet high, had a sufficiently low elevation (approximately 85 feet above sea level) to assure it considerable protection from much of the adverse weather experienced inland. At the same time, 12 to 15 miles to the east, in the vicinity of the great *S* bend of Clyde Inlet, the mountain barrier with peaks between 3000 and 5000 feet presented a formidable obstacle to surface winds and effectively broke much of the severity of weather travelling inland from the coast. This was particularly well illustrated in the latter part of August when the heavy, low cloud which blanketed the coast for several days was stopped abruptly by the mountain barrier, thus permitting the Camp B area to enjoy brilliant sunshine broken only by scattered patches of cumulus.

Camp B records showed a total of 67 days in June, July, and August with minimum temperatures above 32°F. The only continuous frost-free period was from July 15 to August 20 inclusive, and the snow which fell during the last days of this period did not continue to lie on the ground at station level although it persisted for several days above the 1000-foot level on the surrounding mountains. All "summer" months, particularly June, showed temperatures below 32°F, although with the two exceptions of July 14 (31°.5F) and August 20 (31°.7F) these sub-freezing temperatures occurred only in the first five days of July and last two of August. Only on eight days did the minimum temperature remain above 43°F. Mean maximum temperatures registered were about

40°F in June, rose to about 52°F in July, and fell to approximately 48°F in August. The highest temperature recorded for the season was 71°F on July 29.

Since the 1950 summer was a particularly unfavourable one according to the records of the regularly established Baffin Island stations, it seems probable that, in a "normal" year higher mean temperatures and a frost-free period of about six weeks duration might occur at Camp B.

In all months the mean and maximum temperatures, as well as the temperature range, were higher at Camp B than at Clyde while the pressure readings were almost invariably lower.

Throughout the summer, precipitation was extremely light, and only rarely interrupted field work. The period of heaviest rain occurred in the second and third weeks of August when, on three occasions, an estimated 0.12 inches of rain fell during a period of 6 to 9 hours. Under these conditions, moisture for plant growth was supplied, not by summer rains, but by the melting of winter snows. During the first warm spell at the end of June the suddenly-released meltwater flooded the river beds, making a number of them impassable for some time and, in areas of poorly defined drainage, covered large sections of the plains and valley with pools of water, many of which never dried up completely.

Surface winds in the area were deflected by the mountains and the channelling effect of Clyde Inlet was clearly evident in the predominance of winds with a strong easterly component, about 60 per cent of the total observations. East winds were most frequent in the warmest period when the contrast between the warm, dry air at the head of the inlet and the cooler air of the coast was most marked. Wind velocities ranged all the way from "calm" on a few rare days in July and August to gusts exceeding 50 m.p.h. when deep depressions influenced the area and intensified the channelling effect of the inlet.

As mentioned earlier, comparison with locations at the heads of neighbouring fiords less protected from the direct influence of winds off Baffin Bay, suggests that Camp B enjoyed a more favourable climate than was typical of the area as a whole. The aridity, the high daytime temperatures, and the diurnal range of temperature even during the period of continuous daylight, all stress its continental character—a character which would doubtless be even more apparent during a favourable summer.

Ecological Study of the Vegetation. *By Pierre Dansereau*

The biologists spent most of the time at the head of Clyde Inlet where there is a great variety of topography and altitude. Trips were made to the coast, to various points on other fiords, to the edge of the ice cap, and to Foxe Basin. On the return voyage aboard the *C. D. Howe* Pond Inlet, Arctic Bay, Dundas Harbour, and Frobisher Bay were visited. Observations, measurements, and collections were made at all these places.

However, most of the detailed work was done at the head of Clyde Inlet, where a careful ecological survey was carried out and a record was obtained of biological events throughout the growing season. The following outline refers to work in this area.

Vascular plants collected number a little over one hundred species. The great majority are widespread arctic types. A few are indicators

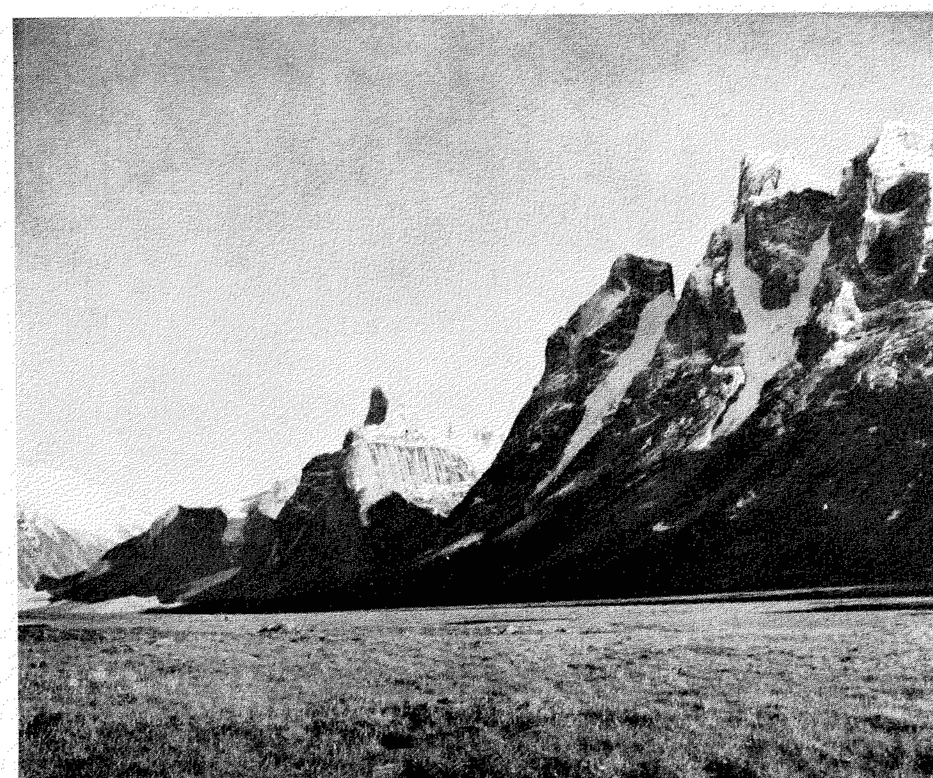


Photo: F. Elmiger

Revoir Pass near Eglinton end. Eglinton Tower, 4100 feet, centre background, was climbed for the second time on 27 August 1950; first ascent T. G. Longstaff 21 August 1934.

of a southern penetration or of locally warmer conditions: *Salix cordifolia* and *Dryopteris fragrans*. Some appear to be relics of older or possibly primitive types: *Crepis nana* and *Erigeron compositus*. The discovery of the latter is of especial significance as it has not previously been recorded in eastern North America between Ellesmere Island and the Gaspé Peninsula.

A considerable collection of lichens and mosses was assembled. The latter will be identified by W. C. Steere (Stanford University). The lichens were collected and studied by Mason Hale.

Special attention was given to the ecological conditions in which each species was found and to the morphological variation involved. It is a remarkable feature, which has not been sufficiently emphasized, that many arctic species have a very broad range of habitat. Most of these, such as *Saxifraga oppositifolia* and *Dryas integrifolia* also enjoy a wide geographical range, and play an important ecological role in more than one community. On the other hand, species that appear to be confined to a single habitat also have a discontinuous, if broad, distribution, such as *Crepis nana*, *Dryopteris fragrans*, and *Erigeron compositus*. Many species are strikingly variable in leaf-shape, habit, and other visible characteristics. This would seem to imply a very mixed heredity, a condition of great importance to the survival of plants in a rigorous and probably unstable environment. In some cases, such as *Potentilla* and *Salix*, hybridization is involved, and there is more than a suggestion of local contamination of one species by another.

A record of the periodic behaviour (budding, leafing, flowering, fruiting, shedding) was taken of all the dominant species, and together with microclimatic measurements should make it possible to delimit the seasons.

Observations in this area will have some bearing on the general concept of plant association. It can be suggested that the replacement of one plant community by another, invading, plant community is slowed down and tends to attenuate the sharp differences in botanical composition of each unit and to emphasize transition stages. A rather close resemblance was found between the vegetation of high altitudes, late snowdrifts, and glacier edges. Although the order of succession of these associations can be estimated, the absolute time scale is difficult to establish.

It was found that the microrelief often favoured the formation of microhabitats within a community which is of great significance as the role of the latter in soil building was considerable. They also produced layering of vegetation and a rather complex interaction of species usually involving flowering plants, mosses, and lichens.

Quantitative floristic surveys were made in small homogeneous areas in order to sample all the vegetation types present. An attempt was also made to find the relationship of floristic units to landforms, soils, and microclimates. Many pictures and diagrams were drawn of selected stations in order to explore the entire range of topographic and edaphic conditions, such as the relation of vegetation to various patterned soils. With the collaboration of Miss Margaret Montgomery, temperature measurements were taken at regular intervals at different depths in the soils of these stations. These measurements show a characteristic pattern in each group and record the recession of the frost line and the retention of heat in the various soil layers.

Lichens. *By M. E. Hale*

The writer took part in the expedition as lichenologist and assistant to Dr. Dansereau. This is the first time that a biologist with experience in lichens has made field studies of the Eastern Arctic lichen flora and has remained at the same station for a whole summer. Most of the time was spent at Camp B, at the head of Clyde Inlet, where large collections were made and the lichen communities studied. About 200 species were found, more than was previously known for the whole of Baffin Island. Brief visits were made to the ice cap, Clyde settlement, Frobisher Bay, Padloping Island and the Cape Searle bird cliffs, Pond Inlet, and Arctic Bay, so that it was possible to compare the lichens of these areas with those of Clyde Inlet.

Determinations of the large collections are still in progress, but a few of the more interesting discoveries of macrolichens thus far are as follows:

New to the Canadian Eastern Arctic–*Nephroma expallidum*, *Peltigera polydactyla*, *Solorina octospora*, and *Xanthoria fallax*.

New to Baffin Island–*Parmelia infumata*, *Peltigera canina* var. *rufescens*, *P. malacea*, *Solorina bispora*, and *Umbilicaria deusta*.

Significant range extensions–*Nephroma arcticum* (Lake Gillian), *Cetraria Tilesii*, which was found repeatedly on limestone throughout the area, *Cladonia alpestris* (to Pond Inlet), *Parmelia incurva*, common to all stations, and *Peltigera venosa* (to Pond Inlet).

Names on the Map

The following new names have been adopted by the Canadian Board on Geographical Names:

Ayr Lake	To perpetuate the name North Ayr given to this region by Ross.
Barnes Ice Cap	After the late Howard T. Barnes, Professor of Physics at McGill University, who carried out much research on ice.
Clyde River	River running into Clyde Inlet.
Cormack Arm	After John Cormack, formerly Hudson's Bay Company's post manager at Clyde.
Flyway Lake	From the migrating route of king eider ducks.
Gee Lake	A geological campsite of the expedition.
Generator Lake	The expedition generator was set up near this lake.
Inugsuin Fiord	After the Eskimo name as reported by Boas.
Revoir Pass	At one period Dr. and Mme. Dansereau were at opposite ends of this pass.
Sam Ford Fiord	After Sam Ford who was drowned in a helicopter accident off the Koksoak River and had at one time been H.B.C. post manager at Clyde.
Sam Ford River	River draining into Sam Ford Fiord.
Swiss Bay	Camp M1 here was the headquarters of the Swiss group.
Walker Arm	After Captain J. B. Walker, a whaling captain, who made an early map of this district.