GREENLAND

University of Newcastle
East Greenland Expedition 1967

REPORT
Report of the

University of Newcastle upon Tyne
Expedition to East Greenland, 1967

to

Tugtilik and Kungmiut

leaders

Christopher Sugden & Philip Storey

THE EXPLORATION SOCIETY . DAYSH BUILDING . THE UNIVERSITY OF NEWCASTLE UPON TYNE
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The Angmagssalik Area of East Greenland

Kajaks drying at Kungmiut

Centre Map

Cover
The expedition carried out an eight week scientific programme in the Tugtilik region, 350 km. north of Ammassalik in latitude 66° 22’N, and in the Kungjuk area at the head of Ammassalik Fjord. It had originally been intended to devote all the time to work in the Tugtilik region but, owing to ice conditions, the expedition was unable to move north until late July. The period 3rd - 21st July was spent at Ammassalik Fjord and the period 22nd July - 30th August at Tugtilik.

Tugtilik had only been occasionally visited by coastal expeditions before 1931, and then never for longer than a few days. As a result of the British Arctic Air Route Expedition, 1931-2, led by H.G. Watkins, the lake between Tugtilik and Riggertuusoq was chosen as the most suitable landing site in East Greenland for sea planes on this air route. Watkins also led the 1932 expedition to the area, and it was on this that he lost his life. The other members of the party, Rynill, Chapman and Riley, wintered in the hut at the head of Tugtilik, completed their several survey tasks and meteorological observations, and returned to Britain at the end of the 1933 season.

Tugtilik Lake was never developed as an air base and no scientific expedition has been based there since. A study of air photographs and of the reports of previous visitors had suggested that the area offered unique opportunities for the geological, geomorphological, paleomagnetic and biological work planned. In the event the work done around Ammassalik Fjord was of equal value, and essentially complementary to that in Tugtilik.

The expedition comprised ten men. The members from the University of Newcastle were:-

C.J. Sugden, aged 21, final year Geography, joint organiser and geomorphologist.
P. Storey, aged 20, final year Geography/Surveying, joint organiser, geomorphologist and surveyor.
P.C. Roy, aged 21, final year Geography, ornithologist and geomorphologist.
B. Kington, aged 25, second year Electrical Engineering, paleomagnetic work and radio.
R.T.G. Parker, aged 21, final year Geology, geologist.
B.D.L. Beck, aged 20, first year Geology, geologist.
J.R.A. Moutonhouse, aged 20, second year Town and Country Planning, paleomagnetic work and campman.

The other members were:-

B.I. Madisen, aged 32, assistant lecturer in Zoology at the University of Copenhagen, limnologist.
J. Finley, aged 26, second year Botany at the University of Leicester, botanist.
Early in the evening on 26th June the expedition sailed from Leith for Reykjavik on the Icelandic vessel, M.V. "Gullfoss". University expenses were barely over and there had been a busy ten days as the ton and a half of food and equipment had been prepared and packed. After three uncomfortable nights crossing the North Atlantic we were all glad to be ashore in Reykjavik, Iceland's capital city. Two days were spent there, and on 1st July, leaving the cost of a D.C. 68 charter flight with the Birmingham University Expedition, we left Reykjavik for Greenland. Within an hour the cloud and drizzle of Iceland were behind, and we were flying at 3,500 m. over the continuous belt of pack-ice that lies off the east Greenland coast. Beyond the pack the coast slowly emerged as an endless chain of unbroken and barren mountains. Near the sharply serrated peaks of the Caladanian Alps could be seen standing above the glaciers which make their way down to the fjords from the inland ice. In these fjords, and immediately along the coast, the pack was broken and the ice drifted in isolated masses.

Several men, heavily muffled, stood by with a fire tender at the bleak airstrip on Kulusuk Island as the plane touched down, raising a trail of gravel and dust. As we disembarked we were impressed by the scenes that would very soon become familiar to us.

It was intended to move to Narsilik, 160 km. further north on the coast, but the Greenlanders at Kulusuk said that the ice in this area had not yet broken up, and that it would be at least another two weeks before it did. With this in mind, immediate plans were made to move to Kungittuq, a prosperous settlement at the head of Angmagssalik Fjord. A start could then be made on some aspects of the scientific programme, and the progress of the ice-break-up watched more closely. Having laid in enough fuel for the duration of the expedition, we left Kulusuk on 3rd July in two small and very heavily laden motor boats.

A few hours zig-zagging between the brilliant ice-floes which lay stranded in the fjords brought us to within sight of Kungittuq, a modern village nestling beneath a jagged skyline. The small pier filled with people who looked on curiously as we came ashore. Wooden houses, the newer ones brightly painted, were scattered along the rocky shore and linked by dusty pathways. Teams of scruffy dogs were chained in long lines outside the houses, and well out of their reach on wooden frames, fish and seal skins were left drying. Close to the pier was the store where the shelves were noticeably empty as the supply ship had not yet called after the winter freeze. From the church, high on the rocks in the centre of the village, one looked across an open bay where many small boats lay moored between the ice-floes. On a promontory to the north of the bay was a new fish factory, built in an attempt to diversify the traditional Eskimo economy. Nearby stood many rows of high timber frames on which seal and harp drying. Parched by the sun, the cod craked and rattled in the wind.

We pitched our tents beyond these fish racks. From the camp there was a magnificent view up Angmagssalik Fjord to the low col at the head of Gingissuaq. In the clear midday sun the colours were vivid, and brightly coloured flowers and glimmering icebergs contrasted with the deep blue of the sky and sea. As the sun dipped behind the mountains for a few hours at midnight the colours changed through pastel shades of pink and green, each colour reflected in the icebergs.

During the first part of July two areas on the western shore of Angmagssalik Fjord were visited. Madsen, Kintopp, Elaisy and Ray carried out some botanical and limnological work at Marie Haven and Iarteeva (17th - 23rd July), and then more further work was done in the big lake, Iarteeva, by the same party, but with Moorhouse replacing Elaisy (17th - 24th July). On the other side of the fjord Parker and Back made a detailed geological study of a small area north of Kungittuq, while Elaisy collected herbarium specimens from the rich flora of the area. The rest of the party were engaged variously in making a large scale topographic map of the settlement, and in preparing and testing equipment for use in Tugtullik.

On 25th July word came through from the outlying settlement of Semallik that the ice further north was now well broken up. This was confirmed several days later; the scientific work was rapidly completed and preparations were made to depart on 21st July. During our stay in Kungittuq we were shown considerable kindness by the Greenlanders, particularly the headman, Mr. Ulrik Lewert, who gave us much help, and Mr. Ulrik Malmi, who asked us to the dances held in his house. Many a happy night was spent dancing. The young people also, who spent a lot of time around our camp, were only too willing to help where they could.

It was a cold but clear morning when we finally left Kungittuq at 2 a.m., on 21st July, in the two open, six metre motor boats that made their way along the narrow fjords towards the open coast. A short stop was made at Semallik, a small settlement on the side of Semallik Fjord and the mall from Kungittuq delivered. In the late afternoon we reached the open coast where a thick blanket of fog lay over the sea. With visibility sometimes less than a hundred metres we went on compass bearing from headland to headland, taking care to pass to the landward side of the coastal inlets. In places, where the mist was thick, the sun broke through and cast across the water a silvery light that seemed to splinter against the ice-floes. Over long periods the only sound was the thrum of the boat's engines, but occasionally one of the great icebergs lumping up towards the fog would heel over and disintegrate with a noise audible for kilometres around. By 10.30 p.m. we had reached Igaliku, a small rocky island on the south side of Kangrerdungamuit. With a total of 15 men and 30 out of equipment in the two small boats, we were all very cramped and cold and glad to go ashore on the island. On a grassy ledge about 10 m. above the sea we were shown the ruins of an old Eskimo winter-house. It was a turf and stone building about 3 m. square with a long tunnel entrance, and on the high rocks nearby there were numerous graves.

Although it was quite dark in the fog and the rocks wet and slippery, we all felt much warmer for having been ashore.

In the early hours of 22nd July the mist had lifted to 20 m. and the two boats were travelling along the foot of the precipitous cliffs north of Kangrerdungamuit. Kilometre after kilometre along the coast the cliffs rose vertically from the sea, dark, wet and apparently lifeless. The monotonous broken only by the occasional dirty snow gully that came down from the cloud. The gaps in the cliffs were swarmed in dense masses of fog. Some of the gaps must have been valleys coming down to the sea, for sometimes grey across or small glacier snouts could be seen protruding from above the cloud level, in other places the fog must have concealed fjord entrances. Somewhere there was Tugtullik Fjord but we did not know where. Shortly after 5 a.m., with the sun beginning to thin the cloud, a seal was sighted and in the usual way the boats went in pursuit through the pack-ice. From a greater distance from the above a large glacier could be seen coming down to the sea about 5 km. further north. It was soon confirmed that it was Steenstrup's Fjord and that we were well north of Tugtullik. It was soon confirmed that it was Steenstrup's Fjord and that we were well north of Tugtullik.
Close to the landing place were the ruins of the hut which Ejnar Mikkelsen built in 1932 and in which Chapman, Nyall and Alley worked. We rebuilt it during the next few days and it provided an invaluable base for the expedition's work in the area. The tent was pitched amongst the rocks in a wide area around the hut. For sleeping, four "Arctic Guineas" tents and two "Napoleons" were used, and a modified "Icelantic" was kept as a store. All the tents proved to be perfectly satisfactory.

During the first few weeks all work was centred on the Tugtulik base and from there most of the area could be reached in a day's walk. For some of the more detailed work in August, however, a number of camps were made near the adjacent fjord of Nigertussoq. Moorhouse, Sugden and Bay worked on the raised marine features on the eastern shore of the fjord (11th - 14th August), while Parker and Beck, with the use of a rubber dinghy, carried out geological investigations on the western side (11th - 13th August) and, from a camp near the Nigertussoq Glacier, Storey and Moorhouse took 24 hour temperature readings in a number of frost features (11th - 24th August).

Although Nigertussoq is named after the cold north-easterly wind that is supposed to blow there, it was almost invariably warmer than Tugtulik at the other end of the lake where advection fogs were particularly frequent. In the late afternoon it was a common sight to see the white blanket of fog spreading into Tugtulik from the disintegrating pack ice. The fog usually dispersed by mid-morning, but sometimes persisted all day. At base, on such days it was cold and damp, but to sleet often only a hundred metres brought one into warm sunshine where the mountains stood above the dense white blankets of fog like monstres above the ice. When the sun was low in the sky the surface of the mist had a pinkish colour barely different from that of the ice.

On the headland between the two branches of Tugtulik, Nyall, Chapman and Alley erected a memorial to Oeno Watkins in November 1932. When we visited it, thirty-five years later, the cairn remained but the wooden cross had perished. The Greenlanders said the wood had been chewed by a polar bear. There was at this place a remarkable feeling of timelessness, as the wave poured to and fro with the swell across the smooth rocks that formed the point between the fjords. Ailsa, the small island standing in the fjord mouth, which was named after the rock in the Firth of Clyde, rose about 300 m above the water and cast a dark shadow across the pack.

Across the branch fjord, opposite the memorial, we found the ruins of an old Eskimo settlement. It was on a small rocky ledge a few metres above the water, backed by cliffs and screened by rose bushes for over 500 m. The walls of seven winter-houses were visible as ridges above a metre high, and in some cases the tunnel entrances still intact. In spite of an easterly aspect the ledge bore a luxuriant vegetation, particularly of Sedum rosses and grasses, and the houses were much overgrown.

Old legends of this part of Tugtulik tell of the many salmon (a species of Arctic char) caught, some so large that sealing implements had to be used. The largest salmon that we caught during the summer was only 8 lbs., but the average catch each time the net was put out was over 60 lbs. At first the salmon net was put out at high tide, but the problems of putting out a 3 m net over a 1 n. boat proved too great, and the net was later laid across the mudflats at low tide. This did, however, prevent it becoming entangled with the ice-flows. Throughout the expedition the salmon made a welcome addition to our diet, but they were so plentiful that it was only necessary to put out the net five times. They were most appreciated during the first week, but we rapidly tired of the salmon, mainly because we could catch nothing else. A cod would have been most welcome.

By late August the several survey tasks were nearing completion and preparations were made to leave. The short Greenland year was virtually over and the geese now being near the lake had already left on their way southwards. The flowers, which at the time we arrived had streaked the valley floors with colour, had gone to seed and the stunted shrubs had taken on the characteristic autumn hues of red and yellow. Before we left Kangiuut arrangements had been made for the two boats to reach Tugtulik by 23rd August. Work had been rapidly completed and the equipment packed for the return journey when news came through on the radio that the boats had had to turn back because of bad ice conditions. Twice the small boats started out but they barely got beyond Sermilugup. Every day we had a radio schedule with the head of the station at Kangiuut, and all listened anxiously to the latest ice reports. On 25th August a large experimental fishing boat set out but it too had to turn back. The light was fading on 29th August and for yet another day we had given up hope of the boats arriving when the first sound of engines was heard down the fjord. We had heard it before - the sound of wind blowing across the end of a tubular peak frame, the stream rolling stones along its bed, or just the noise of the generator resonating off the valley walls. This day, however, it was the boats from Kangiuut and we hastily struck camp.

At 3.00 in the morning on 30th August the boats weighed anchor and we made our way out of Tugtulik. It was a very, cross-flow day and still dark. There were two boats, the 'Akio', a broad fishing boat with a crew of four and the headman of Kangiuut and a guide from Sermilugup, and an open motor boat with two other Greenlanders. A climbing party from Imperial College, London, was isolated near the glacier snout at the head of Kangertillugssualaq and an attempt was made to reach them with our larger boat. Once in Kangertillugssualaq the ice was exceedingly dense and it took most of the day to cover the 20 miles up the fjord. The Imperial College base was on a boulder beach some little way to the peak of Ingolf's Fjord, the highest mountain in this part of Greenland.

During the evening we retraced our course down the fjord. The cloud had cleared and Glacier de France and its flanking mountains lay silhouetted against a vivid crimson sky. The ice had a pinkish tinge right into the distance. As it grew darker it grew colder and the fresh ice, which formed in the still water between the ice-flows, curled as we went through. It was almost completely dark when we cut across the fjord to Store, an island where we planned to rest for the night. A moon was rising over Nordfjord and the aurora flickered and veered continuously across the clear sky. The pilot lights of the 'Akio' were reflected on the ice as we passed, and the searchlights played on the ice ahead.

There is a journeyhouse on Store but it was grotesque inside, and pieces of ancient seal liver and weird bones hung from the ceiling. Most of us preferred to rest outside on the boats. When we left the island at 3.30 the next morning it was foggy, but it cleared, and during the morning we made rapid progress down the coast. In areas between the islands the ice was very thick so we made one attempt at a little ice-flows drifting in the current, was squeezed out of the water. Harkily we all jumped out onto an ice-flows.

Much to our relief we watched the skipper slip the boat back into the water.
We reached Kungstut in the evening and very many familiar figures were gathered on the small pier as the 'Aco' came up the fjord. One day was spent in Kungstut, living in a Nissen hut in the centre. At 8 a.m. on 2nd September, the first day of school in the village, we left Kungstut for Kulusuk, and that same day we were wandering around the busy streets of a Saturday night in Nuuk, Greenland. The expedition sailed from Iceland on 9th September and finally reached Newcastle on 12th September.

Note on the radio used in Tugtilik

The radio used for communicating with Kungstut and Angmagssalik was an A.V. 30 Set Mk.III Transceiver. The power supply was obtained from 12 volt Nickel-Iron Accumulators, charged by a small petrol generator. In the set-up used at Tugtilik a dipole aerial was erected for operation on 3.25 mc's. Communications were very unreliable for most of the period, mainly because of insufficient modulation depth and a general lack of power (15 watts output). Whilst Kungstut and Angmagssalik could usually find our carrier wave and we could usually hear them, they found it difficult to read our signals. There was a simple modification available for this transceiver, which uses the intercom amplifier as a modulation amplifier, and any future expedition using this set would be well advised to effect this improvement.

BOTANY

John E. Ebley

The botanical programme can be divided into two major sections:-

A. The collection and recording of floristic data from localities situated on Angmagssalik Fjord and in the vicinity of our Tugtilik base.

B. Specific ecological investigations at Tugtilik.

FLORISTIC PROGRAMME

Material of vascular plants was collected from three localities on Angmagssalik Fjord, while a further seven were investigated at Tugtilik. Herbarium material was collected for the majority of species recorded, and collections have been deposited in the following Herbaria:-

- Botanical Museum, Copenhagen, Denmark.
- Botanical Museum, Geth.
- University of Lancaster (Dr. G. Halliday), Lancaster.
- University of Leicester.

A complete record, showing the vascular plants and lichens collected and recorded at each locality, is shown in the accompanying tables. Details are listed under the locality names.

A. ANGMAGSSALIK FJORD

The following is a description of the localities together with notes on species of particular interest.

(1) Kungstut Settlement - 65° 51'N 37° 00'W

This locality includes the south facing slopes of Torenskataak Fjord east of the settlement, and corresponds closely to the locality visited by Kruse in 1899 ('Tunug'). Sea cliffs and herb slopes around the settlement were also investigated together with the east and south facing mountain slopes on the east side of Angmagssalik Fjord, north of the settlement.

In addition to Kruse's visit in 1899 the locality was visited during the summer of 1993 by the 6th and 7th Thule Expedition to south-east Greenland. Botanical collections (locality 34) were made by A. Bégréi and M. Hauers. The following 11 recorded species are additional to those listed by Kruse and Bégréi:-

- Aplectania viridea
- Dryas intermedia
Of these species *Cardamine helidifolia* is of particular interest, in that apart from being especially local in its distribution in the Aŋmagssalik area, it is considered as occurring mainly in inland alpine habitat. In this instance it was located in a sheltered rock crevice near the coast at an altitude of 30m.

(3) West coast of Aŋmagssalik Fjord. A few north of Harres Horn and south of Qasigiannguit

- 65° 35'N  30° 10'W

Areas visited included the southern coastline of Sioraq Del and the river valley leading south and south-east of Sioraq Fjold. This locality has no previous botanical records, but is situated just south of locality 33 visited by the 6th and 7th Thule Expedition in 1933. *Cephalopodium tetragonum* and *Viola minutae* are two of the most interesting species noted, having only infrequent records in the Aŋmagssalik region.

B. TUGTILIK / NGRUTSUQ LOCALITIES

- 65° 20'N  35° 00'W

Prior to our own expedition this area had been visited by three botanists, Kruse in 1899, Böcher in 1932 and Øgård during the summer of 1933. In addition, Chapman has made several references to the Tugtilik flora while Böcher attributes the discovery of *Potentilla griffithii* to the Nager brothers who visited Tugtilik in 1935.

The records of Kruse (1899) constitute the first botanical information from the locality. He briefly landed at two sites, one on the north side of Ngrutsuq west of the entrance to Tugtilik, and secondly on the north-east branch of Tugtilik between the glacier at the head of the fjord and the promontory on the west side where Watkin's Mine is seen. His finding of *Alchemilla micrantha* and *Heracleum inconstans* among the plant life of the fjord. Chapman, as a member of the British Arctic Air Route Expedition called at “Lake Fjord” during the summer of 1939, and although his later writings only briefly mention the flora of Tugtilik, Böcher (1938) refers to verbal communications with Chapman. In this context, Chapman made reference to the occurrence at Tugtilik of three significant species, namely *Rhabda nana*, *Gandalingia norwegica* and *Pavonia radicans*.

Böcher himself briefly visited Tugtilik in 1932 as a member of the Scoresby Sound Committee’s 2nd East Greenland Expedition (Böcher 1933). During his visit he noted 81 species, several of them having an extremely disjunct distribution in East Greenland. Examples of such species include *Carex strata*, *Carex microrhiza*, *Carex rupestris* and *Saussurea rickeri*. Most of his data was collected on the north shore of “Lake Fjord”, and he cites reasons for the interest of Tugtilik as a locality and suggestions for its rich flora (Böcher 1938). Øgård, during his brief visit to Tugtilik as a member of the 6th and 7th Thule Expedition in 1933 added a further ten species to Böcher’s list.
Bohner (1938) lists Négral's finds under localities 47 and 48.

A total of 21 species, additional to the previous combined lists for Tjugtlik and Nigertuusq, were collected in the summer of 1967, bringing the combined total of recorded species for both localities to 322. The seven localities investigated (4a - 4g) cannot be directly related to any sites previously visited.

![Map of localities](image)

**Figure 4.** Tjugtlik and Nigertuusq localities

4a. North side of the south of Nigertuusq opposite Sarvanalivik. Collections made around the lake and along the main north/south orientated valley up to the col leading over to "Lake Fjord", and along the ridge separating the main valley from Tjugtlik Fjord.

This ridge numbers a number of northern and continental species, very rare in north-east Greenland and chiefly recorded from inland mountains. **Artemisia alpina**, **Poastrum compositum**, **Corema uniflorum** and **Pauowu radiatum** provide examples of such species.

4b. North facing slopes on south side of "Lake Fjord". Exposed habitat with numerous snow patches plus associated saltwater areas.

4c. South facing slopes on north side of "Lake Fjord" between the Rejshesm and about mid-way between it and Water's Minskensersort. Rich herb slopes especially below 75 m.

4d. Marshy flats and heath between the Rejshesm and the Jordan Valley river.

4e. Both sides of the Jordan Valley ascending on the west to about 600 m. East facing valley slopes richly vegetation - in marked contrast to the west facing slopes.

4f. West of Jordan Valley river to Nigertuusq and including part of the east coast of Nigertuusq towards the glacier. Mainly rocky heath but isolated patches of more luxuriant vegetation in more sheltered, natural habitats.

4g. Rocky heath on the north-east shore of Nigertuusq and along the coast to within 5 km. of the fjord mouth. Isolated patches of luxuriant vegetation in the more protected habitats towards the fjord mouth.

Five species previously only recorded by Kruse from Nigertuusq were found growing at Tjugtlik, namely *Oxytropis hirta*, *Nicotiana glaucescens*, *Poastrum radiatum*, *Poastrum uniflorum* and *Rudbeckia glaucescens*. A sixth species, *Alchemilla vulgaris*, was still restricted to Nigertuusq and confirmed Kruse's original record previously un substantiated by a specimen at Copen hagen (Bohner 1938). This present find probably corresponds to Kruse's original locality. The discovery of *Belora sordida*, *Pauowu radiatum* and *Glaucium norvegicum* confirm Chapman's verbal records. A fragment of *Potentilla nitida* was collected in the mountains behind the Tjugtlik Rejshesm, confirming the record by the Bager brothers. This later species, together with the finding of *Garvez nudum* at locality 4e, are additional examples of northern and continental species rare in south-east Greenland.

Several of the recorded species reach their known northern distribution limit at Kangerdluqasatnivik, namely *Nicotiana glaucescens*, *Chamaenerion angustifolium*, *Glaucium norvegicum* and *Platanthera hyperborea*. The *Rudbeckia glaucescens* record is an extension of its known east coast range northwards from the Angmagssalik area, while that of *Garvez nudum* is an extension south of its range, south from Kangerdlugaan. The records of *Asclepias viridiss*, *Borrichia longiloba* and *Anchusa albida* fill in major distribution gaps between their previous northern and southern records. Tjugtlik is now only the second known locality of *Garvez nudum* between Kap Basseg (66° 44' N) and the head of Brusee Fjord (63° 40' W).

Further information relating to these and other recent botanical discoveries in south-east Greenland has been included in a paper prepared in conjunction with Dr. G. Halliday.

**References:**


**LEGENDS**

During the time the expedition was at Tjugtlik a collection of lichens was made and subsequently given to Mr. R.L. Headworth (University of Leicester) for determination. The lichens are all now in his herbarium, with the exception of one in the herbarium of Colorado University.

Collections were made at three localities:--

1. West side of peak north-east of Rejshesm, alt. 100 - 150 m., 9th August 1967.

   3 species

   *Aleuoria miniscula f. amplicata* (Lyng.) M. Lamb (syn. *Parmelia miniscula* sp. *
minutissima Rau.) Known from E.E. Greenland but this is the first record for this form south of Scoresby Sund. It is also known in Antarctica.

Alectoria pubescent (L.) R.H. Howe
Alectoria pavesca var. reticulata (Wulf.) Wade
Umbilicaria hallerina Ach.

(ii) Rejeshus, 1st August 1967; and south facing slope of "Lake Fjord" north west of Rejeshus, alt. 10 - 20 m., 22nd August 1967. 66° 20-22' N., 34° 56-58' W.

30 species
Alectoria miniscula Nyl. Alectoria nigricans (Ach.) Nyl.
Alectoria pavesca var. reticulata (Wulf.) Wade
Umbilicaria hallerina
Cetraria medinia (Ach.) Vain.
Cetraria islandica (L.) Ach. A rare species in East Greenland; previous records are from about sea-level as was this collection.
Cetraria nivalis (L.) Ach.
Cladonia bifida (Ach.) Schäur.
Cladonia chlorophaea (Fik.) Sprung.
Cladonia constricta (Ach.) Nyl.
Cladonia macropodia Nyl.
Cladonia mitis Sand.

Lescaona alta (Hoffm.) March. 2010. This specimen is peculiar in having an ochraceous thallus due to uptake of iron from the substrate rock and in having the areolae separate and not in a continuous crust due to erosion by wind and rain.

Lescaona bifida (Hoffm.) Ach.
Lescaona polychroa var. alpigena (Ach.) Rabenh.
Leiocolea dioecii Ach.
Lecanora neglecta (Nyl.) Bhra.
Pycnia muscicola (Ach.) Nyl.
Porina hydropiper (Vahl.) S. Gray
Rutaceae geoponicae (L.) DC. agg.
Rutaceae gratae (Florke ex Pflot.) Arnold
Rutaceae tenui esp. diaphanae (Rau.) Bunemark
Solorina crocea (L.) Ach.
Schweiggersa fructile (L.) Paris.
Suvelothea alpina (Wahlenb. ex Ach.) Th.Pr.
Stereoziella alpinae Bour.
Stereoziella botryosa Ach.

Thamnolia vermicularis var. subalpinae (Rauh.) Schäur.
Umbilicaria chrysostoma (L.) Del.
Umbilicaria hallerina Ach.
Umbilicaria torrefacta (Light.) Schrad.
Xanthoria elegans (Link) Th.Pr.

(iii) On exposed rocks, south end of north-south ridges on west side of Tugilik Fjord, alt. 650 m., 28th July 1967. 66° 17' N., 34° 48' W.

2 species
Alectoria nigricans f. subalpinaeformis Rau. New to Greenland. Previously only known from Russian Finland.

Thamnolia vermicularis var. vermicularis (Sw.) Schäur.

A paper concerning these species, with a discussion on A. nigricans f. subalpinaeformis Rau., is published in the Bryologist in 1968 (Haworth, D.L., Bryologist 71, pp. 52-56).

ECOLOGICAL PROGRAMME

The following is an outline of the ecological investigations undertaken at Tugilik. It is intended to publish a more detailed account of the work at a later date on the completion of a more detailed analysis of the data.

1. Much of the work was concerned with the effect of aspect on specific ecological factors including temperature, floristic composition and weight features. The investigations were undertaken at four sites on the banks of "Lake Fjord", three on the north shore having a southern aspect, and a fourth site on the south shore having a northern aspect. Those on the north shore were located along a 60 m. transect, each site having a slightly different micro-aspect. All four sites were situated at approximately the same altitude.

A. Temperature

Hourly diurnal readings were taken at each site, an attempt having been made to make the readings at each site on days with similar prevailing weather conditions as possible. Simultaneous readings were made with a thermistor at 10 cm., 5 cm., and 1 cm. below ground level, at ground level, and 1 cm. above ground level, together with readings in different vegetation types. A record was also made 1 m. above ground level at each site, while a comparable reading, 1 m. above sea level, could be used for all four sites. Lower soil and vegetation temperatures were recorded at the site with the northern aspect. Differences in the range of 10 - 15°C were common when compared to similar positions at the other sites. Surface and near surface readings on the south shore reached their daily maximum earlier than at the other sites, falling very rapidly after reaching this point. Over a diurnal period the most constant temperatures occurred at the deepest recorded level, while surprisingly large fluctuations were noted around ground level. Differences between the maximum and minimum 1 cm. below ground level reached 25 - 30°C, while on occasions the
ground level readings exceeded this range. No really significant differences were recorded in different vegetation types, although species of “dune” habit (e.g., *Batis maritima*, *Herniaria glomerata*) reached higher temperatures than more “open” species (e.g., *Salix plana*).

B. Vegetation

At each site a detailed floristic investigation was undertaken, including the laying of quadrats and the recording of species occurring in the immediate vicinity of the sites. The quadrat data showed that the three sites on the north shore of the Fjord supported a far greater range of species than the south shore site. Also, they showed a greater percentage of the ground surface covered by vegetation, while individual species tended to be of greater height. In more general terms, the vegetation on the south side of the fjord was markedly later in its growth; species in flower on this side tended to be flowering on the north shore. Snow patches were in evidence down to the fjord’s edge on the south shore, while the occurrence of typical “snow patch” species in full flower provided another indication as to the nature of the north-facing locality. These “snow patch” species (e.g., *Alchemilla vulgaris*, *Cardamine bulbifera*, *Herniaria glomerata*) were largely absent on the south facing slopes.

C. Habitat Features

Soil profiles were cut at each site and samples collected for investigation. The three sites on the north side provided a similar profile with clearly defined horizons. The upper or "A" horizon consisted largely of undecomposed organic matter bound together by the fibrous roots of shallow rooting species (e.g., *Carex*). Below this was a "B" horizon composed of a mineral soil and decomposed organic matter. Large *Salix* roots permeated this horizon. The underlying "C" horizon consisted of mineral soil and fragments of the underlying parent rock. Roots of deeper rooting species (e.g., *Vaccinium*) were much in evidence throughout this horizon. It seemed probable that the profile had developed largely in situ, and from early results there is evidence of leaching from the upper horizons.

The depth of profile development was approximately 40 cm. On the south side of the Fjord much larger areas of the ground surface consisted of bare rock, with a thin soil development in depressions and on ledges. Although not as distinct as in the previous profile, horizons could be located in the profile section. The surface "A" horizon was highly organic, while the "B" horizon below consisted of a mixture of mineral soil and partially decomposed organic matter. The height of profile development was around 25 cm. It is likely that the profile was mainly formed in situ, although some of the material could easily have been derived.

(2) Another project involved an investigation into the temperature regime within

Silene acaulis, a species of extreme coldsさま habitat. The plant investigated was growing on the glacial outwash delta at the west end of "Lake Fjord", and exhibited a marked degree of flower formation. Hourly diurnal temperature readings were taken with the thermometer simultaneously on the north, south, east and west sides of the plant just below the surface. The east facing side of the plant showed a much later flower development than compared with the more sheltered sides. The northern aspect of the plant showed an even earlier flush in flower formation. From the evidence obtained, the east side of the plant worsened up first but then cooled down earliest, while the west side, although slower in heating up, remained warmer over a longer period of the day. Continually low temperatures were recorded on the north side, while much higher readings were obtained on the south side. Although pressure clouding over prevented the recording of any extreme

diurnal readings, the evidence obtained seemed to indicate that temperature played a major role in determining the succession of flowering zones in *Silene acaulis*.

(3) Finally soil samples were collected from habitats of the following ecologically interesting species:

- *Carex pallescens*<br>- *Carex strata*<br>- *Carex nigricans*<br>- *Geum norvegicum*

<table>
<thead>
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<th>TABLE OF SPECIES COLLECTED AND RECORDED AT THE 10 LOCALITIES VISITED</th>
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<td>C. tenuissima</td>
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<td>C. tenuiflora</td>
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</table>
ground level readings exceeded this range. No really significant differences were recorded in different vegetation types, although species of "dunes" habit (e.g., *Spartina bermudiana*) reached higher temperatures than more "open" species (e.g., *Salix paluca*).

B. Vegetation

At each site a detailed floristic investigation was undertaken, including the laying of quadrates and the recording of species occurring in the immediate vicinity of the sites. The quadrat data showed that the three sites on the north shore of the fjord supported a far greater range of species than the south shore sites. Also, they showed a greater percentage of the ground surface covered by vegetation, while individual species tended to be of greater height. In more general terms, the vegetation on the south side of the fjord was markedly later in its growth; species in flower on this side tended to be flowering on the north shore. Snow patches were in evidence down to the fjord's edge on the south shore, while the occurrence of typical "snow patch" species in full flower provided another indication as to the nature of the north facing locality. These "snow patch" species (e.g., *Drimia diosa*, *Cassiope hypericoides*, *Ramunculus aquaticus*) were largely absent on the south facing slopes.

C. Edaphic Features

Soil profiles were cut at each site and samples collected for investigation. The three sites on the north side provided a similar profile with clearly defined horizons. The upper or "A" horizon consisted largely of undecomposed organic matter bound together by the fibrous roots of shallow rooting species (e.g., *Spartina*). Below this was a "B" horizon composed of a mineral soil and decomposed organic matter. Large galing roots permeated this horizon. The underlying "C" horizon consisted of mineral soil and fragments of the underlying parent rock. Roots of deeper rooting species (e.g., *Vaccinium*) were much in evidence throughout this horizon. It seemed probable that the profile had developed largely in situ, and from early results there is evidence of leaching from the upper horizons.

The depth of profile development was approximately 40 cm. On the south side of the fjord, much larger areas of the ground surface consisted of bare rock, with a thin soil development in depressions and on ledges. Although not as distinct as in the previous profile, horizons could be located in the profile section. The surface "A" horizon was highly organic, while the "B" horizon below consisted of a mixture of mineral soil and partially decomposed organic matter. The height of profile development was around 25 cm. It is likely that the profile was mainly formed in situ, although some of the material could easily have been derived.

(2) Another project involved an investigation into the temperature regimes within

Silene acaulis, a species of extreme carex grass habit. The plant investigated was growing on the glacial outwash delta at the west end of "Lake Fjord", and exhibited a marked degree of flower senescence. Hourly diurnal temperature readings were taken with the thermister simultaneously on the north, south, east and west sides of the plant just below the surface. The east facing side of the plant showed a much later flower development when compared with the more sheltered western side. The northern aspect of the plant showed an even greater delay in flower formation. From the evidence obtained, the east side of the plant warmed up first but then cooled down early, while the west side, although slower in heating up, remained warmer over a longer period of the day. Continually low temperatures were recorded on the north side, while much higher readings were obtained on the south side. Although premature clouding over prevented the recording of any extreme

diurnal readings, the evidence obtained seemed to indicate that temperature played a major role in determining the succession of flowering zones in *Silene acaulis.*

Table: Species collected and recorded at the 10 localities visited

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* = Aggregate Species
Having been advised by Dr. F. Salomeen of the Zoological Museum, Copenhagen, that the evidence of this whole stretch of coast was likely to be poor, the absolute paucity, both of numbers and species, still came as something of a surprise and is a recurrent theme throughout these notes. All Latin names of birds are those as used by Salomeen in his "Birds of Greenland" (1950). Where racial differences are critical the race has been inferred from Salomeen’s accounts of their ranges.

Observations made in the Angmagssalik Fjord area were concentrated on Halmstret, Maries Havn, and Isertava (Localities 1, 2 and 3 respectively in Figure 8).

**MARIES HAVN**

A narrow north-south valley on the west side of Angmagssalik Fjord, entering Ikkasat at 65° 35' N, 77° 01' W. This valley, together with the rock basin lakes to its west, was covered for a period of three days from 7th to 9th July, 1967. Bare rock and shore, flat land being confined to narrow gravel or sandy strips in valley floors and adjacent to the coast. Vegetation cover approaches completeness only on the valley floors and on isolated hillside patches which were usually below 300 m. and free of shore. Locally dominant were Vaccinium, Empetrum with Cassiope on drier slopes, replaced with Carex and Eriophorum on the valley floors.

1) **Red-Throated Diver** (*Clybeus stellatus*). One pair on large shallow rock basin lakes to east of valley. Nest on a minute rocky island in middle of the largest lake. Still brooding 9th July.

2) **Ptarmigan** (*Lagopus mutus rupesstris*). One pair had nest on gravel flat near large lake. Contained 6 eggs. Another pair held similar territory in main valley. The males of these pairs, together with two other apparently unattached males, were still showing very much white, with the brown of the summer plumage beginning to show through on the crown and nape of only one individual.

3) **Wheatear** (*Oenanthe o. leucorhoa*). Only one bird seen.

4) **Redpoll** (*Carduelis flammea rostrata*). One pair probably of this species seen by Madsen near lakes.

5) **Snow Bunting** (*Plectrophenax n. nivalis*). Commonest bird by far. 20 - 30 pairs seen throughout the area, and thus at least thinly populous. One free-flying juvenile near valley mouth on 7th July, while on 9th July an adult was seen near lakes with a feather in its bill. There is thus a distinct possibility of double brooding having occurred during this season.

**INGULIAA AND SIERAQ**

West coast of Angmagssalik Fjord, 8 km. north of Maries Havn (65° 55' N, 77° 10' W). The area covered included the basin containing two lakes and the mouth of the two valleys which open into Sieraq, an inlet with several thousand square metres of tidal mud flats. Such a large expanse of this type of habitat is something of a rarity in this area, and in Europe might well be rich in bird life. The only birds in evidence here, however, were three Mallard. Altogether four days were spent in the district.

2) **Red-Throated Diver**. A pair bred on the smaller of the two lakes, in preference to Isertava, the larger lake. Madsen suggests that this may well be because the larger lake, being deeper and colder than the smaller lake on which the divers bred, was noticeably poorer in aquatic life. These factors would counter-balance the element of security which the large lake offered to a greater degree. Neither lake contained islands, which offer the usual secure site for this species. The pair had two young on 11th July, in post-first moult down (cf. pair still brooding at Maries Havn two days before).

3) **Mallard** (*Anas platyrhyncha*). Two males and one female, feeding in a shallow creek on the mud flats in Sieraq at low-water on 11th July. All in breeding plumage, but presumably non-breeding birds.

4) **Ptarmigan**. Two males only, one showing very little of the white winter plumage.

5) **Raven** (*Corvus corax principalis*). One flying over area 19th July.

6) **Wheatear**. Locally fairly plentiful, with an apparent preference for steep slopes with turf covered rocky ledges and occasional boulders and rock outcrops.

7) **Redpoll**. Very local, with preference for open slopes, well vegetated with Vaccinium, Empetrum and Salix bushes. Four birds seen, one pair clearly in possession of territory in an area of dense Salix scrub.

7) **Lapland Bunting** (*Calcarius lapponicus subarcticus*). Sighted. Two pairs in Sieraq Gål in possession of territory. One male in the east-west valley south of Sieraq Fjeld in company with three flying juveniles. Singing males’ territories very similar to Snow Bunting habitat; being rocky, boulder-strewn slopes with patchy vegetation, but on more level ground nearer valley floor.

8) **Snow Bunting**. Again by far the most plentiful bird with numbers approximately equalling the sum of the other passerines. One meet with four well-fledged young found 11th July.

**RINGMUID**

Area centred on settlement of Halmstret.

All the above species present with the exception of Red-Throated Diver. Ptarmigan confined to higher slopes well away from settlement. Only three Lapland Buntings seen, two males and a flying juvenile, in Torssukatuk 4 km. east of the settlement. Two Redpolls seen with the buntings. Wheatears, and particularly Snow Buntings, fairly plentiful, with the latter well domesticated in Ringmuid. Other species of note were:

1) **Mallard**. Four males and three females by edge of fjord in Torssukatuk. Breeding
plumage, but presumably non-breeding. Two adult mallards were also hanging up outside one of the houses in the settlement.

2) **Hinged Piercer (Charadrius h. hiaticula)**. One bird in Torsukalak.

3) **Glacous Gull** (Larus h. hyperboreus) and **Iceland Gull** (Larus g. glaucoides). Birds of both these species present all the time in small numbers, rarely in excess of ten birds observable on any given occasion. Both species were shot by the villagers for food. Majority of birds seen were adults.

**Tuqtilik and Nigertuusq**

The Tuqtilik-Nigertuusq area was the destination of the expedition. A boat journey was undertaken lasting 21 hours on 21st-22nd July, and passing some 80 miles of desolate coast. A constant watch was maintained throughout, though hampered by fog and semi-darkness for some 9 or 10 hours, and was most revealing in its largely negative results. The narrow ice-free margin of land was composed of large stretches of steep boulder and scree-covered mountain slopes, broken by the mouths of fjords and occasionally assisted by cliffs, usually of less than 100 m. in height. The only concentrations of sea birds were near such cliffs. Birds observed whilst travelling were:

1) **Polar (Pulmarus g. glacialis)**. One bird seen near Kangarajakjiq (66° 4' N. 35° 20' W).

2) **Rider (Eudromia scolopaciformis)**. Eight to ten on sea at east end of Iskasak (62° 50' N.).

3) **Glacous Gull** and **Iceland Gull**. Relatively frequent in ones and twos. Probably at least fifty Glacous Gulls at a gallery on very steep cliffs on the north-east of Depot B.

4) This would be quite a large gallery for the species on this coast according to Stedman's (1933).

5) **Black Guillemot** (Cepphus grylle articus). The only plentiful species, yet not really abundant or widespread. Locally up to twenty or thirty birds in loose parties at Depot B and in Iskasak (62° 55' N). Well over 100 around cliffs just north of Kap Mandel (66° 37' N).

The only previous ornithological records from the Tuqtilik-Nigertuusq area appear to be those of Chapman on Hattons' 1932-33 expedition. His records for the expedition are published in his book "Watkins' Last Expedition" (1934), and it is most interesting to note the several changes in the avifauna which have occurred in the thirty-five years which have since elapsed. These will be discussed briefly in the section which follows.

1) **Red-Throated Diver**. Two pairs bred, one on a very small lake in the old lateral moraine of the Nigertuusq glacier, with one well grown young losing its down by 7th August, and the other on the Tuqtilik Lake which lies in the transverse valley between Nigertuusq and Tuqtilik. The one chick of the latter pair did not hatch until 3rd-12th August, very late in the season when the fjords were beginning to freeze at night. Chapman has two records of this species in summer, but none of breeding.

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Plate 1: Agarite with blocks of foliated amphibolite and matrix of foliated gneiss.

Plate 2: Typical blocky agmatite with pegmatite matrix.

Plate 3: Looking west across Nigertuusq. Wide, large scale lithologic bands are seen in the lower half of the mountain. A large overfold is visible in the centre of the mountain.
2) Long-Tailed Duck (Clangula hyemalis). Right male and six female adults in summer plumage, but presumably non-breeding, on a small tidal lagoon in Nigertussaq on 24th and 7th August. May well have stayed longer. Chapman has no records of this species in summer.

3) Ridder. Mixed parties of up to eleven adults on Tugtulik close to the base camp. Occasionally thirty and fifty on Nigertussaq, all in eclipse by 7th August. No signs of their having bred.

4) Pink-Footed Goose (Anser falklandicus brevipes). Undoubtedly the most interesting species recorded in the area. Salomonson (1950) records its known breeding range in Greenland as extending from the Hochstetler Peninsula south to Niaa Fjord (66°00'N), the Niaa Fjord birds being separated off from the main population to the north by the barren Bloemfontein Coast. On 24th July four members of the expedition surprised two family parties of Pinkfeet which had been feeding near small pools in the gravelly between the Lake and Nigertussaq; two pairs of adults, one with five goslings and one with three. The goslings were well grown, approximately 25-35 cm. in length, still in down, and were very active runners. The parent, however, gave way to flight when pursued persistently. The nesting sites of these geese were not found but the transverse valley between the fjords abounds with open grassy areas of the kind which Salomonson states to be possible sites for such isolated pairs. This breeding ground lies 200 km. south of the previous known southerly limit of the species' range.

Besides the breeding pairs there was a large flock of non-breeding free-flying Pinkfeet (possibly first year birds), first noted 31st July on the Lake. Numbers varied considerably from day to day, but the maximum count was twenty-one. The grassy area around the lake was liberally scattered with the evidence of moulting and with goose droppings. The birds were observed through until late August. They appeared to feed on, amongst other things, Carex, Arctitis, Salix and Caricea, and abundant growths of Carex gigantea were often found well cropped. The peltumeral area between the two fjords would be expected perhaps to provide a good refuge for geese, and the only signs of contemporaneous occupation of the area by geese were a set of tracks on a beach in Nigertussaq, together with some old tracks and droppings by the Lake; in total very little.

5) Barnacle Goose (Branta leucopsis). Also a high arctic breeding species in Greenland, not breeding south of Scoresby Sund (Salomonson 1950). Four non-breeding free-flying birds (possibly first year birds) moultered on Tugtulik Lake, and it was noticeable that they rarely conformed with the Pinkfeet. Chapman mentions finding goose feathers and droppings by the Lake in mid-August but has no sight records of geese in summer except one of a single Barnacle Goose in June. The geese in 1947 were very secretive and inconstant, and the non-breeding birds were overlooked for the first two weeks, although all the signs of a recent moult were in abundance, so it is perhaps possible that some did moult in September.

6) Swallows (Hirundo rustica). No sightings but plucked remains of gulls were found on two occasions and, together with large pellets containing the bones and feathers of what appeared to be a Snow Bunting, these were taken as evidence of the recent presence of a raptor, probably of this species. Chapman recorded a pair breeding above a gallery off Kaj Japetus Steenstrup, but the lack of local sea-bird colonies would presumably account for the non-residence of this species in the immediate Tugtulik district.
7) **Flamman.** Fairly common; groups of up to nine juveniles recorded and several family parties with free-flying juveniles after 14th August. One young pullus, however, only 0.6-8 cm. and still in down, was caught and examined on 22nd August, while the adult birds were nearby.

8) **Ringed Plover.** Two pairs held territories on aluliurik fans, one in Nigertussen, the other near the Tugtitik rejeocrus.

9) **Terns** (Arinaria interpres). Eight adults in summer plumage seen on rocky shore in Nigertussen on 24th August. One in winter plumage on gravelly near river mouth in Tugtitik the next day. Up to four on tidal chingle by rejeocrus throughout last ten days of August.

10) **Kooy** (Calidris canusia). Poor view of three on Jordan Delta on 2nd August; one of which was certainly in winter plumage. One red bird at same place ten days later. Up to six on mud in Tugtitik at end of August.

11) **Sanderling** (Creedus alba). One in winter plumage with Ternstones in Nigertussen, 17th August. Up to eight on mud in Tugtitik at end of August.

12) **Glaucous Gull.** Frequent over fjords and the Lake. On return journey to Kungsjet, 30th August, a large colony of very approximately one hundred pairs was discovered on the steep cliffs just south of Kap Japetus Steenstrup. Many first-year birds were present, but no other species were observed on the cliffs.

13) **Iceberg Gull.** Very few positively identified and no evidence of breeding found in the area. This is in direct contrast to Chapman's records of "plentiful" matters of the species in "Lake Fjord" around 22nd - 26th August 1932. It may be that his birds were moving south through the area, for it is around this date also that he noted the coastal snow migration. He also makes reference to a gully off Kap Japetus Steenstrup, with Iceberg Gull breeding, but in 1967 no trace of this species breeding was seen.

14) **Sabine's Gull** (Kren Sabirin). Five small gulls, with the striking wing pattern of this species, were observed at long range as they inspected the salmon net at the mouth of the river in Tugtitik on 28th August, after several days of onshore winds.

15) **Black Gull** (Chroicocephalus). A few pairs bred in small cliffs on the north shore of Tugtitik, with many more on the steep sides of Safsdrasluuk and at Kap Wendel.

16) **Raven.** Only three sightings of up to three birds.

17) **White-throat.** Rather scarce, but locally more frequent, as in the Ieran area. Few in lower Nigertussen, and none seen in the barren valley which slopes south towards Safsdrasluuk. Several family parties seen by mid-August. It is difficult to assess how this compares with Chapman's record of "several family parties" seen during a single walk past the lake in 1932.

18) **Meadow Pipit** (Anthus pratensis). A species with a very recent history of colonization in the Angmagssalik district (Salomonsen 1950); it was recorded by Chapman on 17th August 1932, near the Rejeocrus at Tugtitik, and also in large numbers further south near Angmagssalik. In 1967 the writer observed no birds of this species. It would be interesting to know more of the present status of this species in East Greenland; as its foothold has been so recently gained, its population may be more subject to fluctuations than longer established species appear to be.

19) **Redpoll.** A very scarce species, only three pairs recorded, and no proof of breeding, although two pairs appeared to be occupying territories. On 17th - 18th August, 1932, Chapman recorded parties of up to twelve birds flying over the Rejeocrus.

20) **Lagland Buntings.** Also very scarce. One fledged and free but as yet flightless juvenile caught and examined by the lake on 24th July, and a pair of adults were seen in the same area the next day. Two adults with two juveniles in Nigertussen on 13th August complete the total. Chapman's record of "a few Lagland Buntings" for 11th August on a walk from the Rejeocrus past the lake perhaps suggests a greater abundance than this.

21) **Snow Buntings.** By far the commonest land bird, yet still rather thinly spread. No more than three pairs were in evidence in the valley opposite Safsdrasluuk. Together with a pair of Redpolls and a pair of Ravens they made up the total avifauna of this valley. Many family parties seen after 4th August when a 7 km. walk from the Rejeocrus and past the lake one might encounter thirty or forty birds altogether. Contrast this with Chapman's records of parties of fifty or sixty birds seen near the base around the same time in August (16th - 22nd).

Preferred habitats were in the Angmagssalik Fjord area. The species was very rarely encountered on the bare slopes above 500 m.

Unfortunately, lack of quantitative data, both for the 1932-33 and the 1967 expeditions, precludes the drawing of any firm conclusions. However, the records would suggest one of three alternatives:

(1) A considerably denser resident population of passerines in the Tugtitik-Nigertussen area during 1932-33 than in 1967.

(2) A greater down-coast passage of passerines during 1932-33 than 1967, swelling the local population. Most of Chapman's large parties were seen after mid-August and were in flight, but he did record parties of twenty or thirty snow buntings as early as 11th August, which were all juveniles, the adults having disappeared. In 1967 no such obvious influx of the passerine population was recorded, there being merely a population of many juveniles, most of which were in family groups. This is such as might be expected as the fruition of a season's breeding. Furthermore, the areas to the north are severely restricted in terms of passerine habitats which could supply a passage population. Chapman makes no comment on whether or not the parties he observed appeared to be migrants.

(3) A coastal passage may have either been delayed or taken place to seaward of the recording area. This does, however, seem unlikely in view of the numerous fowls after 13th August and the persistent onshore winds during the month. The small, but noticeable, influx of weavers and gulls in the area suggests that the normal passage was in progress, having begun around mid-August.

I would like to thank Dr. P. Salomonsen, and Mr. H. Spencer of the British Trust for Ornithology, for their kind assistance and advice on the ornithological programmes.
This is only a short report on my work on the expedition. The full account of the results will appear in Meddelelser om Grønland.

While the localities at Kungsniut were very fine and interesting from a limnological point of view, the localities at Tugtulik were rather disappointing.

1. Ecological work on water beetles

At Kungsniut as well as at Tugtulik I found many larvae of *Coleoptera dolabratus*. Soon it was evident that it occurred only in low ponds, never in lakes or in ponds at higher altitudes.

This was in contrast with my previous results in West Greenland, where its main occurrence was in lakes, and where in summer larvae as well as adults were found. This led me to the idea that the species had a different mode of wintering in West and East Greenland. In West Greenland it winters in the water under the ice as an adult. As Dr. Høen has shown, its northern limit distribution is limited by the duration of the ice cover (personal communication). Probably the duration of the ice cover is too long in the Kungsniut/Tugtulik area for the adults of *C. dolabratus* to winter. I postulate that here it winters in the egg stage. The eggs hatch in spring and the larvae grow up in the short summer. Therefore they are restricted to ponds, which melt early and soon reach a high temperature. No larvae were found in ponds with low temperatures, i.e., those at higher altitudes.

In Fig. 6 I have shown the life history in West Greenland and the suggested life history in East Greenland. The mean temperatures give an indication of the difference in the duration of ice cover.

Unfortunately the expedition ended before I could expect to find adults, although I found larvae beginning pupation. The best way to check the postulate is to search for eggs in the adults in the fall or for adults in the spring.

At Tugtulik I found larvae, pupae and adults of another water beetle, *Hypnocus melanophthalmus*. The last day at Tugtulik a lot of newly pupating larvae were found in the gravel bordering a pond. The larvae were seen crawling on the stones, a behavior quite different from that of *C. dolabratus*, which is a swimming larva.

2. Plankton in the lakes and ponds

In all the lakes and ponds visited plankton samples were taken with a no. 20 net. In Incirinaa, near Kungsniut, series of vertical hauls were taken in order to estimate the standing crop.

The material is under preparation by Dr. Høen, University of Copenhagen. He has been working with fresh-water plankton from Greenland for more than ten years and has placed a preliminary list at my disposal. I will have only mention that the most numerous species was *Oculina aquilina* and that *Diplostemum minutus* and *Alouella naive* have never before been recorded in East Greenland.
3. Chemical investigations in lakes and ponds

The oxygen conditions in Inerteva and in the big turbid lake at Tugtilik are shown in Fig. 7. There is an excess of oxygen, probably due to photosynthesis and a very low decomposition. The degree of supersaturation is shown by the area between the graph of actual oxygen content and that of the saturation values calculated from the temperatures.

Chemical analysis is given below.

<table>
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<th>Locality</th>
<th>pH</th>
<th>Alkalinity</th>
<th>Conductivity</th>
<th>Ca²⁺ ng/l</th>
<th>Mg²⁺ ng/l</th>
<th>K⁺ ng/l</th>
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<td>33.5</td>
<td>1.5</td>
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</tbody>
</table>

4. Physical investigations in the lakes

Temperature measurements in Inerteva and in the lake at Tugtilik show no pronounced thermocline (Fig. 7.).

Light measurements are shown in Fig. 5. Inerteva is extremely clear. As a reference I have shown the transmission in distilled water on the same figure. The lake at Tugtilik, in contrast, has an extremely low transmission. It is very turbid due to the melting water from the fiordan glacier. An interesting thing is that the red light penetrates to a greater depth than the blue light. This is very seldom, if ever, seen before. It may be explained by the fact that the absorption, which is greatest at high wavelengths, is smaller than dispersion, which acts most on the smaller wavelengths.

5. Others

Some interesting groups of animals found are under preparation by various specialists. It can be mentioned that I found some, probably new water snails. They are with U. Letterwall at the University of Lund, Sweden. The Chironomids are under preparation by Dr. Saether, University of Oslo.
Metasediment would suggest the mass was originally sill-like.

**Ultrabasic Masses.** Several of these masses occurred in the gneisses. Most were rather small (20 or 30 m. long) and consisted entirely of hornblende. However, in the north of the area mapped there is a particularly large ultrabasic mass about 400 m. long. It is surrounded by metasediments which have several bands of distinctive lithology. These bands were mapped out in order to determine the relationships of the ultrabasic mass with the surrounding gneiss (Figure 9).

On the map it can be seen that the northern contact of the gneiss is discordant but the eastern and western contacts are slightly discordant with respect to the lithologic bands. It would appear that the mass has displaced the country rock partly sideways and partly upwards. The deflection of the foliation round the mass would suggest that the foliation was in existence prior to emplacement of the mass.

The mass is surrounded by a zone of highly sheared granular rock. This rock contains lenses and schlieren of ultrabasic material in various stages of disintegration, and drawn out parallel to the margin of the mass. This type of rock is unique to the margins of the ultrabasic mass and appears to have been produced by earth movements subsequent to emplacement of the mass. The fractured nature of this marginal rock would suggest that it was formed during a minor earth movement, later than that which formed the gneisses.

The unaltered rock is only found near the centre of the mass and has the homogeneous texture of an igneous rock. This rock contains large phenocrysts (up to 2.5 cm.) of pyroxene. A similar porphyritic pyroxenite is described by L.B. Nager (1934). The central core of unaltered pyroxenite is surrounded by a wide zone in which the rock has been altered to black hornblende. The black hornblende is further altered to green hornblende along narrow shear planes.

The unaltered core of the mass has only escaped alteration because of the large size of the mass; smaller ultrabasic masses tend to be totally altered to amphibole.

**Metamorphic grade.** The presence of kyanite indicates that the rocks are of high metamorphic grade and probably belong to the almandine-amphibolite facies. The abundant hornblende and less abundant biotite are probably the result of retrogressive metamorphism. This could also account for the alteration of the ultrabasic masses.

** Pegmatites.** Two undeformed pegmatites each about 30 cm. wide trended in the directions 200° and 345°, i.e., across the foliation. They were therefore later than the gneisses.

**THE TERTIARY REGION**

The rocks here were all gneissic with the exception of the Tertiary dyke swarm. The gneisses fall into two distinct types, different in both structure and lithology.

1. **The granite gneiss.** In this type the foliation is usually indistinct and where present it shows strong small-scale folding. When traced laterally the foliation tends to die out. In composition the gneiss is more acidic than the grey gneisses at Kungmiut, and could be described as a granite gneiss, the mineral constituents being quartz-plagioclase-biotite-
hornblends. The rocks appear to have undergone a post-deformation granitisation and this would account for the poor foliation. The more massive rocks contain a pinkish or purplish felspar which seems to be associated with the granitisation. The rock shows little variability except where it contains agmatites. These occur as irregular bodies in the gneiss and consist of angular blocks of amphibolite embedded in a leucocratic matrix. Two distinct types of agmatite were found:

1. contains unfoliated amphibolite blocks in a pegmatite matrix (Plate 2).

2. Foliated amphibolite blocks in a gneissic matrix (Plate 1).

No brecciated amphibolites as found at Kongsulit occurred.

2)Well Foliated Gneiss. This tends to be more basic than the granite gneiss and is generally leucocratic. These rocks lie mostly to the west of Nigertuooq, whereas the granite gneiss outcrops in the eastern part of map in Figure 10. The foliation is very well developed and large-scale lithologic bands were observed parallel to the foliation (Plate 3). These well foliated gneisses do not show the same small-scale folding as found in the granite gneiss. The foliation generally has a gentle and consistent dip to the south or southeast. Looking westwards from the mountain tops near Tugilik it can be seen that similar large-scale lithologic banding occurs on mountain faces westwards from Nigertuooq as far as Ingolfs Fjeld.

There seems to be no definite boundary between the granite gneiss and the well foliated gneiss to the west; the foliated gneiss and the granite gneiss appear to be interbanded in the vicinity of Nigertuooq. A sharp contact between granite gneiss and foliated gneiss can be seen at the head of Nigertuooq at the western end of the glacier south although well foliated gneiss occurs in bands for several kilometres to the east. Blocks and cobbles of the granite gneiss a few metres across showing the characteristic strong small-scale folding were found surrounded by the well foliated gneiss on the western shore of Nigertuooq.

Plagioclase Amphibolites. These rocks have a similar mineralogy to the amphibolite blocks found in the agmatite, i.e. plagioclase and hornblends, and occasionally garnet. The field relationship, however, proves that they are younger than the agmatites.

Wager (1934) described a horizontal sheet of amphibolite cutting transgressively across the gneiss at Kap Japetus Staenstrup and deduced that the amphibolite was younger than any period of flow of the gneiss. Similar sheets were found in the Tugilik region. There is a particularly conspicuous example in the Jordan Valley (Plate 5).

The amphibolites of the region show various degrees of structural conformity with the country rock. Plate 6 shows the lower contact of the Jordan Valley amphibolite and here the contact is parallel to the foliation of the underlying gneiss and of the amphibolite itself. However, about 30 metres vertically below the contact the strong foliation dies out and normal granite gneiss occurs. The gently sloping attitude and the unfolded structure of these amphibolites suggest an association with the well foliated gneisses to the west of Nigertuooq. It was thought that the amphibolites might be emplaced by a shearing mechanism rather than by simple intrusion, but the occasional presence of angular xenoliths
near the lower contacts of some amphibolites suggests that shearing was only of minor importance.

Plate 7 shows a higher degree of structural discordance; the upper contact is concordant with the foliation of the gneiss but the lower contact is markedly discordant.

The amphibolite marked on the map about 1.5 km. north-east of the head of Yugullikoq is a dyke-like body showing a greater degree of discordance with the structure of the surrounding gneiss. At the western end of the outcrop the shear zone at the contact is only about 2 m. wide and the amphibolite has a more unfaulted appearance. This body dips strongly northwards and has a strike of about 080°. It can be seen to continue eastwards on a straight course for at least 4 km. Similar bodies can be seen in the mountains to the west, cutting across the gently dipping lithologic banding. These amphibolites are truly transgressive and are obviously later than any movements of the gneiss.

About 2 km. east-north-east of the Yugullik reservoir a similar dyke-like body of amphibolite was found; it is about 0.75 m. wide and trends east-west. There is no sign of shearing at the margins of the dyke and it contains randomly oriented felsspar crystals which appear to be original igneous phenocrysts.

Ultrabasic Mass. A similar ultrabasic mass to those at Kunderut was found about 3 km. south-east of the reservoir. This was the only such mass found in the area. It is about 20 m. across and 50 m. long, elongated along the foliation. The larger part of the mass is a black hornblendic rock but there is a small core of pyroxenite pyroxenite very similar to that at Kunderut.

Late base crush belts. Two north belts were observed, one about 1.5 km. on a bearing 295° from the reservoir and the other about 2.5 km. north-east of the camp. These belts are 2 - 10 m. wide and are characterized by crushed and brecciated gneisses. The interstices between the brecia blocks are often voids and are sometimes lined with quartz or calcite. The existence of voids means that movement must have taken place at shallow depth and is later than the main movement of the gneiss. The belts are stained by humusite and can therefore be easily traced.

Tertiary dykes. These formed a swarm with most dykes trending about 030°.

Two types were very distinct in the field:

1. Weathered chocolate brown
2. Weathered pale green-gray and has large felspar phenocrysts.

The former type is cut by and therefore older than the latter.

References:

level. It is also possible, however, that this shoreline is not of marine origin, but again no likely overflow or other evidence of a lake was found.

Another extensive shoreline feature was found on the eastern shore of Bierskuntsoq at 43° 44' N. above sea-level. The terrace varies from 30 m. to less than 5 m. in width, but exceeds 1,000 m. in length, although a few portions are detached. The terrace is formed of partially sorted moraine, and in places rises by up to 1 m. towards the lip. It would appear to be similar to shorelines described by Hoppe (1959) in northern Sweden. Directly above the 43° 44' N. terrace is a very poorly defined terrace composed of large boulders with the finer material apparently washed out. For 350 m. it maintains a height relatively close to 111° above sea-level, and this may also be a remnant of a past shoreline.

The presence of raised shoreline features, the absence of any shells, and the possibility of some of the features being of lacustrine origin rather than marine, makes it difficult to consider either the relative or absolute ages of successive levels.

It does, however, seem likely that the Jordan glacier was about 4 km. Further down the valley at the time when the 30 m. shoreline was being formed. Close to the present river, at a level accordant with the shoreline, are a number of alluvial fans from which dry channels can be traced back. One of the channels originates in a breach in an old and moraine of the Jordan glacier, now well above the present river. Further east, 500 m. along the shoreline, another series of channels originates on the valley sides at a position where it is difficult to envisage their being supplied with water were ice not to have been in the immediate vicinity.

Between Bierskuntsoq and the lake is a low col (Figure 11) with an altitude of 40 m., and west of this is an extensive spread of sparsely vegetated gravels. It is composed of sand and small stones, but with some larger stones up to 20 cm. and a few moraine boulders. Stone sizes generally increased in the direction of the col. There is evidence of sorting, but bedding is not clear near the surface. A glacier from the east has left two and moraines; one on the col and the other 800 m. to the south-west, coming down to an altitude of 30 m.

Only a small stream flows across the gravels today, although their extent suggests they were formed by a much larger river. A larger river would either have originated from a glacier snout at the col, or from Tuyilik Lake if it were, by some means, prevented from flowing through its present outlet at the east end. An area of 'kane and kibbels' riddled in the gravels on the col suggests that this part of the spreads was relatively close to the glacier snout when deposited.

There are no marked breaks of slope on the gravel spreads and it could not be ascertained whether or not they were deposited in water. They must, however, pre-date the 30 m. shoreline around the lake, as when the gravels were deposited this area is likely to have been under the ice which would have destroyed the shoreline.

References:

Kruuse, C. 1912 Meddelelser om Grønland. Bd. 49.

PALEOMAGNETISM

Bryan Knopton & Andrew Norwegian

The numerous Tertiary dykes in the Tuyilik area were sampled for paleomagnetic purposes. Five or six rock cores were collected from each of eleven sites along the north shore of the Tuyilik branch fjord, and orientated with a sun compass and spirit levels. An adapted two-stroke chainsaw unit fitted with a 25 cm. diameter diamond-impregnated coring drill was used to obtain cylindrical samples of about 10 cm. length. A pressurised water supply was incorporated to cool and lubricate the cutting edge.

The dykes sampled have been investigated in the Department of Geophysics and Planetary Physics at the University of Newcastle upon Tyne. Both normal and reversed polarities, with respect to the present Earth's magnetic field, were found; the normal polarities being the first normal polarities observed in the Tertiary sequences of East Greenland. The mean directions, irrespective of polarity, are similar to those observed previously by other expeditions and these will be published together as part of an analysis of the Tertiary paleomagnetic field in the North Atlantic.

MEAN SEA LEVEL AT TUYILIK

Milton Thornton

For both geomorphological and survey work it was thought useful to know mean sea level. A gauge was constructed and continuous measurements taken for 38 days, 14 consecutive ones being plotted on a graph and averaged to give M.S.L. A bench mark was cut in the rock below the Tuyilik reefs at 1,948 m. above M.S.L., the accuracy being estimated at ± 1.5 cm. (Fig 12)

BATHYMETRICAL SURVEY OF TUYILIK LAKE

Milton Thornton

The lake floor was mapped to assist the limnology and geomorphology programmes. The maximum depth found was 28 m. and a complete still deposit was noted. The depth rather disagrees with Nyuill's estimate of over 40 fathoms in 1933 (Chapman 1934). (Fig 11)

FILM

Andrew Norwegian

The expedition is very much indebted to Mrs. V. Parfield, who kindly donated to the University 1,700 ft. of 16mm. black and white cine film. Thanks is also due to Mr. E. W. Lidsey of the Department of Photography in the University Medical School who supervised the editing of the film, and also to Professor W. F. Caseie of the Department of Civil Engineering for the loan of a Bell and Howell 700R camera. The film is now in the care of the University Exploration Society.
The settlement of Kungmiut was mapped at 1:2,500 scale. As no large scale map was available in the village this was considered an interesting and useful project to be carried out in the few free days expected before ice conditions improved further north.

In view of the short period of time expected to be available before the move to Nugssalik, a plane table survey was started. It soon became obvious, however, that more time would be available and so it was decided to switch to a tacheometric survey, using a Kern 2261 theodolite, and provisionally based on the control established by plane table. Unfortunately, a higher order of control was never established; indeed, a small area of the detail had to be left over until the return visit in September. The observation of several common points from neighbouring control points allowed some check on the accuracy of control and, in general, this proved adequate. The plotting was done as the survey progressed thus allowing field checking which showed that no buildings were omitted, or other gross errors perpetrated. The coastline and several buildings which also appeared on an unpublished 1956 map were used to superimpose the 1967 planimetry upon the topography. The 1956 map is Copyright (A.31/68) of the Geodetic Institute of Denmark.

The settlement was founded in 1933, by a catechist, Karale Andreassen, and ten years later Chapman (1941) described "Kungmiut" as a flourishing settlement of twenty or so houses. The houses were built of turf and stone, with timber fronts on the better ones, clustered around some flat land on the north of the stream, 8 - 15 m. above the fjord. Several houses were built side by side to economize on walls. By 1956, although the original nucleus remained, many new buildings had been constructed, particularly on the south side of the stream, and these included the present clinic and store.

It is since 1956, however, that there has been the most rapid development. Approaching 300 houses and many new community buildings, including a "Fish factory", school and church, have been built. Today the settlement is characterized by many small, brightly-painted timber houses laid out across the steeply-sloping rock surfaces, together with a nucleus of older turf and stone houses. Between the rocks are patches of earth and grass, a few small pools and scattered piles of refuse which give the whole area a not-unpleasant fetid smell.


Reference:
The ruins of nine Eskimo winter houses were found in two groups: one on the east side of the main fjord (II) and one on the south side of the branch fjord (I). When compared with other former Eskimo dwelling-places in the area this would appear to be a relatively large concentration. Reindeer were said to have been plentiful here once (Tutulik is Greenlandic for reindeer) and stories tall of salmon the size of seals. It is also said that a bear trap was erected here by Aagsaagik, the legendary hero of Angmagssalik (related in Chapman, 1934).

The eastern settlement is on a small rocky ledge a few metres above the water, backed by cliffs which rise steeply for 500 m, making access by land difficult. The turf and stone walls of at least seven winter houses are visible as ridges about 1 m high and 2 m wide, but they are heavily overgrown with vegetation. The buildings are 15 - 20 sq.m. inside and have narrow tunnel entrances up to 7 m long, some of which are still intact. Numerous grooves are scattered about the settlement, including one in the entrance of a winter house.

At the settlement in the branch fjord there were the ruins of two winter houses and what may be the ruins of three much older ones. An interesting feature of both Tutulik settlements is the complete absence of any land-water in the immediate vicinity, suggesting a dependence on snow or ice in the fjord throughout the year.

There is one solitary winter house on an isolated raised beach in Nigertuassuq (III). It is similar in size to those in Tutulik, but built entirely of stones. The walls are made with stones from the beach, but faced with more angular stones from the cliffs.

The former Eskimo dwelling-place opposite Sermarikvik, which is marked on Geodetic Institute maps and was referred to by Kruus (1912) could not be identified.
The expedition was fortunate to receive financial support from the following:

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University of Newcastle upon Tyne £600
University of Newcastle Students’ Representative Council £150
Gino Watkins Memorial Fund £100
Draper Company £75
Ford (Dagenham) Trust £75
Gibb (Dagenham) Trust £70
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We would like to thank them and the Royal Geographical Society for their support.

The expedition is particularly indebted to the Right Reverend Newcastle Bp. Bishop of Norwich, who very kindly acted as patron and referee. We are also most grateful for the help and advice given to us by many other people during the months of preparation, in particular: the members of the University Exploration Council; Prof. J. Wehe; Mr. E. E. Pigg; Dr. H. C. John; Geodetic Institute, Copenhagen; Dr. P. W. F. Grigson; Grønlænder Geologisk Undersøgelse; Dr. O. Halliday; Scott Polar Research Institute; Mr. J. J. Sharp; Dr. D. S. Sugden; Dr. D. Tarling; Dr. A. W. Walker; Mr. S. A. Winchester; and Mr. S. R. Wom.

We are especially grateful for the help and kindness shown to us in Greenland by Mr. Ulrik Lenzart, Handsel-Sørensen, Kungshol, who not only helped us during our stay in the settlement but devoted considerable time and effort to getting us out of Tugtiklik at the end of the expedition. We also received much help from Mr. E. Petersen, Mr. J. Flesser, Mr. P. Carlsen, and the Kongsfjordskanske Mandat, Angmagssalik. In the long days travelling up the coast we appreciated the kindness of the bowman, Albert Christiansen, Guna Magillik, Thomas Adakt, Asser Peter, and Jorgen Abelsen and the crew of the ’Ilaq’.

We wish to thank the following for the invaluable help: Lloyds Bank, Haymarket, Newcastle, for help with finances and foreign currency; Icelandsair for assistance in Reykjavik and with the air charter; Miss H. E. Thoris, Miss J. Collingwood, Miss A. Kirkham, Mr. B. Douglass and Mr. J. O. Oliver, for practical help in Newcastle; the Department of Surveying, for loaning scientific equipment; Mr. A. McPhail of Musgrave & Proctor Pharmaceuticals Ltd., for help with medical supplies; Mr. J. H. May of Lavo Stores, Morpeth; Signode Ltd. for the loan of a steel bending machine; W. W. Storey Ltd. for help with the radio; Royal Naval Reserve (H.M.S. Calliope) for lending distress flares; and the following firms for their gifts of food and equipment:

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- Aerated Foods Ltd. - soups
- Ashton Brothers & Co. Ltd. - towels
- Thomas Bell & Sons Ltd. - flour
- Van den Bergh Ltd. - margarine
- Alfred Bird & Sons Ltd. - coffee
- Blocks of Greenock Ltd. - camping equipment
- Bosco Ice Cream Ltd. - saloon net
- Rowater-Scott Corporation Ltd. - toilet and face tissues
- British Egg Marketing Board - dried egg
- British Famous Ltd. - clinging type
- British Steel Wool Co. Ltd. - steel wool
- Bryant & May Ltd. - matches

Cars ofCarlisle Ltd. - lifeboat biscuits
Cereso Foods Ltd. - salt
Chambers Packaging Ltd. - plastic coated boxes
Condor (England) Ltd. - dried vegetables
Coppex Ltd. - ‘Coppex’ and tape
The Distillers Co. (Great Britain) Ltd. - dried yeast
Export-Swissagarter Meter Sales - ‘Danelard’
Fassone Mills Food Company Ltd. - soups
Fmce Ltd. - ‘Rivastick’
Glasco Laboratories Ltd. - ‘Germix’ and ‘Complan’
G. M. & T. Harris (Galles) Ltd. - tinned meat
H. J. Heinz Co. Ltd. - tinned beans and spaghetti
J. A. Hunter & Co. Ltd. - meat foods
Jeyes Sanitary Products Ltd. - toilet paper and disinfectant
Kavli Ltd. - tinned cheese
Kocke Ltd. - film
Kraft Foods Ltd. - processed cheese
Kurek & Co. Ltd. - camping equipment
L.H. Levery & Co. Ltd. (GCA Industries) - ‘Iamix’ and ‘Lesilo’
Mapletons Ltd. - fruit tin bars
Mars Ltd. - chocolate
Mawson & Proctor Pharmaceuticals Ltd. - medical supplies
Maltonian Wines Ltd. - boot polish
The Metal Box Co. Ltd. - polythene bags and containers, and paraffin drums
Metal Containers Ltd. - 5-gallon petrol drums
Morris & Jones Ltd. - provisions
S.J. Morelani & Sons Ltd. - matches
N.E. Bagg Ltd. - matches
The Brittany Co. Ltd. - coffee
Oak Ltd. - ‘Opus’ and corned beef
George Payne & Co. Ltd. - confectionery
Pears Rose & Co. Ltd. - dried onions
The Phillips, Scott & Turner Co. - ‘Sparkling Spring’
Potter & Sons Ltd. - ‘Dust’ and ‘Piky’ Soap
T. B. Phillips & Co. Ltd. - ‘Midas’
Quaker Oats Ltd. - oats
Rank Organisation - cine camera book
Ringtote Ltd. - tea
G. Rossetti Ltd. - Kavlin Mint Cake
Ribbons Ltd. - adhesive tapes
The Ryton Company Ltd. - ‘Ryton’
Schoemaky Ltd. - groats
Scheppe’s (Hong) Ltd. - canned drinks
Scott-Brand Foods Ltd. - Scott’s Forbes Ota
Scottish & Newcastle Breweries Ltd. - ‘Brown Ale’
Shaw’s Biscuits Ltd. - biscuits
C. Shipton Ltd. - meat goods
A. L. Simpson & Co. Ltd. - glues, tablets and sweets
Sutherland Foods Ltd. - meat spreads
Swans Packaging Ltd. - polythene food bags
Tate & Lyle Refineries Ltd. - sugar and syrup
Thomas Board Mills Ltd. - fibreboard boxes
Thorne’s Students’ Bookshop Ltd. - stationary
Tyne Brand Products Ltd. - meat foods
Unilever Export Ltd. - ‘Vesta Meals’, ‘Surprise’ vegetables, Gibb’s ‘SBC’ toothpaste,
Veneer Pan & Pencil Co. Ltd. - pens and pencils
Valor Engineering Ltd. - 2-gallon petrol drums
A. Vander Ltd. - ‘Ovaltine’ biscuits, tablets and drink
Welsh & Sons Ltd. - confectionery
W.H. Whitehead Ltd. - peanut butter
W.D. & H.O. Wills - cigarettes and tobacco
Zimco Ltd. - cleaning pads

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