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DANEBOG EKSPEDITIONEN 1964

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BIRD OBSERVATIONS  
IN NORTHEAST GREENLAND

BY

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WITH 20 FIGURES AND 6 TABLES  
IN THE TEXT

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## INTRODUCTION

In 1964 an ornithological expedition set out for Northeast Greenland with headquarters at Daneborg weather station on the south coast of Wollaston Forland, 74°18' N, 20°10' W.

The purpose of the expedition was the qualitative survey of bird-life in the area, with special emphasis on the changes that had occurred since the region was last an object for ornithological observations; furthermore, a count of breeding birds within smaller and representative areas was planned.

In contrast to earlier expeditions, transport to the region was accomplished by an airplane which landed on the ice in Young Sund near the weather station on the 18th of April. The expedition was present during the arrival phase of the birds and during the beginning of their breeding season; this would previously have meant spending the winter there. The expedition departed again on the 20th of July.

This paper is a compilation of the Daneborg expedition's work and results. The expedition's participants consisted of the three authors of the present work.

The expedition was sponsored by the Committee for Ornithological Investigations in Greenland. The members of the expedition are deeply grateful to the Greenland Ministry and the Carlsberg Foundation for assistance with various arrangements and contacts, and for economic support. We are also indebted to the late Professor, Dr. phil. RAGNAR SPÄRCK, whose never failing interest and encouragement was of great importance for the expedition. We also wish to thank Major IB POULSEN for his help in preparing the expedition, and the personnel of the weather station for their hospitality and friendship. Finally thanks is due to Dr. phil. FINN SALOMONSEN for his critical review of the Danish manuscript.

## GENERAL PART

### Earlier Investigations

The extremely difficult sailing conditions of Northeast Greenland are responsible for the considerable delay in initiating ornithological research in that area in contrast to the west coast.

The first ornithological reports stem from the discoverers of this coast. In 1822 SCORESBY investigated the region between 70° and 75° N. Lat., and the following year CLAVERING carried out observations between 73° and 75° N. Lat.

The first thorough information on birdlife in these parts was the result of the second German Northpole expedition, 1869–70, which spent the winter in Germania Havn on Sabine Ø. Specimens, eggs and journal entries, mainly collected by PANSCH, were upon return prepared for publication by FINSCH (1874) and NEWTON (1874).

During the decades around the turn of the century there were many expeditions whose goal was the same area north of Scoresbysund as treated here. Among these was the first Danish expedition, led by RYDER 1891–1892. The ornithological contribution is due to BAY (1894), and mostly covers areas south of those concerned in 1964. The same is true of the "Carlsberg Foundation's Expedition to East Greenland, 1898–1900" led by AMDRUP, from which DEICHMANN (1904) processed the ornithological observations.

In 1898 and 1899 NATHORST (1900) carried out two Arctic Ocean journeys, the latter of which had Northeast Greenland as its objective. KOLTHOFF, who participated in the first of these, himself equipped an expedition in 1900. The expedition's reports include much ornithological information and confirm much of that mentioned by NATHORST (KOLTHOFF 1903).

Research activities around the turn of the century culminated with the "Danmark-Expedition" of 1906–1908, which reached points more northerly than any previous NE-Greenland expedition. MANNICHE's eminent observations of birdlife, mainly from areas around the main base in Germania Land (76°46' N. Lat.) still represent one of the most important contributions to our knowledge of bird biology and distribution in Northeast Greenland (MANNICHE 1910).

The years leading up to the international arbitration findings in the Hague in 1933, as well as a steady increase of well organized trapping activity, form a background for a new stream of information on birdlife.

The following expeditions have carried out ornithological observations around 74° N. Lat. in these years:

The Danish Godthaab-expedition 1930. (LØPPENTHIN, 1932).

The Norwegian scientific expeditions to East Greenland, 1929–31. (SCHAANING, 1933).

Three-year expedition to Chr. X. Land 1931–1934. (PEDERSEN, 1934).

Danish Northeast Greenland expedition 1938–39 (mainly in the more northerly regions, but with some bird observations from the areas treated here). (PEDERSEN, 1942).

In addition to this activity, in 1936–1938 BIRD collected a large amount of information, mainly from Myggbukta and Hochstetter Forland, south and north of Wollaston Forland, respectively, (BIRD & BIRD, 1941).

All these reports include many secondhand observations from local trappers.

The ornithological contributions of MADSEN (1925), KNUDSEN (1933), and JENNOV (1963) are more directly associated with trapping activities.

Finally, a collection of specimens from this period is in the possession of the Zoological museum in Copenhagen<sup>1</sup>). This material is discussed by, among others, SCHIØLER (1926) and SALOMONSEN (1950).

The forties provided observations made by the first Peary Land Expedition 1947–1950 which had its southern base at Zackenberg. Their ornithological findings are published by MØHL-HANSEN (1949) and JOHNSEN (1953).

At this point the systematic investigation of this part of the coast was temporarily concluded, until the Daneborg expedition in 1964.

There has, however, been some contribution from the weather station Daneborg (CONRADSEN 1957), as well as important recaptures in the area made by its staff.

The results of the Daneborg expedition have been presented in a report to The Committee for Ornithological Investigations in Greenland, as well as in various other publications: CHRISTENSEN (1965), GENSBØL (1965), ROSENBERG (1966), CHRISTENSEN, GENSBØL & ROSENBERG (1965), and CHRISTENSEN (1967); the last two deal especially with the moult-migration of the Pinkfooted Goose, (*Anser fabalis brachyrhynchus*).

The results of the expedition's ring-marking activities are included in lists by SALOMONSEN (1965 and 1967a).

<sup>1</sup>) A gift from East Greenland's Trapping Company.

### Climate and Weather Conditions

The sea around Wollaston Forland is ice-locked during 10–11 months of the year, which helps to explain the absence of sea-bird colonies in the area. Only on the extremities of the coast, early in the year, and sometimes during midwinter, can gaps be found in the ice due to the effect of currents.

In Young Sund the ice is normally driven to the sea about 20/7; in 1964, according to telegraphic reports from Daneborg, this began as late as 5/8. The ice in Albrechts Bugt north of Wollaston Forland does not break up every year, according to the sledge-patrols. The edges of the coast are, as a rule, ice-free from the middle of July to the middle of September.

Long before the fjord ice has totally disappeared, tidewater channels are generated, and are, together with "landwater"<sup>1)</sup>, of great importance for many birds. In illustration one can mention that as early as 10/6, landwater had been formed in the area where the river at Zackenberg empties into Young Sund, and was occupied during parts of the day by Long-tailed Duck (*Clangula hyemalis*), and Red-throated Diver (*Gavia stellata*). On 17/6 a three meter wide crack ran from Sandøen to Kap Berghaus where there were 5–600 Eiders (*Somateria mollissima borealis*). On 2/7 there was a  $1 \times 1\frac{1}{2}$  km gap here, and three smaller gaps between Sandøen and Kap Breusing. The island could be reached by dog-sledge, and not until the night of 17/7 the ice from Sandøen and outwards drifted into the sea.

Snow cover is a deciding factor for the birds in breeding time as well as during their arrival.

The snow was  $\frac{1}{2}$ –1 meter deep at Daneborg in April. The snow was, however, distributed quite unevenly throughout the landscape; areas exposed to the wind were entirely free of snow, while in depressions, e.g., Lille Sødal riverbed, the snow lay from 3 to 4 meters deep.

In the mountains near Daneborg and Zackenberg, an increase in the size of the snow-free areas could be seen from the beginning of May, while the rivulets did not begin to flow before about 1/6.

90 % of the lowlands on the northcoast of Wollaston Forland were still snow-covered 1/7, as opposed to the southcoast, which was entirely snow-free at this time. Over large portions of the peninsula the melting of snow occurred so late, that vast lowland areas could hardly have significance as breeding locations (fig. 1).

The lake in Store Sødal was completely under ice and snow on 14/6 (fig. 2).

<sup>1)</sup> A narrow strip of water between the shore and the fjord ice.





Fig. 1. Snow-covered slopes at the north coast of Wollaston Forland near Kap Schumacher 21 June 1964. N.H.C. phot.



Fig. 2. Store Sødal viewed from the northern slope of the Zackenberg mountain 14 June 1964. N.H.C. phot.

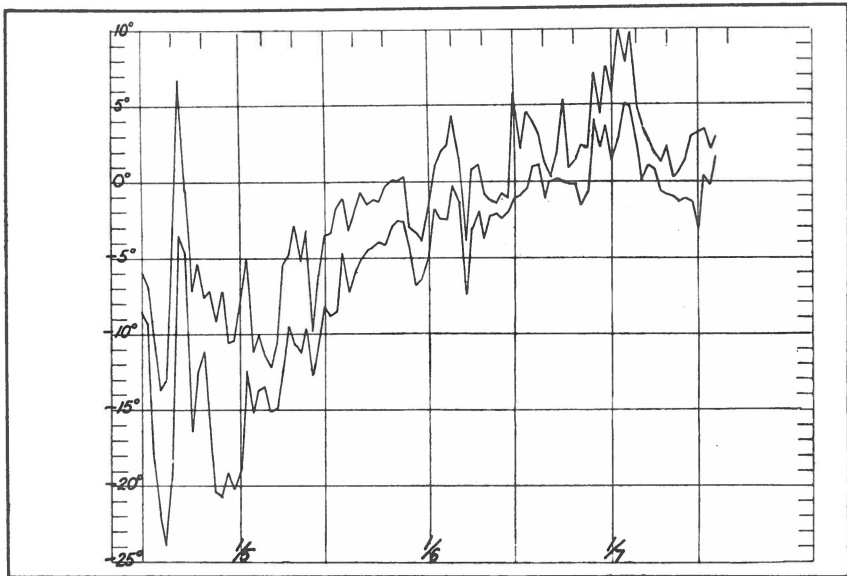


Fig. 3. Daily minimum and maximum temperatures at Daneborg weather station April 18th–July 20th 1964.

The lakes in Lille Sødal (7–8 larger and smaller) were completely icebound on 19/6, and on 30/6 still icebound for the most part. On 9/7 these lakes, with a single exception, were ice-free.

The lakes near Kuplen (visited 2/7), as well as the lakes on the coastal plain between Lille Sødal and Blæsedalen, were similarly late in becoming ice-free, and had nearly no vegetation on their edges.

The most fertile lake biotopes were found on the plain east of Zackenberg; many of these were ice-free before the middle of June, others first in July. Similar areas were to be found at Albrechts Bugt and 4–5 km east of Herschellhus. Many of the ponds at these last mentioned localities were actually waterholes of no more than a few square meters, but these were ice-free relatively early and their edges abounded with grasses, sedge, and mosses.

A tiny pond on Sandøen was ice-free as of 18/6.

There was midnight sun from the beginning of May and during the rest of our stay in East Greenland. In April, May and the beginning of June, the sky was cloudless and the sun dominated. Toward the end of June there was a period of sleety, windy weather, and in the beginning of July we were hampered by the fog that often lay over the Daneborg-Kap Berghaus area for many days at a time.

There were a few snowstorms: two days in May during our stay at Germania Havn, a couple of times while at Daneborg, one day at Zackenberg hut on 16/6, and at Albrechts Bugt on 27/6, during which we

had to remain indoors. A strong gale occurred while we were tenting on Sandøen on 17/7.

The daily temperatures at Daneborg are shown in fig. 3. The meteorological conditions at the weather station are at times surprisingly local, but it is supposed that fig. 3 on the whole gives a picture of the temperature patterns for the entire area. The following meteorological information has been obtained from inspector AXEL DUEGAARD, Meteorological Institute, and shows how much the spring and summer of 1964 deviated from the norm:

*Average temperatures (°C) at Daneborg*

	April	May	June	July
Average 1948-65 .....	-15.1	-5.5	1.3	3.7
Average 1964 .....	-12.6	-6.7	0.4	2.6

Even though April 1964 was the warmest registered since 1948, it is surely of greater significance to the birdlife that the months of May, June, and July were considerably under the norm. The average temperatures for these three months were the third or fourth lowest registered at Daneborg since 1948.

### Biotopes

During its stay in Northeast Greenland the expedition kept mostly to the lowlands, less than 200 meters high; now and then, however, we found occasion to climb to greater heights (Zackenberget 1372 m, Brisbane Bjerg 486 m, Germania Bjerg 302 m) and it was clear each time, that the highland areas (over 200 m) offered little possibility of supporting birdlife. An exception to this is represented by a breeding colony of Barnacle Geese on the northeast corner of Clavering Ø. This colony was situated on basalt cliffs that rose to an altitude a.s.l. that we could not establish, but which could well have been 200 m.

In the lowlands the ecological conditions varied greatly from place to place, partly as a result of the uneven distribution of snow cover and differences in the thawing pattern, and partly because of the various soil conditions and consequent differences in the plant population.

Along the stretch Isdal-Daneborg-Blæsedalen, the coastal plains mainly consisted of rough gravel, with a very sparse growth of *Salix arctica*, *Saxifraga oppositifolia*, *Dryas octopetala*, *Cassiope tetragona*, and grasses. On this graveled plain the Ringed Plover (*Charadrius hiaticula hiaticula*) was the characteristic bird (fig. 4). Similar gravel formations were found more sporadically on Revet, at Zackenberget estuary, at Lindemansdalen estuary, and along the north coast of Wollaston Forland from Lindemansdalen to Kap Schumacher.



Fig. 4. Gravel plains, characteristic for the coastal plains between Lille Sødal and Blåsedalen. 14th July 1964. N.R. phot.

Along the stretch Isdal-Zackenbergl, the plain took on a more clayey, damp character with richer vegetation and sporadic occurrence of ponds with abundant vegetation on their edges (Fig. 5).

We took the opportunity at the end of April of making a sledge trip over the large, low-lying plains that extend far inland from Albrechts Bugt on the north coast of Wollaston Forland. The land was completely covered by snow, and it was impossible to determine whether one was on fjord ice or land. Storsletten was visited again at the end of June, and at that time was still mostly under snow. Water from a 50–150 m wide river streamed over the fjord ice, which was flooded and full of holes within a perimeter of many kilometers. Along the river and especially in the near proximity of Albrechts Bugt there were several melted-off regions with grassy vegetation and *Cassiope*. The extent of the snow-free regions increased noticeably from day to day. The characteristic bird of this locality was the Sanderling (*Calidris alba*). A characteristic detail of the landscape was  $\frac{1}{2}$ –1 meter high hillocks  $\frac{1}{2}$ –10 m<sup>2</sup> in area, overgrown by an especially rich grassy vegetation, *Potentilla*, *Melandrium*, *Cerastium*, etc. In many places these mounds were the only features that were free of snow. Most of these hillocks were perforated by Lemmings, and bore pellets from the Long-tailed Skua

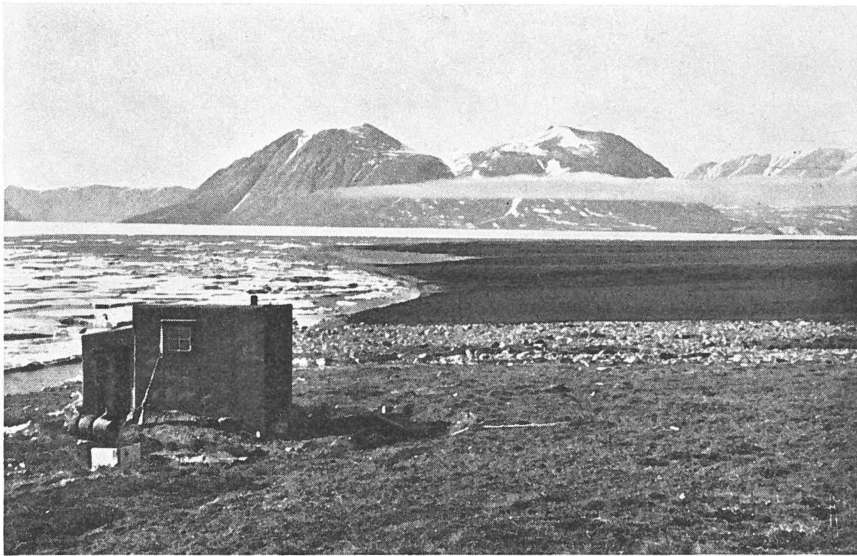


Fig. 5. Coastal plain and "land-water" 11th July 1964 about 10 km SE of Zackenberg, which is seen in the background. N.H.C. phot.

(*Stercorarius longicaudus pallescens*), which was often seen perched on such mounds (cf. "Owl Perches" described by PORSILD 1955 p. 62).

The eastern limit of this plain (Storsletten) is constituted by a ridge, that is 60 m high out along the bay, and 200 m high farther southwards. These hills were of yellow and red slate, which out along the bay were covered by patterned ground; the snow here had melted off by the end of June. A survey and counting of a small area was carried out. On the shores of the small glacial lakes the hardy grass was a bit higher. On the patterned ground we found breeding Sanderling, Long-tailed Duck (*Clangula hyemalis*), and Turnstone (*Arenaria interpres interpres*) (cf. p. 78).

The southern parts of the slate hills were snow-free as of the end of June. The vegetation in certain places indicated that they had been snow-free for a long while *i.e.*, *Salix*, *Dryas*, *Draba*, *Papaver*, and *Polemonium* were in bloom. In most places the surface was formed by slate flakes, and nearly no birds were seen in this terrain.

The plain southeast Albrechts Bugt was not visited in June-July, but judging from a binocular observation on 28/6, this plain was even more snow covered than Storsletten.

The granitic rock areas on the coastal part of the land offered an extremely varied terrain as regards flora and fauna. The highest situated parts, which had been snow-free at the close of winter, appeared during the birds' breeding season as barren fields of rock. The areas that were



Fig. 6. Northern slope of Zackenberg viewed from the mouth of Store Sødal on 17th June 1964. The lake in the foreground was possible breeding ground of King Eider (*Somateria spectabilis*). N.R. phot.

first to melt off were overgrown by *Dryas*, *Cassiope*, *Papaver*, *Silene* and *Draba*, but took on already from the beginning of July a quite dry character. The areas which were last to be snow-free had almost no vegetation. This was the situation in Lille Sødal in the middle of July.

In certain parts of the granitic rock region the melt-water had formed irrigated slopes and damp hollows throughout the summer; at these places there was a rich growth of grasses, mosses, *Salix*, *Ranunculus*, etc. On the bedrock around Daneborg the Snow Bunting (*Plectrophenax nivalis nivalis*) was the characteristic bird, while the Dunlin (*Calidris alpina arctica*) occupied the damper localities.

At the inner fjord region the granitic rock reached to considerable heights, and the mountainsides were in places quite steep, with a profusion of talus formations (cf. fig. 6 and 7).

On Zackenberg's south slope we observed a dense growth of *Salix arctica*, *Vaccinium uliginosum*, *Empetrum vulgare*, and *Cassiope tetragona*. The Snow Bunting was the characteristic bird. On Revet, which was also a granitic rock region, the land sloped less steeply out toward the coast. As early as 25/5 one could see large snow-free and grass-grown



Fig. 7. View from Zackenberg hut into the direction of Tyrolerfjord 12th June 1964. B.G. phot.

surfaces that served as an important biotope for the just-arrived waders and geese. This area was unfortunately not visited during the birds' breeding season.

Large portions of the region are characterized by basalt formations. In these regions very few birds were observed.

Real sand beaches were found only at Herschellhus and on Sandøen.

The expedition carried out more exact counts in the neighbourhood of Daneborg (granitic rock and gravel plains), on Sandøen, and on the above-mentioned patterned grounds at Albrechts Bugt (*cf.* p. 75 ff). Furthermore, line surveys were carried out on Storsletten, on the coastal plains on the south side of Wollaston Forland, in Lille Sødal, and, somewhat before the beginning of the breeding season, in Store Sødal. Generalizations about population densities based upon the present results are difficult to make. The regions investigated by the expedition include widely divergent biotopes, as is clear from the above descriptions.

### Itinerary

During the first week, we took short ski trips to Sandøen, Lille Sødal, Basaltø, and Kap Breusing on Clavering Ø.

From 27/4–8/5 a sledge trip was made around Wollaston Forland for the purpose of setting out depots for later trips. On this journey we camped for 6 days at Germania Havn on Sabine Ø, from where we made daily trips to Hvalrosø, where the current-carved ice-gaps provided for a rich birdlife for that time of year.

The following week was spent around Daneborg, ringing Snow Bunting, and taking sledge trips to Zackenberg and Dahls Skær.

From 16/5 the migratory birds began arriving, and in order to follow developments more closely, we took up posts at Daneborg and Herschellhus, as well as at Kap Breusing on Clavering Ø.

From 23/5 to 29/5 two participants journeyed by dog-sledge through Tyrolerfjord to Revet, west of Clavering Ø, while the third member remained at Daneborg.

The first 10 days of June were spent at the headquarters at the weather station. The Barnacle Geese (*Branta leucopsis*) had at that time begun egg-laying, and the colonies at Kap Breusing and Basaltø were visited. In addition, trips were made to Lille Sødal and Herschellhus.

From 10/6–17/6 we were in the Zackenberg area and made an excursion by ski to Store Sødal, which was still covered by ice and snow.

From 17/6–2/7 two members made a ski trip to the northern part of Wollaston Forland and Storsletten, following to some extent the route taken when setting out the depots. At Daneborg the third



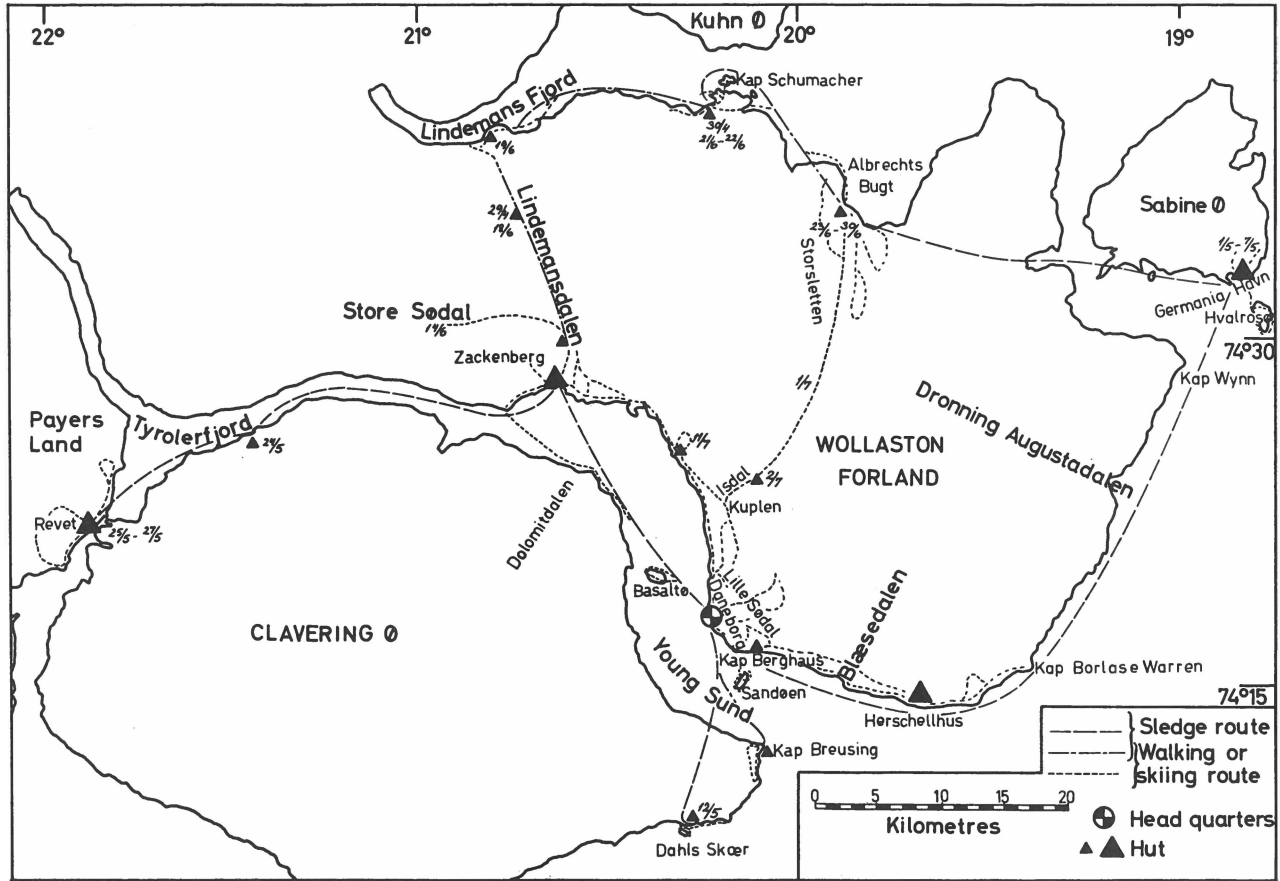


Fig. 8. Routes of the ornithological expedition April 18th–July 20th 1964.

member made observations of birdlife and mapped nests in the station's vicinity.

In July we worked in the Daneborg area on mapping, counting and observation of breeding birds, in addition to making frequent visits to Sandøen in Young Sund. Trips by foot along the southcoast of Wollaston Forland to Zackenberg and to Herschellhus were undertaken, and proved very fruitful from an ornithological point of view. The last days of our stay were spent on Sandøen.

On 20/7 the expedition departed on board a Catalina airplane, which landed outside the entrance of Lille Sødal. Thus one did not manage to follow the birdlife during the final phase of the breeding season. The late breaking up of the ice prevented us from making valuable motorboat excursions.

21/7-24/7 were spent in Mestersvig (Lat. 72°N).

## SPECIAL PART

### List of species

- Gavia stellata* (PONTOPPIDAN), Red-throated Diver.  
*Clangula hyemalis* (LINNAEUS), Long-tailed Duck.  
*Somateria mollissima borealis* (BREHM), Arctic Eider.  
*Somateria spectabilis* (LINNAEUS), King-Eider.  
*Anser fabalis brachyrhynchus* BAILLON, Pink-footed Goose.  
*Branta bernicla hrota* (O. F. MÜLLER), Pale-breasted Brent Goose.  
*Branta leucopsis* (BECHSTEIN), Barnacle-Goose.  
*Falco rusticolus candicans* GMELIN, Greenland Falcon.  
*Lagopus mutus captus* PETERS, Greenland Rock-Ptarmigan.  
*Charadrius hiaticula hiaticula* LINNAEUS, Ringed Plover.  
*Arenaria interpres interpres* (LINNAEUS), Turnstone.  
*Calidris canutus canutus* (LINNAEUS), Knot.  
*Calidris maritima maritima* (BRÜNNICH), Purple Sandpiper.  
*Calidris alpina arctica* (SCHIØLER), Schiøler's Dunlin.  
*Calidris alba* (PALLAS), Sanderling.  
*Phalaropus fulicarius* (LINNAEUS), Grey Phalarope.  
*Phalaropus lobatus* (LINNAEUS), Red-necked Phalarope.  
*Stercorarius parasiticus* (LINNAEUS), Arctic Skua.  
*Stercorarius longicaudus pallescens* LØPPENTHIN, American Long-tailed Skua.  
*Larus hyperboreus hyperboreus* GUNNERUS, Glaucous Gull.  
*Xema sabini* (SABINE), Sabine's Gull.  
*Sterna paradisaea* PONTOPPIDAN, Arctic Tern.  
*Cephus grylle mandtii* (MANDT), Black Guillemot.  
*Nyctea scandiaca* (LINNAEUS), Snowy Owl.  
*Corvus corax principalis* RIDGWAY, Northern Raven.  
*Oenanthe oenanthe leucorrhoea* (GMELIN), Greenland Wheatear.  
*Anthus pratensis pratensis* (LINNAEUS), Meadow-Pipit.  
*Carduelis flammea hornemanni* (HOLBØLL), Hornemann's Redpoll.  
*Calcarius lapponicus lapponicus* (LINNAEUS), Lapland Bunting.  
*Plectrophenax nivalis nivalis* (LINNAEUS), Snow-Bunting.

**Red-throated Diver** (*Gavia stellata*)

The species is distributed over the entire ice-free part of Greenland, including Peary Land. We did not find the bird breeding on Wollaston Forland, but this could be because the species breeds rather late in the summer (the middle of July according to MANNICHE 1910), as well as because many ponds had not fully thawed by the end of June, when most of our investigations took place. Even in milder summers, the species could hardly display great numbers on Wollaston Forland, due to the rather modest number of ponds.

Our earliest observation of this species dates from June 11th, when a pair was seen at the estuary at Zackenberg; nearby, on July 11th, a pair was seen in a smaller half-thawed lake. Another pair was seen on the 14th and 17th of June in a little lake (300 m<sup>2</sup>) near Zackenberg, 6 km from its estuary. Two more pairs were noted on the 24th of June in the river delta on Storsletten; these birds' courtship-call was heard frequently, and they were also seen in mating-flight. Finally 5 pairs and a lone bird were observed along a 11 km long coastal stretch at Herschellhus on the 13th and 14th of July.

**Long-tailed Duck** (*Clangula hyemalis*)

The Long-tailed Duck is found on the east coast, from Kap Farvel to the southern Peary Land (60°–82° N. Lat.), more numerous in the high-arctic than in the low-arctic region.

PEDERSEN (1934) claims that the species breeds only in isolation around 74° N. Lat. The only breeding place mentioned is Sandøen, where about 10 pairs nested in 1932. Upon revisiting the island in 1939, PEDERSEN (1942) noted a considerable decrease in numbers as compared to 1932, perhaps a result of a cold summer, which, further to the north (76°50' N. Lat.) resulted in a non-breeding year. In 1930 many pairs attempted breeding, but were disturbed by the arctic fox (LØPPENTHIN 1932). PEDERSEN (1934) sets the species' arrival at Clavering Ø from the 1st to the 15th of June, depending on ice conditions.

We encountered the species for the first time on 8/6: 2 birds at Kap Borlase Warren, where they occupied an ice-free beachside lake. The river at Zackenberg was flowing upon our arrival there on 11/6, and in the estuary 3 pairs were seen. On the following day the count was 17 pairs + 1. These birds flew about between the estuary and the few lakes that were ice-free. The collective courtship display was frequently witnessed during these days, and the far-reaching calls of the birds were often heard.



Fig. 9. Pair of Longtailed Duck in a fresh water pond on the eastern side of the Zackenberg river estuary. 16th June 1964. B.G. phot.

The ponds at the Zackenberg estuary are possibly breeding localities for the species. In the middle of July the species was noted again, but there was no direct indication that they were breeding.

The Long-tailed Duck was observed at various times on the north coast of Wollaston Forland. On 21/6 3 pairs were seen in land-water at Kap Schumacher, 5 pairs on Storsletten 23/6, 8 pairs on 25/6, and 3 pairs on 29/6 at the same place. On 25/6 on the lowest part of the slate hills facing Storsletten, two nests were found, each containing 1 egg. One nest was situated 2 meters from a  $1 \times 2$  meter large waterhole, which looked as if it would dry out before long. The other nest was situated close to a snowdrift, but not in the immediate vicinity of a waterhole. On 28/6 a third nest was found, again near a small lake; it contained 4 eggs. The male was seen lying in the water while the female sat on the nest. On the following day the nest was observed to have been plundered; tracks and excrement revealed that a fox was responsible.

The species was not observed at all on Sandøen in 1964. This is perhaps a reflection of the unfavourable local conditions (see under Eider) but a general decrease of the population can naturally not be excluded.

On 12/7 and 13/7 about 25 Long-tailed Ducks were observed in the sea along the coast between Blæsedalen and Kap Borlase Warren; 11 of these were in a flock.

**Arctic Eider** (*Somateria mollissima borealis*)

The species' breeding sites are found spread on the east coast from Kap Farvel to Germania Land (60°–77° N. Lat.), partially in small colonies which consist of a maximum of 100 pairs, partially as single nests. In the area traversed by the expedition, two colonies, discussed repeatedly in the literature, are to be found, namely Hvalrosø and Sandøen.

The island Hvalrosø was visited by PANSCH 14/6 1870, who counted 40 nests (FINSCH 1874). NATHORST (1900) visited the island 8/7 1899 and found "rather many" nests. That KOLTHOFF (1903) 4/8 1900 only found two nests, is certainly due to the late time of year. On 10/7 1930 VAN HAUEN visited the island (LØPPENTHIN 1932) and found "a large colony" on the northside. PEDERSEN (1934) checked on the colony on 20/6 1932 and found about 50 nests, all of them apparently with a complete clutch of eggs, despite the early time of year.

Sandøen was visited by LØPPENTHIN (1932) in July 1930. The Eider colony was at the time harassed by the arctic fox, but LØPPENTHIN estimated its size at 50–80 pairs. From mid-June to the beginning of July 1932 PEDERSEN (1934) visited the island many times, and set the count of breeding pairs at 90. Finally, MØHL-HANSEN (1949) was there on 24/7 1947, and writes "Here breed hundreds of Eider and Tern".

As regards further breeding occurrences on Wollaston Forland, PEDERSEN (1934) writes that the bird is found as a single breeder on the coast of Gael Hamkes Bugt. JOHNSEN (1953) describes the species as nesting every year in the vicinity of Zackenberg.

The species' arrival at the breeding territories in the fjords at 74° N. Lat., according to PEDERSEN (1934), takes place from May 20th to the 5th of June (Clavering Ø), depending on the current ice conditions. These data tell more about the local ice situation than about the species' arrival at the latitude. This is also emphasized by the fact that the Eider has been observed at Wollaston Forland in the winter (SCHAANING 1933). PEDERSEN (1942 p. 36) describes three large ice-gap systems along the Northeast Greenland coast, of which the middle one is located at Sabine Ø. Open water can exist here during the winter, extending temporarily toward Herschellhus and Clavering Ø.

From the 3rd to the 6th of May we visited Hvalrosø many times, and each time encountered the species in current-carved ice-gaps off the eastside of the island: 3/5 14 ♂♂, 2 ♀♀ and 6/5 48 ♂♂, 10 ♀♀. On the 8th of June, in dense fog, a ♂ was seen in passage at Herschellhus, while courting King Eiders could be heard. On the 18th of June, after having been away from the area for a week, we found 5–600 Eiders in an approx. 3 meter wide crevice in the ice that stretched from Kap

Berghaus to Sandøen. On June 22, a lone pair was seen in an ice crevice at Kap Schumacher in the otherwise very wintry landscape of the north coast of Wollaston Forland; it was the only observation of the species here. According to PEDERSEN's arrival data, one can state that arrival at the nesting sites in 1964 occurred late, but, as discussed on p. 60, the ice conditions this spring had been relatively unfavourable.

The colony on Sandøen in 1964 suffered a fate that reminds one of LØPPENTHIN's description from 1930. As already mentioned, a very considerable number of Eiders (about 600) was seen in the vicinity of the island. On our visits on 2/7 and 5/7 the beginning of breeding activity was ascertained by the find of, respectively, 4 and 20 nests. Still more birds occupied the island in pairs, and it is estimated that the colony at this time consisted of 70 pairs. During our stay on the island later in the month, 16/7, only one nest with one egg was noted. This nest was plundered on the next day. On 17/7 egg laying in two new nests was noted.

The reason for this failure presumably is that up until our departure (20/7), there was an ice-bridge from the mainland to the island. Many signs of fox activity were noted, and even though this animal had not devoured all of the missing eggs, the uneasiness at the breeding grounds during the egg laying period could very well have been deleterious. The remains of Eider eggs devoured by the Glaucous Gull were seen. The fjord-ice did not disappear before 5/8 1964, and thus there could hardly have been many broods of Eider hatched on the island this year. We have received information that the conditions in 1965 were similar to those in 1964.

The personnel at Daneborg informed us that a colony not previously described had existed "for some years" on Daneborg's area itself. When this colony originated is not exactly known, but as it is not discussed by CONRADSEN (1957), one can assume its establishment as having occurred after 1955. We had the unique opportunity in this locality of closely observing the establishment of the colony. On 18/6 the first pair was seen at the weather station, and on 27/6 the first nests were found. Thereafter the colony grew quickly. On 1/7, 29 nests were counted, and there were 70 nests in the middle of July. The first broods of Eider in the Daneborg-colony hatched a few hours before our departure on 20/7. Frequent checking of nests and capture of nesting birds had, according to our judgement, no influence on the breeding.

The occurrence of an Eider-colony of a size significant for Northeast Greenland, in a densely built area with much traffic, seems odd. Most of the nests were situated near buildings or close to the dog-teams, where nests were found as close as 5 meters from rows with 10-12 lively and noisy huskies. In thus situating the colony the birds

were possibly protected against predatory foxes, which never were seen on the station area; however, this advantage could hardly be the Eider's motivation for choosing this locality.

The favourable situation of the colony is reflected by the fact that only a few nests were destroyed. Of the total of 70 ascertained nests only five were missing at the final check. Two of these were placed at a distance of 1–200 meters from the nearest building or dog-team, and at least one of them was destroyed by the fox, *i.e.*, the nest contained fox excrement after the plundering. It cannot be excluded that three of the nests were plundered by Glaucous Gulls, which constantly were seen in the station area. Besides the plundered nests, three more were lost when the birds abandoned them. They contained 1 and 2 eggs.

It is possible for 58 of the nests to quote the time of the initiation of egg-laying as well as the size of the fully laid clutch. The following table is divided into three time-periods, and the individual broods are shown according to the time they were first registered.

Number of eggs per clutch	27/6–2/7	3/7–9/7	10/7–15/7	Total
2.....	0	0	1	1
3.....	2	5	0	7
4.....	4	13	2	19
5.....	15	8	2	25
6.....	2	2	0	4
7.....	1	1	0	2
Total .....	24	29	5	58 (clutches)

The average clutch size for the entire period is 4.5. The average clutch-size for broods initiated in July is seen to be slightly smaller than for those initiated in June.

The colony was so closely watched that only a minimum number of nests could have avoided being registered by the observer on each of his rounds. Each nest was checked from 2 to 8 times, the first established, of course, most often. Only isolated irregularities were revealed by this procedure, as regards sudden changes in the number of eggs. This can be explained by the fact that the female here, in contrast to those of more southerly populations, BERGMAN (1963), began sitting on the eggs already after the 1st or 2nd laying, at which time padding of the nests with down also began.

In addition to the two breeding grounds discussed, there was a single nest find of Eider on the southcoast of Wollaston Forland between Blæsedalen and Lille Sødal. The nest was situated in a rocky, completely barren area, and was found on 14/7, plundered.



During the summer of 1964 30 adult Eider females were ringed, all of them from the Daneborg-colony. One of these has been recaptured at Husavik in Iceland, which is the first recapture of a Northeast Greenland Eider (SALOMONSEN 1967a).

### **King-Eider** (*Somateria spectabilis*)

The King Eider is found on the Eastcoast, in the high-arctic zone from 70° to 82° N. Lat., possibly even farther north. It is present in strongly varying numbers, depending on an area's suitability as a breeding ground.

ALWIN PEDERSEN (1942) mentions the species as one of the earliest birds arriving in Northeast Greenland; this applies, however, only to its arrival at openings in the ice, often far from the coast. At Mallemukfjeld (81° N. Lat.) the species has been seen in great number on 9-10/6 1907 (MANNICHE, 1910) and on 16-17/5 1939 (PEDERSEN, 1942). According to information from trappers, the species has been seen even during the winter, living in ice-openings at Wollaston Forland (SCHAA-NING, 1933).

In accordance with the above, up to 103 King Eider were seen on 3-5/5 1964 at Hvalrosø.

In the fjord regions the species appears at a significantly later date, normally around the first half of June (PEDERSEN, 1942 and RØEN, 1965). In Gael Hamkes Bugt and Young Sund we saw the first King Eider in June. On 8/6 the species' growling call was heard from the ice-openings outside of Hershellhus. On the 18th and 20th of June a pair and a male were seen, respectively, in an opening between Kap Berghaus and Sandøen, together with a greater number of Eiders.

The main distribution of the species lies north of the regions investigated by the expedition. It is said to be not uncommon on Sandøen during the mating period, but it is usually gone from this locality by the middle of June. According to trappers, the species has bred in this place from time to time (PEDERSEN, 1934). The same source reports finding three nests in Sødal (without, however, specifying whether it was Lille or Store Sødal). LØPPENTHIN (1932) often noted the species in Young Sund in 1930. A nest probably belonging to this species was found on 10/7 1930 with 3 eggs at Henningelv on Clavering Ø.

A number of King Eiders were observed during the breeding period in 1964, but no nests were found. One pair was seen at a lake near the mouth of Store Sødal in Lindemandsdalen on 17/6, (*cf.* fig. 6), and at least one pair was seen on 24-29/6 on Storsletten, where there also are ponds that could serve as breeding places. On the banks of the ponds on Zackenbergsletten small flocks of 2-3 and 5 females were seen on 11/7. 30 males, mixed with a flock of 170 Eiders in an ice-opening out-

side Herschellhus, were observed in the days 12-13/7. Finally, 2 males were seen outside Sandøen on 17/7.

During especially unfavourable years, *e.g.* 1907 and 1939, the species does not breed (MANNICHE, 1910 and PEDERSEN, 1942). 1964 was a normal year, as far as this is concerned, in that many nests were found on Peary Land the first as early as 1/7 (RØEN, 1965).

The King Eider arrives at the breeding grounds in pairs, in contrast to the Eider, whose mating takes place at the breeding grounds; at least this is true for Sandøen in 1964. Accordingly, courtship display was observed in the King Eiders at Hvalrosø in May, whereas the coexisting Eiders displayed no such activities.

The display of the King Eider is well known (DELACOUR, 1959) and have many patterns common to the Eider (JOHNSGARD, 1965). The flock at Hvalrosø on 5/5 consisted of 68 males and 35 females. The greatest number of birds was settled on the banks of a narrow ice-gap that stretched all the way in to the steep cliffsides of the island. Among the males in the water "neck-stretching" as well as "lateral head-turning" were frequent (JOHNSGARD, 1965). A female was frequently observed swimming close behind a male who, with vertically raised tail, exposed the white patches on the side of the rump in a very conspicuous manner (compare HÖHN, 1957).

The male's call is quoted as "broo rroo rroo", which coming from the many mating birds, sounded like a continuous growling, not unlike the mating call of the Black Grouse (*Lyrurus tetrix*). Another characteristic sound, a goose-like "ga-ga", was often heard; it is produced, according to JOHNSGARD, by the female.

#### **Pink-footed Goose** (*Anser fabalis brachyrhynchus*)

This species breeds between 70° and 75°30' N. Lat.; an isolated breeding place at 68° N. Lat. (Mikis Fjord) is also known. ALWIN PEDERSEN (1942) states that the species nests on Wollaston Forland in modest numbers in small colonies.

**Arrival period.** The first Pink-footed Geese in 1964 were noted on 16/5; it was a pair searching for food on a mainly snow-covered stretch at Kap Berghaus. Subsequently, up to and including 3/6, the species was seen nearly daily in passage or resting in small flocks. During the same period most of the other migratory birds arrived, including the Barnacle Goose. At that time the expedition's members took special note of the migration.

In the table below an outline of the migration of the Pinkfoot is given. In parenthesis are unidentified geese. The latter were probably

Table 1. *Spring migration of Pink-footed Goose. (Anser fabalis brachyrhynchus)*

Date	Daneborg	Other Localities
May 17	0 (1)	5 (12)
- 18	0	0
- 19	9 (1)	0 (2)
- 20	2	2 (2)
- 21	3	—
- 22	0	—
- 23	5	1
- 24	0	0
- 25	0	0
- 26	51 (16)	0
- 27	18 (21)	0
- 28	0	0
- 29	0	0
- 30	0	—
- 31	2	—
June 1	0	0
- 2	9	0
- 3	27	6
Total	126 (39)	14 (16)

The number of Pink-footed Geese observed in spring migration. In the table, the observations at Daneborg are entered separately. Parenthesis: unidentified geese (see text). The — sign indicates, that no observations were carried out.

of this same species. The Barnacle-Goose can as a rule be identified from a great distance because of its motley appearance.

To obtain an impression of the value of Daneborg as migratory post in comparison to other localities around Young Sund, simultaneous migratory observations at three different points were carried out, from 18-21/5 (see p. 16 and table 1).

Conditions in the inner fjord region may be different. On the 26th and 27th of May two members were posted at station Revet on Payer Land, while the third member was at Daneborg. It was precisely during these days that the spring migration of the Pinkfoot culminated at Daneborg (*cf.* table 1), but at Revet no migration of this species was noted—only resting flocks. On the other hand a rather lively migration of Barnacle Geese was in progress here. Perhaps these observations suggest different migratory paths for the two species.

According to ALWIN PEDERSEN (1942) the birds arrive at their breeding grounds at 74° N. Lat. in the period 25-29 May. The main mi-

gration observed in 1964 fell in precisely this period, but the first arrivals occurred at least a week earlier.

**Occurrence of Breeding.** According to ALWIN PEDERSEN, the species occurs sparsely on Wollaston Forland as a breeding bird, an evaluation with which we are in complete agreement.

As a basis for our evaluation, three methods were used.

- 1) A counting of paired birds at foraging places, previous to egg-laying. This method is applicable as the birds are to a high degree concentrated in the few vegetation-rich areas, in this case mainly Zackenberg and Revet.
- 2) Localization of the nests. This method is difficult to apply to smaller colonies where to-and-fro flights are seldom. Apparently one has to pass a colony at less than 200 meters for the birds to rise from their nests, and certain pairs even remain on their nests until the observer has arrived within 30 meters of them.
- 3) Searching for geese and goslings along the coasts. If one assumes, along with ALWIN PEDERSEN, that family-flocks of Pinkfoot always remain on the coast as long as the goslings are small, one should, by counting along the coast in the middle of July, find nearly all pairs which have accomplished breeding.

All three methods have been used here, and the following evaluation of the size of the breeding stock in the areas investigated has been made.

Revet was visited on 25-27/5. It was assumed that this locality would serve as a breeding ground because of its suitable foraging places and the observed presence of flocks. Indeed, about 10-12 pairs, together with 40 unpaired Pink-footed Geese, were found in this place. One cannot exclude the possibility that some of these birds were resting migrants.

The Zackenberg area was visited several times. On the 28th and 29th of May 8-10 pairs were seen, and none unpaired. On the 1st of June 4 pairs were seen and 3 + 3 unpaired; on 11/6 3 + 2 pairs and 9 unpaired were seen. On June 12th two nests with eggs were found on small islands in a lake east of the river, and 3-4 pairs seemed to reside in this place. On June 13 two nests with eggs, and 6 empty perhaps years-old nests were found on Zackenberg's south slope, close to the coast, 4 km west of the river. Also seen here were 5 pairs of Pinkfoot. On the 11th of July 6 family groups were found at the first-mentioned nesting place,

with 5+5+3+3+3+1 goslings together with three odd birds. Among the estimated stock of 8-10 pairs in the Zackenberg area, 6 broods of young were ascertained.

**Kap Schumacher.** The peninsula was visited on the 20th and 22nd of June. On the northwest side of this peninsula 1 nest with 2 eggs, 1 plundered nest with fresh shell, and 6 year-old nests were found. 5 pairs of Pinkfooted Geese dwelled in this locality. On the east coast of the peninsula two pairs were seen on 23/6; they behaved as if they had nests on the low cliffs.

Storsletten was investigated from 23-30 of June. On the 28th June a nest with 3 eggs was found on the tundra about 2 km southwest of the coast. The pair left the nest when the observers came within 30 meters; until then the birds attempted to conceal themselves by stretching their necks along the ground.

In addition to these observations it should be mentioned that in the beginning of June 3 birds were constantly seen in Lille Sødal's eastern end. In addition, 20 were seen along the coast between Herschellhus and Kap Borlase Warren on 8/6, and in the middle of June 8-15 birds were noted in the northern part of the plain at Zackenberg.

On the 13th July the coast from Daneborg to Kap Borlase Warren was searched. In this entire stretch 8 moulted and 4 still fledged birds were seen. On the 11th and 12th of July the coast from Daneborg to Zackenberg was searched, and only the above-mentioned family groups of Zackenberg were seen (besides a large number of moulted geese which will be discussed below).

The total count of breeding Pinkfoot in the areas we visited on Wollaston Forland was hardly more than 20 pairs. Colonies could have been overlooked, but it is unlikely that large numbers of breeding Pinkfoot were passed over. Most of the areas on Wollaston Forland which we failed to visit during breeding time could hardly contain larger colonies of Pinkfoot. Our failure to investigate Dronning Augustadalen on the east coast of Wollaston Forland, constitutes, however, a lack in these investigations.

**Placing of the nests.** The placement of nests has been previously discussed (LØPPENTHIN, 1932). Of the two colonies found at Zackenberg, the eastern one was situated on two small islands (10-15 m<sup>2</sup>) in a small lake, the western one was on a 15-20 m high dome-shaped gneiss formation with accessible 1 m broad shelves. The colony of Kap Schumacher greatly resembled the last mentioned, but was somewhat less

accessible. The nest found on Storsletten was placed on the flat plain close by a melt-water ravine about 3 km from the coast.

During our homeward journey we stayed in Mestersvig from 20-24 July, and noted 6 broods of Pink-footed Geese in the station's immediate surroundings (Noret). According to the head of the station the species at this place breeds in the valley, at a height of about 100 meters, about 2 kms from the coast.

It appears that the species in these regions of Northeast Greenland displays a remarkable variability in choosing its nesting sites.

**Non-breeding geese.** Our observations do not allow for a more exact analysis of the ratio between breeding and non-breeding geese in the breeding grounds, but the number of unpaired geese in the immediate vicinity of the breeding colony at Zackenberg and Kap Schumacher was not surprisingly large, up until the moulting-flight began in the end of June, as discussed below.

**Summer migration.** When the migration seemed to be finished after June 3rd, we did not expect to see more north-heading migrations in 1964. Much to our surprise a new migration began on the 18th June and quickly increased in intensity. It culminated at Daneborg around the first of July, and the last flock was seen heading north on the 12th July.

As soon as we realized that because of the birds' purposeful flight and the rather great participation this was not a matter of incidental, wandering flocks, the phenomenon was interpreted as a moulting-flight of non-breeding birds. Observations of this kind had previously been made at Daneborg (CONRADSEN 1957). Gradually, as the numbers grew from day to day, we began to suspect that these birds could not all have stemmed from the Greenland population (SCOTT and FISCHER (1953) estimated that 500 pairs were involved) and we surmised that the birds stemmed mainly from the large Icelandic stock. A closer analysis of the

Table 2. *Pink-footed Goose (Anser fabalis brachyrhynchus)*

06.00-07.00	07.00-08.00	08.00-09.00	09.00-10.00	10.00-11.00	11.00-12.00
1	0	2	4	4	12
12.00-13.00	13.00-14.00	14.00-15.00	15.00-16.00	16.00-17.00	17.00-18.00
3	4	8	5	8	2
18.00-19.00	19.00-20.00	20.00-21.00	21.00-22.00	22.00-23.00	23.00-06.00
1	0	2	0	1	0

The hourly variations in the moulting flight of the Pink-footed Goose at Daneborg. The number of north-heading flocks are totalled according to the time of day for June-July 1964.

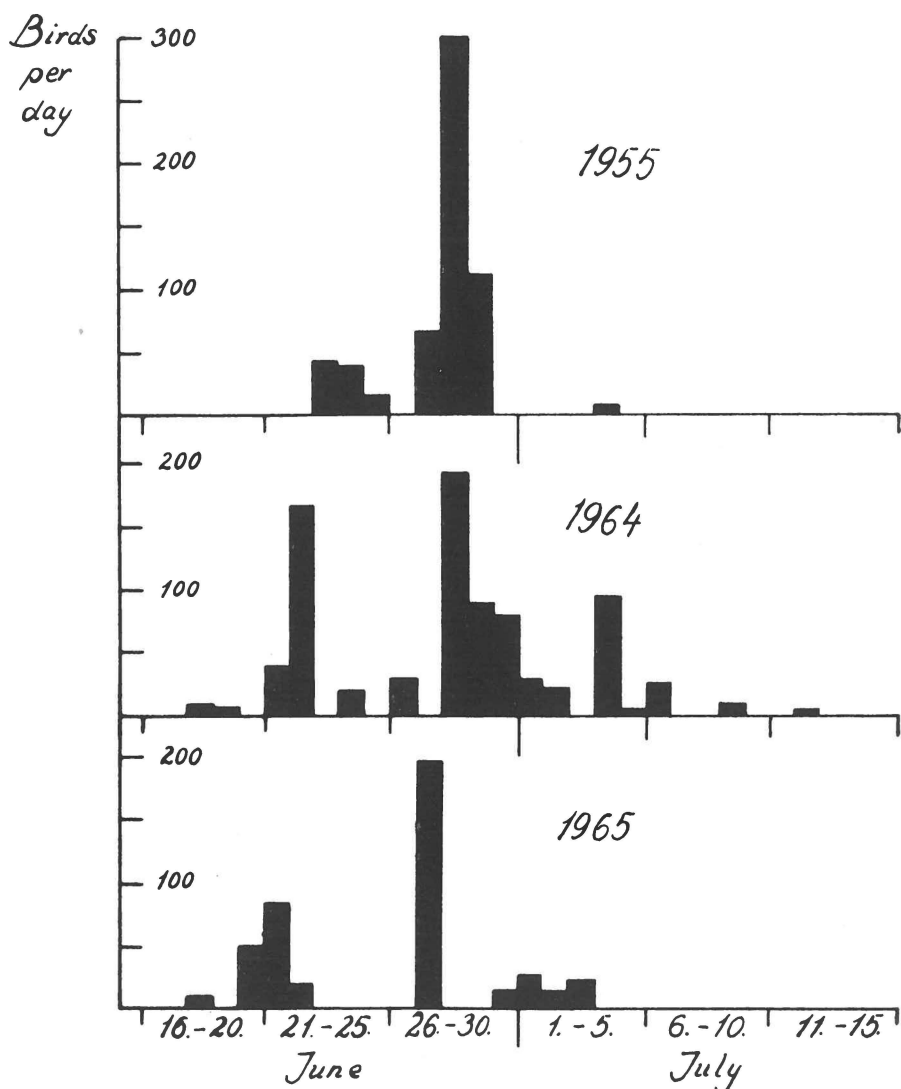


Fig. 10. Seasonal distribution of midsummer migration of Pinkfooted Goose flying northwards at Daneborg. 1955 (CONRADSEN 1957), 1964 (observation records of the expedition) and 1965 (JENSEN, *cf.* appendix I).

literature, together with a few recoveries, have corroborated this assumption. (CHRISTENSEN, 1967).

During a part of the time when the moulting-flight was taking place, two of the members were in the area around Storsletten, while the third was at Daneborg. Further information about the summer migration is obtained from CONRADSEN's observations in 1955, and from the previously discussed observations from Daneborg reported by IB JENSEN. The combined results from Daneborg are depicted in fig. 10.

The agreement among the different series of observation demonstrates that this is a question of a well defined migration season. It is also remarkable that the number of geese in the summer migration at Daneborg has been of the same order in 1955, 1964, and 1965. Finally, it should be mentioned that this number (5-700) is 4-5 times larger than the number for the spring migration at this locality (judging from experience in 1964, *cf.* table 1).

During midsummer the sun remains quite high in the sky at Daneborg, the clock round. It is interesting then to investigate whether the moulting migration progresses in the same degree for all hours. The hours of passage over the Daneborg vicinity of all the flocks in 1964 were noted. A comparative collection of the times is given in Table 2.

Being well aware that one risks registering the observer's activities rather than the course of the migration, the maximum is judged to be between the hours 11-17. As there is round-the-clock duty at the telegraph station, and constant meteorological observations, any "night-flights" could hardly have escaped our notice.

The destination of this moulting migration is not known in detail. The geese passing over Storsletten were mainly in purposeful flight northwards. On 29th June a flock of 49 geese was followed by binocular for 10 minutes, from the northcoast of Wollaston Forland. They flew towards the eastern tip of Kuhn Ø.

At the end of June about 100 Pink-footed Geese rested upon the snow-free areas of Storsletten, but our departure from this area occurred before the moulting migration was over, and before the birds really began to moult. Even though 90 % of the plain was still snow-covered as of July 1st, one week more of snow melting would certainly have been sufficient to uncover large areas able to feed many more geese throughout the rest of the summer.

On July 11 a compact flock of 130 moulted Pink-footed Geese were observed on the coast-plain at Zackenberg. They had surely arrived with the summer migration. They kept themselves clearly apart from the breeding pairs, and from the Barnacle Geese, of which there were breeding pairs as well as moulted flocks in the neighbourhood. The locality was a moss-grown coastal meadow. Besides the many freshly moulted flight-feathers found, there were year-old, and older, feather-remains half-buried in the moss, bearing witness to the fact that these same places are sought out by the moulting geese, year after year. At a similar locality at Kap Borlase Warren 8 moulted geese were seen on the 13th of July. A lake at the opening of Store Sødal, which was visited on June 17, was bordered by a similar mixture of year-old feathers and vegetation. The plain at Zackenberg, where the moulted Barnacle Geese resided (11th July), had a similar appearance.



The destination of the summer migration that passes the Daneborg area may very well be the suitable localities on Wollaston Forland, but many geese surely fly farther north, perhaps to Kuhn Ø and Hochstetter Forland. At the last-mentioned lowland area, ALWIN PEDERSEN states that there is a very large surplus of non-breeding Pink-footed Geese during the whole summer. At the same time, a surplus of non-breeding geese dominates at more southern localities, in July and August (CHRISTENSEN, 1967). This implies that the moulting region extends from Hochstetter Forland all the way to Scoresbysund; thus it is in keeping with the breeding region.<sup>1)</sup>

### **Pale-breasted Brent Goose** (*Branta bernicla hrota*)

The species' regular breeding region extends from about 80° N. Lat., northwards. From the turn of the century there is a report of a nesting site at Kap Borlase Warren (DEICHMANN, 1904), and the species was ascertained in the 20's breeding on Hvalrosø (LØPPENTHIN, 1932). The main migration to the North Greenland breeding grounds goes across the inland ice from Angmagssalik (FREUCHEN and SALOMONSEN, 1961), but according to PEDERSEN (1942), some Brent Geese can be seen in Northeast Greenland, especially in May and June, although mainly in the extreme coastal areas. No Brent Goose was observed by the expedition's members in 1964, but a member of the crew of Daneborg observed on June 17 two geese, which according to his description must have been Brent Geese.

### **Barnacle-Goose** (*Branta leucopsis*)

The species has been observed by previous expeditions breeding between Scoresbysund and Germania Land (70°-77° N. Lat.)—*i.e.* exclusively in the high arctic regions, which corresponds to the species' general distribution.

As the entire Greenlandic population of these birds spends the winter in Scotland and Ireland, one can arrive at an exact picture of its size. According to counts made in March 1961 and April 1962 (BOYD, 1963) the spring population consisted of 13-14,000 birds. If one assumes that the percentage of young birds is of the same order for the Barnacle Goose as for the Grey Lag-Goose (64 0/0, PALUDAN, 1965), then the number of breeding Barnacle Geese in Greenland is estimated at about 2,500 pairs. The number of pairs at known breeding grounds in the whole of Northeast Greenland runs up to a few hundred. There are, thus, large

<sup>1)</sup> During the summer of 1968 and 69 hundreds of moulting Pinkfeet have been observed at Germanialand (77° N. Lat.) (H. MELTOFTE, Feltornithologen 1970). (Note added in proof).

gaps in our knowledge of this species' breeding grounds, which was one of the reasons for carrying out the 1964-expedition

There is no estimate of the total breeding-population size in the area surveyed by the expedition. PEDERSEN (1934) tells of the species' being somewhat more numerous than in the southwards areas (Hudson Land), where it appears only rarely as a breeding bird. Various breeding places are discussed in the literature; these will be mentioned below.

PEDERSEN (1934) mentions 23rd-25th May as the time of arrival of the Barnacle Goose at breeding grounds around 74° N. Lat. In 1930 the first Barnacle Geese arrived on 18th May (GELTING, 1934). We encountered the first bird on 17th May. A presentation of the observations during migration is shown in Table 3.

Table 3. *Spring migration of Barnacle Goose (Branta leucopsis)*

Date	Daneborg	Other Localities
May 17	0	29
- 18	0	2
- 19	21	30
- 20	40	14
- 21	2	—
- 22	0	—
- 23	122	—
- 24	0	0
- 25	0	0
- 26	7	52
- 27	9	12
Total	201	139

The number of Barnacle Geese observed in spring migration. In the table the observations at Daneborg are entered separately. Among "Other Localities" most of the birds were encountered at Kap Breusing, as well as on Revet. The — sign indicates, that no observations were carried out.

Of the 340 birds entered in Table 3, 295 migrated northwards, 11 westwards, 15 eastwards, and 19 towards the southeast. In addition to the birds in passage, 106 resting birds were seen in the same period. Of these, 66 were encountered at Kap Borlase Warren on 21st May. After 27 May no birds in passage were seen. The arrival phase was thus shorter than for the Pink-footed Goose (Table 1).

#### The breeding population in the area

During our stay we visited many of the colonies mentioned in the literature. There is some uncertainty about the colony MADSEN (1925) calls "Goose cliff", but either Kap Mary or Basaltkap (southcoast of Clavering Ø) seems to be most likely.

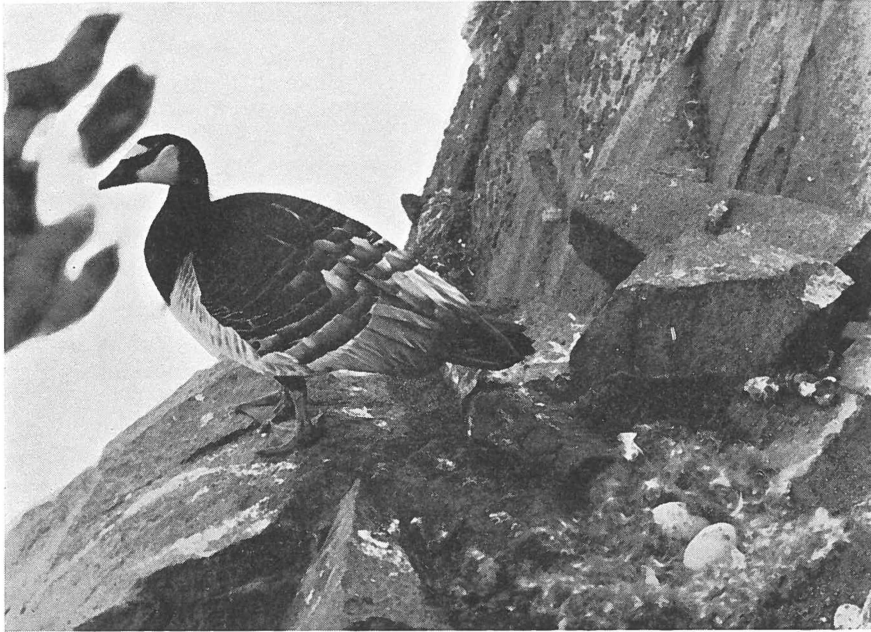


Fig. 11. Barnacle-Goose at the nest at Basaltø, Young Sund 6th June 1964. A comparison with the 32-year older photograph taken by ALWIN PEDERSEN (PEDERSEN 1934 p. 16) shows that the nesting site is exactly the same. B.G. phot.

If we consider all the available information, the following picture of the Barnacle Goose's breeding activities in the vicinity of Young Sund is formed.

- 1) Clavering Ø's northeast corner. The colony has not been mentioned previously. During our passage off the island on 1/6 and 10/6 in foggy weather, many geese were heard in the mountains. These mountains reach a considerable altitude, their highest parts consist of basalt formations facing east and northeast. On our visit 12/6 we observed 36 birds from our position on the fjord ice. They sat on shelves; because of the great distance we could only ascertain a single nesting bird. We estimated the colony at 20-30 pairs.
- 2) Basaltø. Visited 11/6 1932 (PEDERSEN, 1934) and then contained 36 nests. We visited the colony repeatedly between 19/5 and 1/7. The island slopes smoothly up from the south, and reaches an altitude on the north side of approximately 80 meters, where it terminates in a vertical cliffside. On 1/6 a total of 13 pairs were noted, some already nesting. On 21/6 only 6 pairs were brooding, but 1 or 2 nests had been destroyed (see later). On 1/7 only 2 pairs remained in the colony. The others had apparently completed hatching.

- 3) Kap Breusing. C. MADSEN visited this locality on 12/6 1923 and found 3 nests (MADSEN, 1925). We surveyed the locality on 17-20/5 and 1-2/6 after the birds' arrival. On the last-mentioned date we found 4 nests at a height of about 25 meters on the north side of the cape.
- 4) Kap Mary. According to the verbal account of ERLING PETERSEN (trapper in the area, 1947-48) 10-12 pairs nested here on the non-accessible shelves in June, 1948.
- 5) Dahls Skær. Visited several times June-July 1923 by C. MADSEN who found 20 pairs. A. PEDERSEN in 1932 reports 15 breeding pairs. E. PEDERSEN (cf. above) found only 2 pairs in 1948.
- 6) Kap Wynn. The sledge-patrol reported (1964) that geese had been seen at the place we visited on 7/5. The formations were thought to be well suited for Barnacle Geese.
- 7) Hvalrosø. The colony in 1932 consisted of 20-25 pairs (PEDERSEN, 1934). There are no later counts available from this locality.
- 8) Revet. JENNOV (1963) describes a little nesting site on Revet. During our stay at this place 25-27/5 no suitable breeding places were seen. 25-30 unpaired birds, and only 1 pair were ascertained.
- 9) Zackenberg. PEDERSEN (1934), MØHL-HANSEN (1949), and JOHNSEN (1953) tell of a colony near Zackenberg. The two latter authors mention the mountain Zackenberg specifically, but, despite our repeated presence in this area, with this data in mind, we found no breeding place. Our opinion is that this locality has been abandoned.

The literature suggests (MANNICHE, 1910) that large inland lakes are well-suited breeding places for the Barnacle Goose. We visited Store Sødal on 13-14/6, but saw no geese despite careful searching.

In the time from 30 June to 11 July, a total of 13 coveys of nestlings were seen in the Young Sund area, as well as 4 coveys farther eastwards at Kap Borlase Warren.

On the basis of the above outline that is based upon information from different years, an estimate of the population size in the area will be attempted:

For Young Sund the count in 1964 was about 30-40 pairs, distributed in 3 colonies. For Clavering Ø's southeast corner, the stock can, on the basis of old data, be set at 10-15 pairs in two colonies. The largest uncertainty involves the breeding stock in the extreme coastal area (Kap Wynn and Hvalrosø). There is scarce reason to suppose it exceeds 30-40 pairs. It is clear from the above that there are considerable fluctuations in the number of breeding pairs from year to year in a colony.

Because of the large discrepancy between the expected and known numbers of breeding pairs in Northeast Greenland, there is considerable interest in quantitative estimates of the breeding population of Barnacle Geese. It is surprising that a greater number of breeding geese were not found in the Young Sund area, especially as conjectures about the actual breeding population had hinted at considerably greater numbers (JENNOV, 1963). In this regard it is important that future estimates include only direct observations on the breeding place or of pairs with young. Too many indirect testimonies are founded upon estimates of the number of moulting geese, or even upon ascertainment of large amounts of excrement and moulted feathers, whereby there is a risk of confusion with the Pink-footed Goose. The counting of birds at the breeding grounds in the first half of the brooding time bears an inherent source of error, due to the presence of young birds in the colony.

In the opinion of the authors, the Barnacle Goose in Northeast Greenland is mainly found breeding in small colonies of 5 to 30 pairs. These can easily escape detection, not least because they are often placed so as to be inaccessible during the brooding period. One of the largest known colonies in Greenland is "Trekroner fjeldet" where MANNICHE in 1908 counted 150 birds (MANNICHE, 1910). If an assumedly large number of young birds are subtracted from this number, the colony can be said to have consisted of about 40 pairs. In 1939 the colony was scarcely larger than about 30 pairs (PEDERSEN, 1942).

### Non-breeding birds and moulting

According to our observations a considerable number of non-breeding birds resided in the colonies at the initiation of breeding. On Basaltø, which harboured 7-8 pairs, 20 birds were found 1/6, 47 on 6/6, about 40 on 8/6, and only 12 on 21/6 divided into 6 brooding pairs. Evidently the non-breeding birds left the colony in the period from 8/6 to 21/6. Later, Barnacle Geese were observed at moulting places. The following observations exclusively concern flocks of moulted Barnacle Geese:

30/6	6 + 28	in Lille Sødal
9/7	10 + 24	in Lille Sødal
11/7	30 + 56 + 26	at Zackenberg
13/7	24 + 40	at Kap Borlase Warren
15/7	12	in Lille Sødal

If one sums up the largest number from each locality, the collected number of moulting geese in the coastal area Zackenberg-Kap Borlase Warren is set at about 210 individuals. As, unlike the Pinkfoot, no moulting migration was observed, it is likely that these birds are iden-

tical with the non-breeders, who were present in the local colonies when nesting began. In this connection it must be mentioned that no moulting Barnacle Geese were observed on the northcoast of Wollaston Forland during the last half of June, and, particularly, none were seen on Storsletten. Neither were any colonies of the species encountered in this area.

An observation of a neck-banded Barnacle Goose in Lille Sødal shows that birds from more southerly stocks can be included in the area's population. The bird must be assumed as stemming from the Scoresbysund area where such markings are carried out (R. MARRIS, verbally).

### Notes on breeding

The egg-laying begins shortly after arrival at the nesting site. We observed, as mentioned, the first Barnacle Geese on 17/5, and on Basaltø on 1/6 we found a nest with 9 eggs.

On our first visit to Basaltø we frightened the brooding birds from their nests for the purpose of ascertaining the clutch-size. When we noted during a later visit that one or two of the broods counted were missing, we ceased our counting. The explanation of the eggs' disappearance supposedly is that the Glaucous Gull, which brooded in the colony, had emptied the nests before the geese had returned. When the geese are out foraging, they cover the eggs with the down from the wreath around the nest; this camouflage was so perfect that the nest was difficult to discover. We can report the following clutch-sizes:

Basaltø:	1/6: 9 eggs, 6/6: 5 + 5 + 2 eggs, 21/6: 2 eggs
Kap Breusing:	2/6: 5 + 4 + 2 + 1 eggs

As the clutches were not checked because of the circumstances mentioned above, it is of course possible that especially the small ones from 2/6 and 6/6 were not complete. The normal brood size is given (USPENSKI, 1965) as 4-5, and rarely as many as 7 eggs. PEDERSEN (1934), however, tells of many broods of 8 and 9 eggs, and one having 15 eggs. It is probable that these large broods stem from more than 1 bird.

On 30/6 the first nestlings were seen in Lille Sødal. Basaltø was visited on 1/7, and only two pairs still brooded. Immediately after hatching, the young were brought to areas with open water, as well as suitable foraging localities. Some of the colonies were placed so that the young had to be brought over considerable distances to the open water. Thus we repeatedly found, on Sandøen, Barnacle Geese with newly-hatched young, 10 km from the nearest colony.

The broods observed had the following sizes:

Number of young	5	4	3	2	1
Number of broods	2	5	4	3	3

### Greenland Falcon (*Falco rusticolus candicans*)

The Gyr Falcon is distributed throughout entire Northeast Greenland. MANNICHE (1910) reports a significant migration over Danmarks-havn in the autumn, and ALWIN PEDERSEN described the species breeding on Clavering Ø, having arrived there in April. For this reason we expected to encounter the Gyr Falcon often during early spring, but actually the picture was entirely different. We noted, at most, 5 individuals; one was seen 18th May at Herschellhus, one 25th May at Revet, and one 3rd June at Kap Breusing. In the same period, from 20th May to 7th June, there was frequently one in sight around the weather station Daneborg.

The occurrence of these birds coincides with the waders' migration, which perhaps ties in with the scarcity of Ptarmigan in 1964; however, we did not see Gyr Falcon prey upon waders.

On 30th June a Gyr Falcon was seen flying over Storsletten; it was attacked by a Long-tailed Skua.

### Greenland Rock-Ptarmigan (*Lagopus mutus captus*)

The species, according to MANNICHE (1910) and PEDERSEN (1942), is distributed throughout the entire Northeast Greenland, although with large variations in number, from place to place and from one year to another. The species seems to prefer the coastal areas in breeding time, as well as during the migration period. The northernmost regions of the land are evacuated during the dark season, and 75° N. Lat. is, according to PEDERSEN (1942), the limit of regular wintering. The return to the breeding grounds occurs early. The spring migration was thus completed in April in Germania Land (MANNICHE, 1910). At the time of the expedition's arrival in 1964 the passage of northern populations should, for the most part, have already taken place.

On 22nd April we observed 4 birds in flock at Kap Breusing, Clavering Ø. On the sledge-trip around Wollaston Forland a lone bird was seen at Zackenberg on 29th April, as were two flocks of 5 and 4 birds on Hvalrosø, 4th-6th May. All were in their pure-white winter plumage. No Ptarmigans in flock were seen subsequently.

On 12th May a pair was seen at Henningelv, Clavering Ø; the female was in the first phase of moulting. On Revet a male was seen 26th May, and on 29th May a male, 400 meters up on Zackenberg, was en-



Fig. 12. Male of Rock-Ptarmigan in initial summer moulting, Daneborg 20th June 1964. At this time the moult of the female was nearly complete. B.G. phot.

countered. On the 1st and 13th of June the call of the Ptarmigan was heard at the northeast coast of Clavering Ø. A lone pair was observed in Store Sødal on 14th June, and at least two pairs were localized in the neighbourhood of Kap Schumacher on the northcoast of Wollaston Forland, on 21st-23rd June. The females of these two latter-mentioned pairs had nearly full summer plumage, while the males were in the first phases of moulting, with single black feathers on the crown and nape of the neck, and an otherwise yellowish-white plumage. At the same place were found remains of a female Ptarmigan, supposedly a victim of a Gyr Falcon. No Ptarmigan were seen in the Albrechts Bugt area. Thus a maximum of 6 Ptarmigan pairs was observed in the large areas outside Daneborg covered by our expedition from May to June.

More Ptarmigans were observed in the vicinity of Daneborg than other places, possibly as a consequence of our greater excursive activity



in this area. The species was initially encountered here on 12th May; it was a pair, and the female displayed the beginnings of summer plumage. On 20th May the females' moulting had progressed extensively, and on 4th June the males' plumage was speckled black.

During the first half of June Ptarmigans were seen often in the neighbourhood of Daneborg. The males' courtship flight was seen now and then; 4 pairs were localized in an approx. 3 km<sup>2</sup> area. Each pair could be distinguished by its individual moulting pattern. On 30th June the first and only nest was found 1 kilometer from the station. It contained 6 eggs. On 1st July the nest was plundered, presumably by the Arctic Fox. The only observation of Ptarmigan at Daneborg in July was a male on 5th July. It seems unlikely that the birds had departed from the area at this time. The variations in the number of observed birds must presumably be due to a change of behaviour, which can be summarized as follows: In the last part of the migration season the birds led a rather unconcealed existence, and still during the females' moulting period moved about quite conspicuously, often in pairs; in July, when most of the females supposedly brooded, the males adopted more secretive habits.

### **Ringed Plover** (*Charadrius hiaticula hiaticula*)

The Ringed Plover is both abundant and widely distributed throughout entire Northeast Greenland. The greatest breeding density occurs, according to PEDERSEN (1934), in Hochstetter Forland (10 pairs per square kilometer).

The Ringed Plover was first observed on 19th May at Herschellhus (4-6 birds). The species was seen from 23rd May at Daneborg, and was numerous on Revet 25th-26th May, where up to 70 birds were seen, as well as at Zackenberg, visited 28th-29th May. The first observation in Peary Land in 1964 was 28th May (RØEN, 1965).

The birds spent the first days upon the snow-free grassy surfaces, where their behaviour differed noticeably from the other waders in that they dealt up the grassy areas into territories. From the first day aggressive encounters among members of the species were noted, and the birds were in constant action, pursuing each other. On 19th May the first 4 birds who arrived in the "delta" east of Herschellhus were seen in aggressive postures with lowered forebody, raised back-feathers, and spread tail, all accompanied by strong vocal utterances. The "butterfly"-flight with stiff wings was seen 2-3 times. At the same time Ringed Plover were seen in small flocks, *e.g.*, on Revet and Zackenberg. The dispersion from the arrival-terrain to the more poorly vegetated breeding grounds progressed according to the melting of the snow. In Lille Sødal the Rin-

ged Plovers had settled in their breeding grounds about a week before the Sanderlings. Ringed Plovers were observed more sporadically in Store Sødal, Lindemansdalen and on the snow-covered northcoast of Wollaston Forland.

During breeding time the species was present most numerous along the southcoast of Wollaston Forland. The birds preferred the most graveled and barren plateaus, where several line surveys revealed a density of 1-2 pairs per kilometer. On the basis of the birds' noisy behaviour one is liable to conclude that these numbers probably represented quite well the actual situation. A total of 10 pairs was localized on a 5 km stretch of sandy beach at Herschellhus, on 13th July. The species was not seen on Sandøen, nor on Storsletten, which was the preferred territory of the Sanderling.

17 pairs were localized in the neighbourhood of Daneborg. They resided in the bedrock region as well as on moraine surfaces. This yields a density of 6 pairs per km<sup>2</sup> (*cf.* p. 76). This is presumably a maximum number in that certain late localized birds could have been pairs that had changed their habitat after having had their broods destroyed. 7 nests were encountered in the area, from 22nd June, all with complete broods. One had only 3 eggs. Many of these nests were, at a later check, found to be empty, and with no young noticeable. Only in one case were young noted at all (11th July). A single nest with 4 eggs was encountered outside the Daneborg area on 28th June in the slate mountains east of Storsletten. The place was at an altitude of 120 meters, and the breeding biotope was a gravel of slate flakes with a very sparse growth of grass.

The winter home of the Northeast Greenland Ringed Plover as for most of this region's wader-populations, is in the Old World, and is thought, for this species, to be in tropical Africa (SALOMONSEN, 1950). A ringed bird which was collected at Mestersvig at the request of the expedition on 21st July proved to have been ringed in Senegal on 22nd October, 1958. (Bulletin, 1964).

### **Turnstone** (*Arenaria interpres interpres*)

The Turnstone is described as a common breeding bird throughout entire Northeast Greenland. It is most numerous between 70° and 77° N. Lat. (PEDERSEN, 1942). There is no information available from the literature as to the species' breeding distribution, especially with respect to Wollaston Forland.

We first encountered the Turnstone on 18/5, when a single bird was seen at Daneborg. On the following day 4 birds were seen here, and 2+9 were observed in the "delta" east of Herschellhus. The flock of 9,

which presumably was noted just after the birds' arrival, flew about within the delta twittering loudly. None was seen at this locality on 20/5, but on 21/5 27 birds were seen. This flock contained 5-6 ♀♀, judging from the plumage.

The arrival occurred one week earlier in 1964 than in 1932 on Clavering Ø (PEDERSEN, 1934). The Turnstone arrived in Peary Land in 1964 on 25/5 (RØEN, 1965).

As the species did not breed at Daneborg, the daily count from here gave an impression of the period before the birds sought their final breeding ground.

#### May

18th	19th	20th	21st	23rd	24th	25th	26th	28th	29th	30th
1	4	4	9	12	6	6	14	6	40	70

#### June

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	19th	28th
70	70	80	50	60	40	40	40	20	5	1

#### July

4th
3

At Revet 25/5-27/5 up to 26 birds were seen, and among the greater concentrations a total of about 120 birds in the banks of seaweed at Herschellhus on 8/6 can be mentioned. From 11/6-14/6 up to 25 birds were seen at Zackenberg, whereafter the Turnstone disappeared from this region.

From the above data it appears that the species gathered in small flocks about 10 days before commencement of the main migration. This also lasted for about 10 days, but long afterwards lesser numbers could still be seen; they left the resting places more than a month after the first birds' arrival.

During the migration period the species was often seen in flock with Sanderlings. A characteristic of the Turnstone was its pronounced predilection for the garbage dumps at Daneborg. The Turnstone was also observed feeding on years'-old muskox carcasses, as well as among the abandoned provisions of the Peary Land expeditions, 1947-1949 (southern base camp at Zackenberg).

After the arrival period non-breeding birds were seen occasionally at Daneborg. On 10/7 a flock of 7 birds were seen 15 km north of Daneborg, and at Herschellhus 30 birds were seen on 13/7.

In contrast to the species' abundance during the arrival phase, the Turnstone appeared only sporadically and was few in number as a breeding bird in the surveyed portions of Wollaston Forland. At only one place,

the patterned ground areas at Albrechts Bugt, could the species be described as common. In this locality in a 1-2 km<sup>2</sup> area 7-8 pairs were noted displaying intense breeding restlessness. On 25/6 a nest with 4 eggs was discovered here. This represented the only nest of this species found by the expedition. The Turnstones at Albrechts Bugt chose somewhat more richly vegetated areas than the Sanderlings, and dwelled only very close to the coast, or in the areas of the hills which had most recently become snow-free.

On our journeys through Storsletten, 30/6 and 1/7, an area in which the Sanderling was the characteristic bird, no Turnstones were seen.

Along an approximately 25 km long stretch between Daneborg and Herschellhus, on the southcoast of Wollaston Forland, none of the Turnstones observed on 12th-14th July displayed any breeding restlessness. Considering the noisy behaviour of this species at its breeding grounds, it is hardly likely that many breeding pairs could have escaped our notice.

On the coastal plains between Lille Sødal's western opening into Young Sund and Zackenberg, a distance of about 20 km, 3-4 nervous pairs, possibly breeding birds, were encountered on 10th-11th July. In a way similar to the situation at Albrechts Bugt, the areas close to the coast, with their somewhat richer growth of grass and *Cassiope*, were preferred.

Except for the previously mentioned encounters with Turnstones in flock during the first half of July, no conditions were noted which could suggest that 1964 was a non-breeding year for this species. It seems therefore natural to conclude that the Turnstone does not breed frequently in the areas surveyed by the expedition.

At many of the localities in Germania Land visited by MANNICHE the frequency of the species is considerably higher than ascertained at Wollaston Forland in 1964. The bird is found there, moreover, on fell fields at a great distance from the coast. PEDERSEN (1934) states a density of 5 pairs/km<sup>2</sup> on Hochstetter Forland. It is however, not specified whether this number refers to the count at typical breeding localities, or to the area as a whole.

### **Knot** (*Calidris canutus canutus*)

The breeding Knot in East Greenland is considered as having its habitat in all suitable localities from Scoresbysund to Peary Land (SALOMONSEN, 1950). Within this region the species seems to be very unevenly distributed. Manniche found about 30 pairs in 1907 and 1908; they resided on an approximately 10 km long stretch of land from Stormelv to Snenæs in Germania Land (MANNICHE, 1910). Although the be-

haviour of these birds indicated that they were breeding, no nests were found. Outside the mentioned area the species was only rarely observed; it was never ascertained on the sledge journeys in 1906–1908. PEDERSEN (1934) describes the species as a numerous breeding-bird in Hochstetter Forland, with a density of 3 pairs per km<sup>2</sup>. Its occurrence in regions south of Hochstetter Forland is described as very irregular. The same author (PEDERSEN, 1942) noted the species in 1939 in Germania Land as being more frequent there than at any other place in Northeast Greenland. The first nest-find of Knot was made as late as in the 30's by the trapper JOHN GJÆVER in Peters Bugt, Hochstetter Forland (PEDERSEN, 1934). LØPPENTHIN's stay in Northeast Greenland in 1930 took place too late to expect any nest-finds; however, during the last days of July, coveys of fledgling Knots were seen in the moorlands at Loch Fyne, Hudson Land. (LØPPENTHIN, 1932). In contrast to the above-mentioned sparse reports of breeding encounters is the report of BIRD & BIRD (1941) describing the species as "a very common breeding bird over the whole of the Northeast Greenland". This statement is based upon a total of 8 nest-finds at Myggbukta, Hold with Hope, and Peters Bugt in Hochstetter Forland. It seems proper, on the basis of the above, to assume that the Knot's occurrence is considerably more sparse and sporadic than that of the Sanderling. There is no available information on the Knot's occurrence on Wollaston Forland.

In 1964 the species arrived a week after the other waders. It was observed simultaneously by two groups, one at Daneborg, and one at Revet. At the latter site the call of the Knot was first heard on the evening of 26th May. A flock of 7 birds was seen landing on the mountain slope a couple of hundred meters above the ice-bound fjord. From here they performed flight manoeuvres in great circles, at a considerable height. The song-flight was included in the ordinary flight and was initiated by a climbing flight path, followed by a short flight on quivering wings. After this phase, the flight became a gliding on stiffened wings, and during this phase the song was heard, initiated by a few isolated calls resembling the ordinary flight call, followed by a gradual transformation into a number of whistling sounds having a quality not unlike the call of the Curlew (*Numenius arquata*). The far-reaching song and the accompanying flight was one of our most beautiful experiences in Greenland's landscape.

At Daneborg too, the song was noted on the first day (26/5). The call was heard often during the following days, but only fragments of the song. After 27/5 the Knot was seen in increasing numbers, culminating 3/6 when over 150 birds, divided into two flocks, were seen in the Daneborg area. Some of these birds were seen migrating; a few were headed in a southerly direction.

According to the literature the species arrives in Northeast Greenland around 1st June. Whereas the arrival of the other waders in 1964 occurred about a week earlier than previously ascertained, the Knot arrived at the usual time. In 1964 the arrival at Peary Land (RØEN, 1965) and at the Thule area (FERDINAND, pers. comm.) coincided with the arrival at Wollaston Forland.

The Knot was mainly seen in flocks which kept apart from the other waders, partially at greater heights of the sparsely vegetated stone-flats. The song too, took place in flock, or when a bird temporarily parted from the flock to carry out its song-flight at a great height above the terrain. The marked flock behaviour does not correspond to MANNICHE'S (1910) observations which tell of the birds arriving at Danmarkshavn in pairs, conducting themselves pair-wise, and displaying territorial behaviour from the first day. On the other hand, the flock pattern is described by PEDERSEN (1942), who in 1939 (a non-breeding year) observed the species' late arrival at Germania Land. The birds here kept themselves in flocks of 15-20 individuals, restlessly flying about. Not before the last half of June did the flocks gradually begin to pair.

It is not known whether the species' flock-behavior in 1964 was due to a lack of breeding-stimuli caused by climatic factors. There is also the possibility that Wollaston Forland normally is not a breeding ground for the Knot.

After the large migration of the first days of June, only a small number of birds were seen. In the Daneborg neighbourhood from 6/6 to the time of our departure on 10/6 about 10 birds were seen daily. On our return to Daneborg, 17/6, the birds had gone. On 12/6 at Zackenberg, 9 birds were seen. A lone bird was encountered 18/6-19/6 at Lindemans Fjord. Flocks of 11, 4 and 3 birds were seen on Storsletten at the close of June. Finally a bird was seen on 13/7 on the beach at Kap Herschellhus.

The Knot was not observed breeding on Wollaston Forland in 1964.

### **Purple Sandpiper** (*Calidris maritima maritima*)

The species' area of distribution is mainly in the low-arctic region. As a breeding bird the Purple Sandpiper is regularly found in the Angmagssalik District, and has been encountered nesting in inner Scoresby Sund (SALOMONSEN, 1950). Observations of young birds in the beginning of August are proof that the species has bred on Clavering Ø, as well as Hochstetter Forland, (PEDERSEN, 1934). Finally, in the Zoological Museum in Copenhagen, there is a ♂ shot on its nest on Sabine Ø, 30/6, 1919 (SALOMONSEN, 1950).

Without there having been any indication of breeding, the Purple Sandpiper has been observed relatively often in the area surveyed by the expedition (see LØPPENTHIN, 1932).

The species was seen only once in 1964. It was a bird foraging together with other waders in the seaweed banks at Herschellhus on 8/6.

### **Schiøler's Dunlin** (*Calidris alpina arctica*)

PEDERSEN (1942) describes this form as a breeding bird between 70° and 78° N. Lat. Around Hvalrosodden in Germania Land he observed Dunlin in greater number than at any other region in Northeast Greenland. Also MANNICHE (1910) found the species to be numerous in the area of Danmarkshavn. More southerly, on Hochstetter Forland, Wollaston Forland, and Clavering Ø, the species is described as less abundant (PEDERSEN, 1934). As pointed out by MANNICHE, the Dunlin's preference during the arrival phase, as well as during breeding, is for moist, relatively richly vegetated biotopes. As a result the bird is distributed unevenly.

From the very beginning the species in 1964 chose the damp meadows that were, upon arrival, just becoming snow-free. The arrival occurred at the same time as the Sanderling's. A flock of 10 Dunlins was seen in the "delta" east of Herschellhus, 19/5. Within this first flock a great variation was noted with regard to the extension of the breast-patch, which for some of the birds was only faintly pronounced. During the following two days the number at this locality had grown to 18.

On 25/5 and 26/5, 30-40 Dunlins were observed on Revet foraging in small flocks. They were seen in damp meadows up to a height of 3-400 meters. Food was apparently to be found in moss-mounds which were persistently reconnoitered. Dunlins were the dominating waders in the Zackenberg vicinity during migration (about 100 birds on 28/5). The arrival date 19/5 is earlier than previously reported. PEDERSEN (1934) reports 25/5 (1932) and 27/5 (1933) as the first arrival for Clavering Ø and Hochstetter Forland, respectively.

It was an exception to see Dunlins in the mixed flocks of Turnstones and Sanderlings, as the latter search for food at the edge of the melting snow.

As early as 19/5 short song-fragments were heard at Herschellhus, and on 28/5 Dunlin-song was heard at Zackenberg. From 1/6 the song of the Dunlin was heard daily at Daneborg.

In the bedrock regions of the weather station there were many meadows and bogs. In these relatively small areas one encountered several Dunlin-pairs. On 4/6 nidification was observed, and the birds

were seen pursuing each other in the air and on land. During the breeding period in the Daneborg neighbourhood, we localized 7 Dunlin pairs, corresponding to a density of 2 pairs/km<sup>2</sup>. As their presence is limited to the marshy areas, it is perhaps more informative to state that we did hardly find any suitable areas that were not occupied by the species. Despite the fact that we constantly observed the birds, most frequently in pairs, we only succeeded in finding the nests or young of 5 pairs.

Nests with eggs were found from 23/6 to 11/7. The first observation of newly hatched young was made on 6/7. The hatching was followed in one of the nests: On 12/7 cracked eggs were noted; on 14/7 at 10 a.m. the nest contained two eggs and two young, and, at 12 midnight four young, of which the last was not as yet dry.

Two line-surveys on 11/7-12/7, between Zackenberg and Lille Sødal's entrance, revealed a total of 4 breeding pairs over a stretch of about 4 km, and about 5 breeding pairs over a stretch of about 7 km, both in bog biotopes. At the other localities visited the species occurred very sporadically. In the areas at Albrechts Bugt preferred by the Sanderling, no Dunlin was seen at all. On the coastal plain along Young Sund from Daneborg to Herschellhus, the species was represented only occasionally along brook-beds. Thus 2 pairs displayed breeding restlessness at the mouth of a brook between Lille Sødal and Blæsedalen on 14/7. On the plain at Kap Berghaus 1-2 pairs bred, and a nest with eggs was found there on 8/7.

In the breeding-season we saw no indication of flock-formation of Dunsins, with the exception of 7 birds on 11/7.

The Dunlin breeds in Greenland only on the eastcoast. The Northeastern Greenland population is referred to the subspecies *Calidris alpina arctica* (SCHIØLER, 1922), while the form breeding in Southeast Greenland belongs to the southern race, *Calidris alpina schinzii*. SCHIØLER's Dunlin migrates to Europe, and occurs regularly on migration in Iceland. However, very little is known about its wintering regions (NØRREVANG, 1955). A nestling ringed on 6/7 at Daneborg by the expedition was recaptured in 1965 in France (SALOMONSEN, 1967 a). There have been, up to the present, 4 recaptures in France during migration, which fully confirms that the Northeast Greenland subspecies migrates to the Old World (SALOMONSEN, pers. comm.).

### **Sanderling** (*Calidris alba*)

The Sanderling is distributed on the eastcoast from Scoresbysund in the south to Peary Land in the north. In many regions it is said to be the most frequent wader (LØPPENTHIN, 1932, PEDERSEN, 1934). The



species attains its greatest population density on the flat Hochstetter Forland, according to the latter author, who sets the number of pairs per km<sup>2</sup> at 10.

The Sanderling's arrival at Wollaston Forland occurred at the end of May, from 20/5, when two individuals were seen on the beach east of Herschellhus. Already on the next day, 21/5, 11 birds were spotted at this locality. In this period, as previously mentioned, the greater part of the coastal plains on the peninsula were still under snow. Over a stretch of 5 kilometers from Herschellhus eastwards, there were melt water pools everywhere, and the birds occupied exclusively a 2-3000 m<sup>2</sup>, mainly snow-free, area. The biotope here was a beach meadow with small mud-holes among expanses of short grass.

During the days of the Sanderlings' arrival the maximum temperature at Daneborg was 0-2° C and the minimum temperature varied between -4° to -5° C.

The Sanderling arrived at Germania Land 2/6 1907 and 28/5 1908 (MANNICHE, 1910). ALWIN PEDERSEN sets 16/5 1928 and 2/6 1929 as the arrival dates at the Scoresbysund area (PEDERSEN, 1930). Some additional data: 28/5 1932 at Clavering Ø and 28/5 1933, at Hochstetter Forland (PEDERSEN, 1934), and 23/5 1922 and 27/5 1921 at Hudson Land (SALOMONSEN, 1950). As can be seen from these data the Sanderlings' arrival at Wollaston Forland in 1964 took place earlier than previously observed. The species arrived at Peary Land, 8 degrees of more northerly latitude, 14 days later in 1964 than at Daneborg (RØEN, 1965).

On Revet 36 birds were observed from 25-27/5. At Zackenberg on 28/5 only a few birds were seen. This last area hardly played an important role as a resting place for the Sanderling during its migration.

At Daneborg and at Kap Breusing Sanderlings were seen headed north in small groups up to 20 individuals as well as individually. At no time were large flocks noted, and it is likely that migration over the North Atlantic occurs in small groups.

On the terrain around Daneborg only a few solitary birds rested during the first week following the early birds' arrival. On 1/6 the number had increased to 30, a number that was maintained somewhat unchanged for some days until it fell to 10 on 7/6. Small flocks of resting Sanderlings were seen during the first half of June. On 8/6 10 Sanderlings were seen on the previously mentioned marshy biotope at Herschellhus. An additional 30-40 birds were seen together with a greater number of Turnstones, frequenting a year-old seaweed-bank. From 10-12/6 solitary birds were seen foraging together with Turnstone, at the cottage at Zackenberg. But from 12/6 the birds were no longer to be seen here.



Fig. 13. Sanderling foraging at the edge of the melting snow. Daneborg 26th May 1964. B.G. phot.

For comparison, the observations from Peary Land the same year can be mentioned (RØEN, 1965). Here the Sanderling's resting places were at river estuaries, and these were deserted on 15th June. The main migration of Sanderling in the Daneborg area occurred at the same time in 1964 as the arrival of the first birds at Peary Land, where the species at Jørgen Brønlund Fjord was abundant from the first day of observation. Perhaps the forerunners of the main migration at Daneborg constitute a part of the local population, while the northern breeding birds arrive at Greenland at a later date.

During the first days of their stay on Wollaston Forland no indications of pair formation were observed. Coincidental with a rise in the number of Sanderlings appearing in flock, and the increasing snow melting, a dispersal occurred. We noted birds in pairs establishing themselves in pairs in newly-thawed, stoney areas around the station, where the vegetation was sparse. Foraging on the somewhat damper mossy fields still went on.

Courtship display was observed initially at Zackenberg on 1/6, when 6 birds were seen pursuing each other, and fragments of the song-flight were observed. From this day on we often had the opportunity of seeing and hearing the more or less developed display. This is performed at low heights, from 1-2 up to 10 meters above the ground. It is carried out on stiff, down-bowed, trembling wings, in slow, straight or curved flight paths, while a croaking sound is produced. At the end of the play, which usually lasts a few minutes, the bird lands, still with wings trembling, and the sound becomes a snipe-like braying. A variation of this was observed at the breeding grounds at Albrechts Bugt, where the fully developed flight was carried out without any vocal utterances.

The Sanderling is probably one of the most common breeding birds on Wollaston Forland, although it is not evenly distributed. In the interior, high-lying portion of the land, the snow melted so late that these areas could hardly serve as breeding sites to any great degree. This also applied to the greater part of the peninsula's northcoast from Lindemansdalen to Storsletten. On the large, snow-free areas in the highlands east of this plain no Sanderlings were seen. The species' sparse occurrence in the Zackenberg neighbourhood was striking, as this area harboured a large population of other birds.

The biotopes common to the areas in which the birds were breeding, were dry expanses, sparsely vegetated, and with some damper sections that served as foraging sites. The Sanderling was most numerous on the low-lying, clayey Storsletten, and on the lowest part of the hills to the east (*cf.* fig. 20). Within a 0.5 km<sup>2</sup> area of these ridges 6-7 presumably breeding pairs were counted. The nests of three of them were found. We obtained an impression of the density on the plain itself when we crossed the area from north to south on 30/6 and 1/7. Even though most of the plain was still under snow, we encountered snow-free "islands", nearly all of them occupied by Sanderlings. 20-30 pairs of Sanderlings were encountered on an approx. 30 km long route through this landscape.

About 60 km<sup>2</sup> of the traversed plain appeared quite homogeneous, and from the line-survey estimate we calculate the density of Sanderlings within this area at 3-6 pairs/km<sup>2</sup>. This linear survey took place during the beginning of the breeding season, and it is possible that the area harboured more birds later on. Apparently the Sanderling was the only wader breeding on the plain.

Along certain coastal plains of Young Sund the species was similarly numerous. Repeated linear surveys during the first half of July set the number of breeding pairs at about 1-2 pairs/km<sup>2</sup>. Another characteristic bird of this region was the Ringed Plover. A comparison between the frequency of Sanderlings and Ringed Plovers in a given area must take

into consideration that the latter's more noisy behavior can give an incorrect impression of this ratio, tending toward an underestimation of the Sanderling count.

In the bedrock region at Daneborg a total of 4 pairs were localised within an area of about 3 km<sup>2</sup>. The Sanderlings here were rather shy, and despite prolonged observations only 1 nest was found.

As mentioned above, several pairs were found on the low hills at Albrechts Bugt. The birds here were very active, and were often heard singing, and seen chasing each other. At the nesting-sites the birds stole quietly about on the ground. On 25/6 two nests were found here; they contained 3 and 4 eggs. Both nests were situated in patterned ground area with low mound-like growths of grasses. The nest-hollows mainly contained withered willow leaves. During an approx. 3 hr. long observation period near the 3-egg nest, a constant vocal communication between the two mates was noted. These two were slightly different in appearance. At short intervals the non-brooding bird, who was loitering close by, landed and tempted the brooding bird away. They both withdrew for a brief moment, presumably to search for food, and shortly afterwards the brooding bird returned. The eggs were exposed 11 times during the observation period, from 1/2 to 7-8 minutes at a time, a total of 44 minutes during the 3 hours. Only one of the mates was seen brooding in this case, whereas foraging occurred by pair. When we approached the nests, the brooding bird performed a distraction display with creeping movements, tail depressed and spread, ruffled back feathers, and lying down with wings spread out. They were however, not especially shy, and resumed brooding, even when one stood in full view a few meters from their nest. The brooding continued despite a few days with especially bad weather. On 27/6 a bird was seen lying half buried in snow on its nest during a protracted snow and sleet storm. On 29/6 a third nest at the locality at Albrechts Bugt was found. It was situated like the others, on the bare ground, and contained 4 eggs. On the same day a check showed no change in egg number in the 3-egg nest.

A nest at Daneborg on the coast, containing 4 eggs, was found on 29/6. The nest-hollow was situated in an area with sparse grassy vegetation, and consisted of a depression with withered willow leaves, as on Storsletten. The birds at this nest were quite shy; they often left the eggs before we approached within 100 meters. On 14/7 the nest still contained 4 eggs.

Solitary coveys of nestlings were found along the coastal plain of Young Sund; on 12/7 at Kuplen, and on 13/7 between Blæsedalen and Lille Sødal. At both places the coveys consisted of 4 young. On 14/7 a single nestling (probably the whole brood) was found at Daneborg.

At this time the Sanderling again let its presence be more easily known to the eye and the ear. They behaved very uneasily in the presence of their young. Most often two old birds were seen together displaying restlessness, but in many places there was only one bird in sight, and in others, where both mates showed alarm, one was consistently more restless than the other. It looked as if care of the tiny nestlings can be attended to by both mates but mainly is left to one, according to PEDERSEN (1934), the female. A ringed bird that was shot on 15/7 (Jæren, 13/9 1960, *cf.* BERNHOFT-OSA, 1965) proved to be a ♂ in an especially well-fed condition and with pronounced incubation-spots.

At the time when nestlings were being noted, small flocks of Sanderlings appeared on the coastal plains and in the fell fields. This condition has been noted and discussed by both MANNICHE and ALWIN PEDERSEN. It is not known whether these are non-breeding birds, or individuals that have already left the care of young to their mates.

Dimorphism among the Sanderlings has been discussed by earlier authors (MANNICHE, 1910 and PEDERSEN, 1942). Such a phenomenon can hardly be satisfactorily elucidated on the basis of observations in the field, but some individual colour variations were detected: from birds with a dark, nearly bronze-coloured head, and a throat well-defined against the underside, to light, grey-brown birds, with indistinct markings on the throat. One had the impression of a gradual variation rather than a true dimorphism.

### Grey Phalarope (*Phalaropus fulicarius*)

The species appears on the eastcoast of Greenland, for the most part in the high-arctic regions, between 75° and 77° N. Lat. It is, however, absent from large expanses within this area (PEDERSEN, 1942). Where suitable biotopes are available the Grey Phalarope is found breeding in quite large numbers at certain sites, *e.g.* at Myggbukta, Hold with Hope (BIRD & BIRD, 1941) and at Danmarkshavn (MANNICHE, 1910). ALWIN PEDERSEN (1934) mentions the species as breeding at nearly all the ponds in Hochstetter Forland, as well as at Wollaston Forland and Clavering Ø, and Hudson Land. He does not, for these latter areas, specify more exactly the locality or count. The same author later (1942) cites the species as a regular and frequent breeder on Shannon Ø, Hochstetter Forland and in Germania Land. Among the more detailed data available concerning the areas covered by our expedition, are the following: LØPPENTHIN, 1932—the species observed in Young Sund, 14th and 18th July, 1930. JOHNSEN, 1953—one male shot in Lindemansdalen, 27th July, 1947.

The 1964-expedition's experience with this species was very slight. On 12th-14th June, a female was seen in a small lake near the Zackenberg estuary. During our visit 11th July two females were seen at the same place. On 28th June 2 birds were seen in passage over Storsletten, heading in a northeast direction.

On 13th July an anxious male was observed in an overgrown bog hardly larger than 100 m<sup>2</sup>, in the delta-biotope east of Herschellhus. After a short search, 3 nestlings were discovered concealed among the moss mounds. Our attempt to capture these young which were only a few days old, revealed their excellent swimming abilities. The male stood by or flew about, calling plaintively. A female, drawn by the activity, flew onto the scene for a brief moment, then disappeared again.

As previously mentioned, only few sites on Wollaston Forland could serve as proper breeding biotopes for the species. The density of the species, even under more favorable climatic conditions, would hardly be especially great in the areas surveyed by the expedition.

### **Red-necked Phalarope** (*Phalaropus lobatus*)

The breeding grounds of this species are for the most part in the low-arctic region. In the Scoresbysund area the Red-necked Phalarope is a regular breeding bird, though few in number (SALOMONSEN, 1950). In 1932 the species was breeding in Hudson Land; ALWIN PEDERSEN observed two young birds at Kap Stosch (PEDERSEN, 1934). BIRD (1941) found the species to be common at Myggbukta, and Hold with Hope; he cites Herschellhus as the probable northern limit (no data is presented concerning the latter locality). SALOMONSEN (1950) points out that neither NATHORST nor KOLTHOFF, at the turn of the century, observed the species at the above-mentioned locality in Mackenzie Bugt and attributes this altered state to the improvement of climate.

The Red-necked Phalarope has been found north of the mentioned breeding grounds. In 1932 one bird was collected on Sandøen in Young Sund, and SALOMONSEN (1950) mentions a number of specimens collected in 1921 at 74° N. Lat., together with one bird shot on Shannon, likewise in 1921.

In comparison to the previously quite sparse occurrences, in 1964 the species was frequent in Wollaston Forland. On 8th June 2 + 1 birds were seen in a little water hole east of Herschellhus. At this same site breeding Grey Phalarope was ascertained later, but no Red-necked Phalarope was seen here again.

On 11th June-15th June up to 3 pairs were seen at the same time in the Zackenberg area. The birds were seen in an area with many melt-water pools lined with grass and moss. The birds dwelled in pairs in

these waterholes. Copulation was observed, and flights with the characteristic wing-flapping were seen repeatedly. As this particular locality was not visited later, breeding cannot be excluded; however, the biotope may have been suitable for a short time only.

On 11th July 1 female and 1 pair were seen in waterholes east of Zackenberg. They displayed no signs of having broods close by.

Regardless of whether the species did breed in 1964, or whether it was just a question of an prolonged migration without breeding, the relatively many birds sighted, and their observed conduct in pairs, suggest that the species' expansion into North Greenland still continues. In agreement with this are the extremely northern observations in Peary Land in 1963 and 1964 (RØEN, 1965).

### **Arctic Skua** (*Stercorarius parasiticus*)

This Skua species is found breeding at various places between Scoresbysund and Hudson Land, but at no place within this area can it be said to be a common breeding bird. Outside this area the species appears sporadically, having been observed as early as 1899 by NATHORST at Wollaston Forland. In 1930 broods were found at Kap Stosch (LØPPENTHIN, 1932). Furthermore, a few pairs have bred at Loch Fyne, Sandodden (now Daneborg) and at Peters Bugt (southern Hochstetter Forland) (PEDERSEN, 1934). Finally, JOHNSEN (1953) observed an old bird accompanied by a young bird at Zackenberg 15 August, 1949.

Our observations were as follows: On 18th June a bird was seen over Sandøen, heading towards the southwest. On 10th July one example was seen in a flock of 5 Long-tailed Skua headed north over the plain northwest to Isdal (about 15 km north of Daneborg). One was seen at Kap Borlase Warren on 13th July, and finally, on 18th July, 5 + 6 + 8 were seen together with, respectively, 9 + 2 + 2 Long-tailed Skua, flying north in flocks over Sandøen.

The above-mentioned flocks of Arctic Skua in July could mean that this species, similarly to the Long-tailed Skua, did not breed in the summer of 1964. (All the observed Skuas were adult birds of the pale phase).

### **American Long-tailed Skua** (*Stercorarius longicaudus pallescens*)

This species is distributed over the whole of the high-arctic parts of Greenland's coasts. On Wollaston Forland we observed them nearly everywhere during June and July, although they seemed to be missing from the southcoast from Kap Berghaus to Kap Borlase Warren.

The first birds were seen on 31st May at Sandøen, and on 1st June outside of Daneborg. Both flocks of 3 and 9 birds were flying south.



Fig. 14. Non-breeding pair of Longtailed Skua on the station area of Daneborg. The birds were attracted by a piece of meat situated in a traditional fox trap (*cf.* p. 84). B.G. phot.

In the following week 3-6 examples were seen around Daneborg, and on 12th June a total of 20 birds, singly or as pairs, were seen at a 5-6 km<sup>2</sup> plain at Zackenberg. Further, the species was seen spread along the northcoast of Wollaston Forland from Lindemans Fjord to Kap Schumacher; about 20 examples were observed at various places around Albrechts Bugt in the days 24th-28th June, and 13 pairs were counted during a 15 km trip across the mainly snow-covered Storsletten, on 30th June.

Of the many Skuas we saw, we encountered only three aggressive pairs, and these were breeding pairs at their nests. The first nest was found at Zackenberg on 15th June; it contained 2 eggs, and its fate is unknown. Nest no. 2 was found at Daneborg on 23rd June, with one egg. On 29th June the nest was apparently abandoned; however, on 5th July a Long-tailed Skua brooded on the nest. On 6th July neither the egg nor the Skua were to be found at the locality. The third nest was found on a little snow-free spot on Storsletten on 30th June; it had 2 eggs.

Skuas heading north were seen from the end of June; on 28th June 4 on Storsletten, on 10th July 2 at Daneborg, and 1 + 1 + 1 + 5 + 2 + 4 on the plain northwest to Isdal, 15 km north of Daneborg. Finally, on 18th July, 9 + 2 + 2 were seen over Sandøen. Also at Mestersvig on 22nd July, 13 Skuas were seen flying north.



Very few Longtailed Skuas started egg-laying in 1964, presumably because of the scarcity of Lemmings. It is a question whether there were any fledglings at all in 1964. The appearance of migrating small flocks from the end of June indicates a failure of breeding activity.

### **Glaucous Gull** (*Larus hyperboreus hyperboreus*)

The Glaucous Gull is described as being distributed along most of Greenland's eastcoast. The following breeding grounds around Wollaston Forland are mentioned in the literature: Hvalrosø with 60 pairs, Basaltø with 30 pairs, and Dahls Skær with 20 pairs (PEDERSEN, 1934).

We saw the first Glaucous Gulls in the open water around Hvalrosø during the days 2nd-6th May; 25 old birds were counted 3rd May. The first birds at Daneborg were noted on 17th May, and on 20th May 32 were seen at Herschellhus and 11 at the weather station. The number of Glaucous Gull at Daneborg increased gradually to 70 individuals on 1st June; they were almost exclusively adult birds. During the course of June the count at Daneborg fell to about 20-30, a number that remained rather constant throughout the rest of our stay.

Furthermore, Glaucous Gulls were observed spread throughout the entire region covered by the expedition. Even in the otherwise deserted Store Sødal 3 birds were seen on 13th June. At Herschellhus 30 immature birds were seen 13th July (and no adults).

6 breeding pairs were encountered on Basaltø 1st July. One of the nests was inaccessible, one contained two eggs, and four nests had three eggs.

Some Glaucous Gulls were seen on Sandøen; thus 20 individuals; were seen on 16th July. On the same day we found an Eider's egg that had apparently been destroyed by the Glaucous Gull. It is possible that the Glaucous Gull is partly responsible for the low number of breeding Eiders on Sandøen. Daneborg's garbage dumps surely sustain an abnormally large population of Glaucous Gull in the area. The Eider colony at Daneborg, however, does not seem to be much harrassed by the Glaucous Gull.

### **Sabine's Gull** (*Xema sabini*)

Apart from a series of accidental observations, this species is known to breed at two localities in East Greenland, Rensskæret at Danmarkshavn where 2 nests and several birds were found in July, 1908, (MANNICHE, 1910), and Sandøen. At the latter locality LØPPENTHIN observed and shot a total of 26 birds in July, 1930. He also found a nest with eggs (LØPPENTHIN, 1932). In July, 1932, 3 breeding pairs and 25 non-breeding Sabine's Gulls were observed on Sandøen (PEDERSEN,



Fig. 15. Sabine's Gull on the nest found on Sandøen 16th July 1964. B. G. phot.

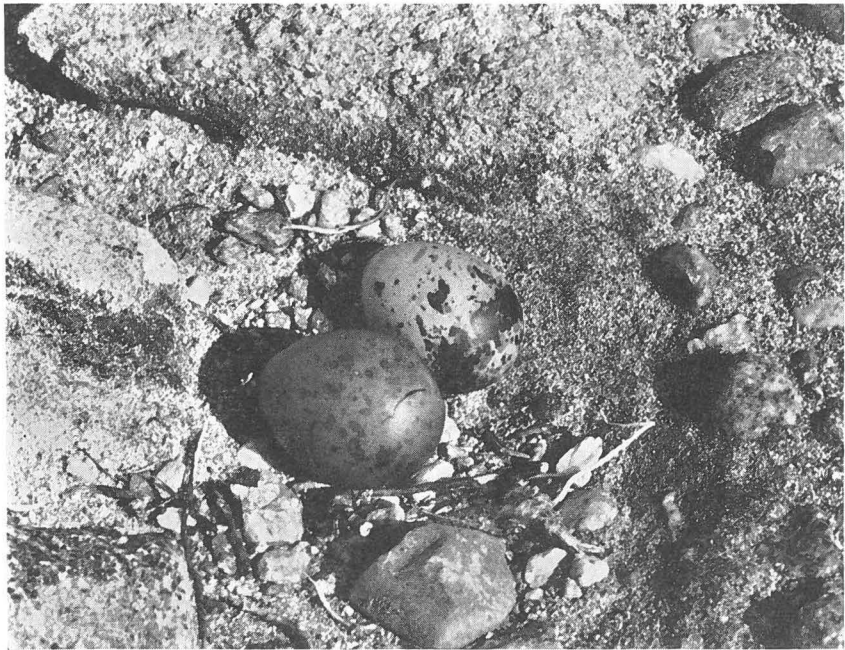


Fig. 16. Nest of Sabine's Gull, Sandøen 16th July 1964. Only one of the eggs is a typical gull's egg, the other belonging to an Arctic Tern. B.G. phot.

1942). Finally, 3 pairs were observed here 24th July 1947 (MØHL-HANSEN, 1949).

Our observations, all from Sandøen, are as follows: 2 on 20th June, 1 on 26th June, 2 on 2nd July, 3 on 5th July, 4 on 16th July, and 1 on 17th July. A nest containing a small gull egg and a tern egg was found 16th July. A Sabine's Gull brooded on the eggs, and quickly became accustomed to a concealed camera that was set up 3 meters from the nest (*cf.* fig. 15 and 16).

### Arctic Tern (*Sterna paradisaea*)

The Arctic Tern is found along the entire eastcoast of Greenland, breeding in colonies that never reach the size of those in West Greenland. In Wollaston Forland only the Sandøen colony, which at full capacity, supposedly represents one of the largest colonies in East Greenland is known. In July, 1930, 28 clutches of Tern eggs were collected here, and several hundred Arctic Terns were observed (LØPPENTHIN, 1932). In 1932, trappers collected 300 Tern eggs on Sandøen (PEDERSEN, 1934) and in 1947 hundreds of Arctic Terns bred on Sandøen (JOHNSEN, 1953).

In 1964 we observed the first Arctic Terns on 3rd June, 5 birds in flock at Kap Berghaus. The Arctic Tern was regularly observed in smaller numbers at Zackenberg, Kap Schumacher, at Lindemans Fjord, and on the coast of Albrechts Bugt, during June and July. 20 individuals flocked together above a tiny rock in the ice-bound fjord north of Kap Schumacher 22nd June. There were no indications that breeding grounds might be found in this area other than for this single observation. On 13th July a total of 80 Arctic Terns was spotted on the stretch from Blæsedalen to Kap Borlase Warren, possibly birds from Sandøen.

When we visited Sandøen for the first time during the breeding season on 18th June, there were 100 Terns. On 20th June the count had increased to 5-700. On 26th June there were 300 Terns at the island but still no nests. The first nests were encountered on 5th July, 9 nests with one egg, 2 with 2 eggs, and several empty hollows. On this day there were only 60 Terns on the island. During our stay on Sandøen from 16th to 18th July, we found only four nests with one egg, and four with two eggs, and even though about 200 Terns were present, hardly more than 15 pairs were breeding.

Although our observations clearly showed that Sandøen attracted a great number of Arctic Terns, we found no confirmation that the island harbours a large colony. In this way the result was quite the same as for the Eiders. It is of course within the realm of possibility that the birds settled here immediately following our departure from the island and succeeded in getting their broods on the wing.

The conditions in 1964 may have been rather special, in that the temperature for June-July might have been under a threshold value needed by these birds to begin egg-laying and brooding. This explanation can however, only apply to the Arctic Tern, as the Eider bred with great success on the Daneborg terrain. Another possibility is that, as mentioned under Eider, Sandøen in 1964 became ice-free so late.

According to information from Daneborg, Young Sund became ice-free about 3 weeks later than usual, namely 5th August. This seems to suggest that even under normal conditions Sandøen could be invaded by fox as late as the middle of July. This information is not in agreement with ALWIN PEDERSEN's data from the 30's. He reported that Sandøen was surrounded by open water from the last half of June (PEDERSEN, 1934 a, p. 117).

Sandøen's dominating significance as a sanctuary for breeding birds is emphasized often in the literature of the thirties, and was the reason why this locality was made as a sanctuary. Perhaps the island's importance for birds has decreased in more recent times.

#### **Black Guillemot** (*Cephus grylle mandtii*)

Within the area surveyed by the expedition, Hvalrosø is mentioned in previous publications as having harboured breeding birds, 40 pairs nested here in 1932 (PEDERSEN, 1934).

During our stay on Hvalrosø, 3rd May, we saw a flock of 20 Black Guillemots. On 13th July 5 were seen in the sea outside of Blæsedalen, and 2 out near Herschellhus.

#### **Snowy Owl** (*Nyctea scandiaca*)

The species occurs widely in Northeast Greenland, but its number varies strongly from year to year. The station personnel at Daneborg told of seeing the Snowy Owl frequently in the autumn of 1963, including at the weather station itself. We saw only single individuals. One was seen flying over the ice in Young Sund on the night of 27th April. One was seen at Revet 25th May, and one at Albrechts Bugt in the period 24-28 June. Finally, there was a Snowy Owl at Lille Sødal 9th July.

#### **Northern Raven** (*Corvus corax principalis*)

The Raven is distributed rather widely in Northeast Greenland, although hardly as a breeding bird. It was a considerable nuisance for the trapping activities in the area, and was therefore intensively pursued by hunting and poisoned bait (PEDERSEN, 1934). We encountered one at Zackenberg, 1st June. Between Kap Berghaus and Daneborg a Raven appeared regularly from 19th May to the time of our departure.

**Greenland Wheatear** (*Oenanthe oenanthe leucorrhoa*)

The Wheatear breeds on the eastcoast from Kap Farvel to approximately 74° N. Lat. On account of ALWIN PEDERSEN's observation of 7 breeding pairs on the southcoast of Clavering Ø in 1932 (PEDERSEN, 1934), this locality is usually quoted as the northern limit. The species was not encountered at all on Wollaston Forland in 1932. Some isolated finds of breeding birds have occurred north of 74° N. Lat., (Kong Wilhelms Land, Shannon, and Hochstetter Forland) and a total of about 10 observations of Wheatear in regions north of 74° N. Lat. has been made.

As the species on Greenland's westcoast has extended its distribution significantly northwards (SALOMONSEN, 1967) there was from the beginning a considerable interest in ascertaining whether a corresponding spreading had taken place on the eastcoast.

The species was rather common in the area we surveyed in 1964. The first example was seen 20th May, at Kap Breusing; one was seen 22nd May at Kap Berghaus, and on 25th May a total of 5 (4 males and 1 female) was seen at Daneborg; on the same day one was seen at Revet. 3 males and one female were seen 29th May at the mountain Zackenberg's south slope; at the same place there were 3 pairs on 1st June—the males were singing. On 15th June there were 3 males at this locality, one singing and another accompanied by a female. Finally, a male was seen at Daneborg 3rd, 4th and 23rd June.

PEDERSEN (1934) places the arrival date at Clavering Ø at about 1st June. Our observations of Wheatears thus deviates in regard to the number and arrival date reported previously. It is at this point uncertain whether one can interpret the observations as an expansion of the Wheatear's distribution. Favourable climatic conditions in the North Atlantic region during the last half of May, 1964 could perhaps be a reason why nearly all species in 1964 were ascertained earlier than ever before, and why there occurred prolonged migrations for a number of more southerly populations. Owing to the unusually low temperatures in June 1964 (see page 11) a possible local population may not have bred that year. It was our impression that the pairs at Zackenberg did not display the restlessness that usually characterizes this species at its nesting place.

**Meadow-Pipit** (*Anthus pratensis pratensis*)

On 25/5, at Revet station, Payer Land, a Pipit was observed under circumstances so favourable, that it was possible for us to determine the species as Meadow Pipit. The song and the well known flight-call "ist-ist" were heard.

During recent years observations of odd Meadow Pipits in the Scoresbysund area have been reported (HALL, 1966).

### **Hornemann's Redpoll** (*Carduelis flammea hornemanni*)

Two subspecies of Redpolls breed in Greenland, the Arctic Redpoll (*hornemanni*) in the northern parts, and the Greenland Redpoll (*rostrata*) in the southern parts (SALOMONSEN, 1950).

The northern limits of the Arctic Redpoll's occurrence in East Greenland is very uncertain. Individuals have been observed as far north as Peary Land (JOHNSEN, 1953) and this author, as well as SALOMONSEN (1967), assumes that this subspecies breeds in northernmost Greenland. PEDERSEN (1942) supposes the northern limit to be between 77° and 78° N. Lat. It is characterized as a frequent breeder in Kong Wilhelms Land "wo er auf den oberen Felsenabhängen brütete und wo er noch im August als einer der häufigsten Vögel beobachtet wurde", (PEDERSEN, 1934). It should be pointed out, however, that the literature does not report one nest find north of the Scoresbysund area.

Most of the observations stemming from the northern regions of East Greenland have been made during the months of April, and August-September, but observations of the Arctic Redpoll have also been recorded during the breeding season, as well as during the dark season.

Concerning the region around 74° N. Lat., PEDERSEN (1934) reports the Arctic Redpoll as breeding numerously in Payers Land. As evidence of breeding is claimed an observation of a family with fledged young on Clavering Ø, opposite station Revet on 22nd July, 1930 (SCHAA-NING, 1933), as well as ALWIN PEDERSEN's observations of fledglings on the same island, in the middle of July, 1932 (PEDERSEN, 1934).

Our first observation was at Zackenberg 28/4 where one example was seen. Redpolls were noted regularly, although few in number, from 12/5 to 5/6, mostly on northgoing migration flights. It was a matter of 1-3 birds per day per locality (Daneborg, Kap Breusing, Kap Berghaus, Dahls Skær, Herschellhus, Revet, and Zackenberg).

On the basis of ALWIN PEDERSEN's information about the Arctic Redpoll's frequent breeding in Payer Land, we investigated the terrain west of Station Revet up to about an altitude of 500 meters, on 26/5. Any breeding birds should supposedly have been present at this time, but only 1-2 individuals were observed, and these showed no special association with the area.

A few spread observations were made during the bird's breeding season: 15/6 and 17/6 a bird was heard repeatedly at Zackenberg; 20/6 a single example was seen at Lindemans Fjord. At Daneborg the following observations were made: 19/6 1 example, 29/6 1 ex. as well as one flying out over Young Sund toward Clavering Ø, 4/7 1 ex.

PEIPONEN's (1962) investigation of the breeding biology of the Redpoll emphasizes the fact that the species' distribution throughout its entire breeding area in the northern hemisphere corresponds to the occurrence of the Dwarf Birch, *Betula nana*, and other dwarf-forms of *Betulaceae*. This is the case in West Greenland where the northern limit for *Betula nana* lies between 74° and 75° N. Lat. (SØRENSEN, 1943, PORSILD, 1957).<sup>1)</sup> Significant occurrence of Dwarf Birch is, however, not encountered so far north. One of the most northerly localities where SALOMONSEN found common occurrence of Dwarf Birch in 1936, was Laksefjorden, 72°30' N. Lat. (SALOMONSEN, pers. comm.).

On the eastcoast the Dwarf Birch similarly extends in the inner fjord regions to about 74° N. Lat. (GELTING, 1934).<sup>2)</sup>

If the Arctic Redpoll in Greenland, as hitherto assumed, breeds much further north than 74° N. Lat., PEIPONEN's hypothesis implies that the nutritional ecology of the Arctic Redpoll during the breeding season is quite different from that of more southern forms of the Redpoll. This, indeed, has not been reported.

The few investigations of the contents of birds' crops that have been reported from Germania Land (MANNICHE, 1910) and Peary Land (JOHNSEN, 1953) have shown seeds of *Luzula*, *Cyperaceae*, *Draba*, *Puccinellia*, and *Polygonum*. These investigations, however, as mentioned above do not concern breeding birds.

There is also the possibility that one has previously misjudged the breeding distribution in North Greenland. It is known (PEIPONEN, 1957) that the Fenno-Scandinavian populations carry out long migrations during, as well as outside, the breeding season. It is not unlikely that the many observations from northern Greenland can be explained on the basis of the Redpoll's nomadic life. Even the reports of fledglings (whose age is not given) on Clavering Ø, cannot therefore be considered as indisputable testimony of breeding at this locality.

As far as Northwest Greenland is concerned, the existing knowledge is similarly insufficient for drawing any definite conclusions. The Arctic Redpoll is reported to breed in Thule District (SALOMONSEN, 1950) but as far as is known no nest-finds exist from here. The area was visited in 1964, when single Arctic Redpolls were observed (FERDINAND, pers. comm.) and again in 1967, when the form was also seen (NORUP, pers. comm.). No evidence of breeding for these years has been reported. Neither from the areas north of Thule District have there been any reports of breeding.

<sup>1)</sup> A typographical error exists in PEIPONEN's work (p. 55). The limit quoted from PORSILD (1957) is given as 79°N. Lat.

<sup>2)</sup> Corresponding to this, *Betula nana* was observed in 1964 scattered on Revet (74°21' N.Lat.) at Zackenberg (74°28' N.Lat.) and sporadically at Lindemans Fjord and on Kap Schumacher (74°40' N.Lat.).

At Orpít, Laksefjorden in West Greenland, during the 1st half of this century, a marked decimation of the relative abundance of *hornemanni* has been established (SALOMONSEN, 1950). This development has since continued. Thus JOENSEN and PREUSS (pers. comm.) ascertained in 1965 that the population at Orpít was now a pure *rostrata* population. Nothing is known of corresponding changes on the eastcoast<sup>1</sup>). The few Redpolls observed on the Daneborg expedition under circumstances allowing subspecific identification were *hornemanni*. Most of the observed "Arctic Redpolls" were admittedly seen under conditions that rendered it impossible to distinguish them from *rostrata*.

### Lapland Bunting (*Calcarius lapponicus lapponicus*)

The species' regular breeding grounds in East Greenland do not extend north of Angmagssalik, but breeding records have been made around Scoresbysund, and single wandering examples have been encountered in the high arctic region (SALOMONSEN, 1950).

On 26th May a female Lapland Bunting was observed during the whole day in the station area at Daneborg. Late in the afternoon we succeeded in capturing the bird, which was then ringed.

### Snow-Bunting (*Plectrophenax nivalis nivalis*)

The Snow Bunting is distributed throughout the entire Greenland. Upon our arrival at Daneborg on 18th April, the station's personnel informed us that 4-6 birds had resided on the station's terrain for a week. The same information concerning the arrival date of the Snow Bunting was supplied to us during our stopover in Mestersvig. It can be said then, that the arrival of the first birds in 1964 was ascertained with rather great accuracy as of 11th April.

During their arrival period Snow Buntings were trapped and ringed in a clover leaf trap available at the station.

For the first 9 days after arrival at Daneborg the members of the expedition remained in the vicinity of the station. Up until and including 21st April, 9 birds were seen here with rather strong association to the station area. On 22nd April the number increased to about 30 birds. During this initial period only males were observed, mainly in winter plumage. The birds appeared mainly in small flocks. Occasional phrases of song were heard from as early as 22nd April, for the most part during the morning hours. During the hours 9-12 p.m. remarkably few Snow Buntings were observed.

<sup>1</sup>) Quite recently WATERSTON (Dansk Ornith. Foren. Tidsskr. 64, 1970, p. 93-94) reported breeding of both subspecies at 71-72° N. Lat. in East Greenland.





Fig. 17. Male of Snow-Bunting in a partial winter plumage on 24th April 1964.  
B.G. phot.

After the expedition's return to Daneborg 9th May, a large number of Snow Bunting was found residing daily in the vicinity of the station; as yet mainly males, but a few females now had arrived.

From 15th May the number of females increased; and from this day a number of birds were seen in pairs; also males were often seen pursuing a female in the air. The intensity of song in the area gradually increased.

A great individual variation in the various song phrases was ascertained. It was evident, as well, that the song changed during the course of the spring. Initially the most common song-type consisting of a short, slightly grating passage in crescendo-decrescendo. This was later replaced by a more varied song. We could distinguish three song-types: the above-mentioned grating "Whitethroat song", a "Blackcap-song" with a rather melodious, whistling passage, and a "Chaffinch-song" consisting of richly-toned, rolling notes of the same pitch, occasionally terminating in a Chaffinch-like flourish.

As previously described, the birds' territorial behavior was to a great extent determined by the weather. During snowstorms the birds flocked together again and cruised about over the whole area. Such a flock of 60-70 was seen as late as 25th May during a snowstorm at Daneborg.

Furthermore, it was our impression that the same birds shifted many times during the day between territorial and social behavior.

Lesser flocks of Snow Bunting were also observed during the arrival phase at Kap Berghaus, Herschellhus, Zackenberg, Lindemansdalen, Revet, and Kap Breusing.

During our stay at Germania Havn Snow Buntings were observed daily. On Hvalrosø the first females of the season were observed 4th May, more than 3 weeks after arrival of the first males.

The number of captured Snow Buntings at Daneborg distributed according to capture, date, and sex, is shown in table 4. The table shows the significantly later arrival of the females. The daily variations in the number of captures is due foremost to the weather, but also reflects the actual fluctuations in the number of newly arrived Snow Buntings.

Table 4. *Snow Buntings (Plectrophenax nivalis nivalis), trapped and ringed at Daneborg 1964, entered according to trapping date and sex*

Date	♂♂	♀♀	Recaptures
April 24	3	0	0
- 25	16	0	2 (4)
- 26	6	0	1 (1)
- 27	3	0	2 (2)
- 28	3	0	0
- 29	5	0	2 (2)
- 30	2	0	2 (2)
May 1	1	0	0
- 3	4	0	1 (1)
- 4	3	0	1 (1)
- 5	12	2	5 (5)
- 6	2	0	1 (1)
- 7	1	0	0
- 9	6	1	0
- 10	1	0	3 (3)
- 11	3	0	1 (1)
- 12	5	0	2 (2)
- 13	10	1	2 (2)
- 14	9	2	13 (23)
- 15	1	3	1 (1)
- 16	3	0	3 (4)
- 17	1	0	2 (2)
- 18	1	0	0
- 25	4	0	1 (1)
Total	105	9	(58)

In the column "Recaptures" the daily number of trapped, already ringed individuals has been introduced. As some of these birds were trapped more than once a day, the total number of daily recaptures is added in parenthesis.

Table 5. *Snow Buntings (Plectrophenax nivalis nivalis) recaptured at Daneborg 1964*

	Individuals	Retrappings
1 time.....	29	29
2 times.....	5	10
3 - .....	3	9
4 - .....	1	4
5 - .....	0	0
6 - .....	1	6
Total.....	39	58

The number of birds is entered according to how many times the individuals were recaptured. The last column gives the total of retrappings within each group.

The variable capturing activities, on the other hand, hardly dominate the fluctuations. During the days when the expedition was on a sledge trip round Wollaston Forland the personnel of the station carried on capturing activities.

Towards the close of the migration season almost no birds were captured; they had divided the area into territories. In this way the trap became situated within a Snow Buntings territory, from which all other birds were driven away. The above-mentioned snowstorm 25th May is, however, clearly reflected by the capture table. (It can be mentioned here that in a clover leaf trap the birds are led to the trap with the help of suitable food, in this case, grain.)

Of the total of 114 ringed birds, 39 have been recaptured, and some of these several times. Table 5 is divided so that one has taken into account how many times a single bird has been registered. Only a few birds are registered a great number of times. This is supposedly not due to the birds having learned to avoid the trap, as some birds, indeed, were recaptured from 2 to 6 times within quite short time periods. The reason is rather, that the stationary birds, after having recovered from their migration over the arctic ice, can gather sufficient food outside the trap. The captured birds then should be mainly newly arrived birds whose nutrient reserves have been depleted. This is confirmed by table 6, which shows that most of the recaptures are made few days after ringing<sup>1)</sup>.

A factor contributing to the asymmetrical distribution of table 6 is probably that a great portion of the birds are in passage, and have only stopped for a short rest.

<sup>1)</sup> The four birds recaptured more than 14 days after ringing were all ringed in April. This implies that the local breeding birds are among the earliest arriving migratory birds.

Table 6. *Snow Buntings recaptured at Daneborg 1964. Number of birds entered according to time-interval between ringing and retrapping*

Interval (days)	Recaptures
0-1	7 (0)
1	10 (13)
2	4 (5)
3	1 (2)
4	2 (0)
5	1 (7)
6	1 (0)
7	0 (0)
8	1 (0)
9-14	0 (0)
15	0 (1)
16	0 (1)
17	0 (0)
18	1 (0)
19	0 (0)
20	1 (0)

The first figure in the column "Recaptures" refers to the number of 1. retrappings only. The number of later recaptures is given in parenthesis.

Concerning the previously mentioned song types, still more changes were noted. The "Whitethroat song" was no longer heard in June. As an example of the great variations among Snow Bunting songs, one can mention a bird whose call strikingly resembled the song of the Great Tit (*Parus major*).

On 6th June the first nest building activity was noted. A pair, the female of which bore nest materials, was seen at Kap Berghaus. On various occasions hereafter nest building was observed. The female always carried the nesting materials, accompanied by the male. Song activity during this period was less than during the occupation of the territories, and decreased further during incubation.

The nests were situated in cliff crevices or between large stones, often in manmade cairns. Nests were often inaccessible to further investigations.

The Snow Bunting has been described by many authors as the most common bird in N.E. Greenland. To what extent this is true cannot be determined on the basis of our experience, mainly because the species is distributed very irregularly throughout the landscapes mentioned in the introductory chapters.

A significantly greater density of the Snow Bunting population was noted during the initial phases of the breeding season than later on.

In a rocky region in the vicinity of Kap Berghaus a nest was observed on 25th June, in addition to 10–15 pairs. On a survey 5th July only 3 pairs were noted in this same area. We can offer no explanation for this decimation.

The greatest density attained by the Snow Bunting was in the bedrock regions such as Daneborg and Zackenberg. At this last-mentioned locality 8–10 pairs were noted during a climb up the mountain's eastside on 28th May. Two males were seen at the high altitude of 1200 m a.s.l. Three separate line-surveys in the species' preferred biotope at Zackenberg revealed 15th and 17th June, respectively, 5 pairs/2 km, 6–7 singing males/3 km and 1 singing male plus 7 pair/3 km. These rather high counts were made during nestbuilding time when the species, as mentioned above, was strikingly numerous.

During a survey of the southernmost 10 km of Lindemansdalen, which was under much snow, 3 pairs were observed on 17th June.

3–5 birds were observed 24th–29th June on the ridge at Albrechts Bugt, mostly males with a rather tenuous association to the region. It could not be determined whether the birds were breeding. Higher up in the slate hills east of Storsletten the Snow Bunting was absent. On Storsletten itself the species was completely lacking, as was true of the coastal plains along Young Sund between Zackenberg and Lille Sødal. In the middle of July, no Snow Buntings were seen between Lille Sødal and Blæsedalen. A line-survey in Lille Sødal 9th July revealed 2 males plus one female per 5 km; on 15th July 5 birds/7 km, one of which was a female on her nest.

Around Daneborg the nests could be registered with considerable accuracy. A total of 14 nests were found in the region's approx. 3 km<sup>2</sup> (*cf.* p. 76). In 9 cases, where the number of eggs and young could be ascertained, the brood size was found to be between 4 and 7, most often 7. Hatching mainly took place during the period 27th–30th June, and fledglings were noted 11th and 15th July.

In the cases where it was possible to determine whether the birds were ringed, it was found that none of the females, but 7 of the 11 males were ringed. The sexual distribution here is a direct consequence of the sexual distribution in the ring-marked material.

Our observations led to some considerations concerning the success of breeding in 1964. A great number of plundered nests were noted, and it was unusual to encounter fledglings. The cause for this can be partially explained. In the beginning of July in the mountains a few kilometers from the station, as well as at Daneborg itself we observed Ermines, who in their search for food systematically investigated cairns, stone heaps and similar places which could be thought to harbour Snow Bunting nests, and even though no direct predation was noted, there

can be little doubt that the Ermine is partially responsible for the relative dearth of fledglings of the Snow Bunting. Because of its small size, the Ermine, as opposed to the Arctic Fox, represents the greatest danger for the Snow Bunting while they are still in their nest. Perhaps the modest population of Lemming played an indirect role on the Ermine's inroads on the Snow Bunting population.

Of the 114 Snow Buntings ringed at Daneborg in April and May 1964, 4 have been reported recaptured: 1 male, Finnmarken, Norway, autumn 1965 (SALOMONSEN, 1967 a), 1 male Shetland Islands, autumn 1964 (SALOMONSEN, 1965) and two recaptures at Daneborg, spring 1965 (JENSEN, pers. comm.).

## DISCUSSION AND SUMMARY

From 18 April to 20 July 1964 an ornithological expedition investigated the bird-life of Wollaston Forland and surroundings. Its headquarters were the weather station, Daneborg (74°18' N., 20°10' W.).

During April and May long sledge-trips were made to the inner-fjord region (Tyrolerfjord, Payer Land) and to the outer seacoast (Hvalrosø). In June and July the work was restricted to Wollaston Forland and the islands in Young Sund (*cf.* fig. 8, p. 17).

The observations will be summarized and discussed in relation to 1) the pre-breeding period, 2) early arrival and prolonged spring migration, 3) courtship and mating, 4) frequency and distribution of breeding birds, 5) non-breeding and similar phenomena.

### Pre-breeding

Most breeding birds (*e.g.* waders) do not find a snowfree and suitable nesting site upon their arrival to Northeast Greenland, but have to endure a period of waiting, often of long duration, under climatic and nutritional conditions which apparently are more unfavourable than those of their winter quarters. This period is hereafter called the pre-breeding period.

The fact that the birds actually survive this period of waiting in the high arctic shows that the food resources are not so insignificant as would appear from a superficial view. It is obvious that the birds in this period have to depend upon food sources produced in the previous year. A special example of this had been recorded in Peary Land for the King Eider (*Somateria spectabilis*), which exclusively depended upon a frozen crustacean diet in June (RØEN, 1965).

During the first month of the expedition's stay, the dominating species at Daneborg was the Snow-Bunting (*Plectrophenax nivalis nivalis*), the first individuals of which arrived on 11 April. By the end of May more than a hundred had been captured and ringed, and many more had been observed.

The males arrived 3-4 weeks earlier than the females. The first song was heard on 22 April, and from this date territorial behaviour became more conspicuous. However, until the egg-laying began at the middle



Fig. 18. Resting waders (Knot, Turnstone, Sanderling) on the station area of Daneborg 3rd June 1964. B.G. phot.

of June, territorial behaviour was temporarily abandoned, and during parts of the day the birds were seen in flocks. For this species the pre-breeding period in Northeast Greenland is therefore almost two months.

Also Eider (*Somateria mollissima borealis*) and King Eider have a long pre-breeding season, spent on the latitude of the breeding places.

During a visit to Hvalrosø at the outer sea coast on 2-6 May Eiders and King Eiders were seen in scores, feeding in stretches of open water. These birds did not appear at their breeding grounds until sufficiently large cracks had formed in the fjord ice at Sandøen and Daneborg (Eider) and before ice-free lakes appeared at Zackenberg (King Eider). This did not occur before the middle of June, and the first egg of Eider was seen at Daneborg on 26 June.

The waders began to arrive to Wollaston Forland during the last two weeks of May, and their numbers culminated at Zackenberg and Daneborg and Herschellhus in the first week of June.

Intra-specific competitive behaviour was noted from the first day of arrival in the Ringed Plover (*Charadrius hiaticula hiaticula*), which fed on grassy, littorine meadows. Sanderlings (*Calidris alba*), Turnstones (*Arenaria interpres interpres*), and Knots (*Calidris canutus canutus*) remained in flocks that fed in snow-free patches of land, predominantly at the very border of the melting snow (*cf.* fig. 13). The Dunlins



(*Calidris alpina arctica*) fed mainly on snow-free vegetation (mosses) in frozen bogs.

Presumably as a consequence of their varying food demands, wader populations differed from locality to locality during this pre-breeding period. The final breeding population frequently had little resemblance to the composition of the flocks that had rested on the same area some weeks earlier. *E.g.* Turnstones were present in fairly large numbers at Daneborg during the first week of June, but none of these birds was found breeding there at the end of the month.

Since the egg-laying of the waders did not start until the end of June, it appears that their pre-breeding season is of considerable duration.

The Barnacle-Goose (*Branta leucopsis*) has a remarkably short pre-breeding period: the first birds were observed on 17 May, and clutches containing up to 9 eggs were found on 1-2 June. The nest, placed on shelves of steep basaltic rocks, is presumably well-protected against predation (at least against the fox), but the real advantage of this adaptation could perhaps be that such sites usually are snow-free. An early egg-laying is required in the case of the geese, since they demand a long period for incubation and raising of their young.

In regard to the Pink-footed Goose (*Anser fabalis brachyrhynchus*), the observations are not conclusive, but the species may have started egg-laying 8-12 days later than the Barnacle-Goose.

The biological function of the pre-breeding period remains obscure; in particular it seems difficult to explain the length of the period found in some of the species mentioned.

#### Early arrival and prolonged spring migration

Several species in 1964 were observed earlier than hitherto recorded. This especially applies to some wader species: Ringed Plover, Turnstone, Dunlin and Sanderling, which arrived during the last two weeks of May. The fast snow-melting and evaporation at this time means that even smaller alterations of arrival time may have a great influence on life conditions of the birds.

Representatives from the low arctic were observed during the spring migration period. A Meadow Pipit (*Anthus pratensis pratensis*) was observed at Payers Land on 25 May. A Lapland Bunting (*Calcarius lapponicus lapponicus*) was caught and ringed at Daneborg on 26 May and a Purple Sandpiper (*Calidris maritima maritima*) was seen at Herschellhus on 8 June.

In addition, relatively many observations of Wheatears (*Oenanthe oenanthe leucorrhoa*) and Red-necked Phalaropes (*Phalaropus lobatus*) were made from the end of May till the middle of June. The latter two species were seen in pairs, but no breeding was established.

### Courtship and mating

The geese, and probably the divers, arrive in the area in pairs. King Eiders were seen in courtship display at the outer seacoast in early May, and they arrived at their breeding places in pairs. The Eider on the other hand, performed the mating close to the colony.

Longtailed Duck (*Clangula hyemalis*) was observed in collective courtship display at Zackenberg on 12 June.

Most of the waders did not form pairs until the time when they occupied their breeding territory, and the complete song-flight of, e.g., the Sanderling was only observed on the breeding ground.

### Frequency and distribution of breeding birds

From earlier expeditions it is known that the area contains breeding colonies of geese, terns and Eiders. Investigations of these colonies, and a search for possible new ones, were among the most important tasks of the expedition.

In this respect the Barnacle-Goose deserves special attention, since the size of the Northeast Greenland population has been estimated in the winter quarters, while the number of Barnacle-Geese breeding in the known colonies of Northeast Greenland constitutes only a fraction of the winter figure.

In the Young Sund region the stock was estimated at 40-50 pairs in 1964, distributed upon 4-5 colonies. It is believed that over its vast breeding area the species is scattered in small colonies which easily escape detection. Inaccessibility of most colonies, the presence of non-breeding birds at the colonies, and the fact that the number of breeding birds in a colony may fluctuate appreciably from year to year are other difficulties in estimating the population size in Northeast Greenland.

Breeding Pinkfeet were found in 3-4 small colonies only, restricted to two feeding areas (Zackenberg and Kap Schumacher). A single breeding pair was found on the tundra of Storsletten. The placing of the nests in varying biotopes was a striking feature. The lack of a firm tradition in this respect possibly could be indicative of the Pinkfoot as a relatively new element in the fauna of Northeast Greenland.

As mentioned below, a large number of immature Pinkfeet from southern populations invades Wollaston Forland by the end of June. It is likely that a connection exists between these immigrants and the breeding population (in addition to abmigration caused by mixing on the winter quarters); this connection would concern as well the original colonization as the maintenance of the present breeding population.

The breeding of Eiders on Sandøen was abandoned in 1964. It is suggested that the value of Sandøen as refuge for breeding sea-birds is highly questionable.

A colony of Eider has recently been established on the station area of Daneborg. This instance of adaption to human beings and dogs is very interesting. The colony numbered 70 pairs in 1964, and the breeding success was high.

As regards species not breeding in colonies, population sizes are much more difficult to estimate. No large-scale maps showing detailed structures, vegetation types *etc.*, exist for Wollaston Forland or for any other part of Northeast Greenland. Moreover, a survey of the snow-cover for the period of the census would also be required, and the snow-cover probably changes from year to year.

As a result of varied topography and the complicated geological structures of the region, different biotopes are mixed in a very intricate manner. These circumstances that make the countings of birds in representative areas a question of team-work among geodesists, geologists, botanists and zoologists, must be taken into account whenever the frequencies of the land-birds occurring in these areas are discussed.

For lack of professional assistance a rough classification of the various biotopes in, *e.g.*, gneissic/granitic rock regions, basaltic rock regions, limestone regions and slate regions was attempted. In the flat lowland areas a distinction could be made between gravel plains and patterned ground areas, but we felt a need for a finer classification with respect to botanical criteria.

The bird-life of Wollaston Forland can be characterized as being restricted to the lowlands below 200 metres and as being dominated by waders.

It was attempted to estimate the density of breeding birds by means of line surveys and, in two cases, by means of the mapping method within selected census areas.

One census area (ca. 3 km<sup>2</sup>) was the immediate surroundings of the weather station. This area comprises an eroded granitic rock region of 100-160 metres height sloping towards the coast of Young Sund into a shore-plain mainly consisting of gravel. The composition of the bird-life in this area is shown in fig. 19.

In the rocky areas Snow-Buntings were among the most common species. Yet the number of nests found and inferred at the beginning of July was much lower than the number of singing males at the beginning of June. Very few fledglings were observed in July; it is believed that they were killed by Ermines, which often were seen searching the surroundings of the nests, followed by anxious Snow-Buntings. This behaviour may be connected with the scarcity of Lemmings in 1964. The Ringed Plover (16 pairs) was the most common breeding bird in the Daneborg area; it occupied the gravel plains as well as the granitic hills. The Dunlin was exclusively found in such bogs as remained humid in the summer. Only

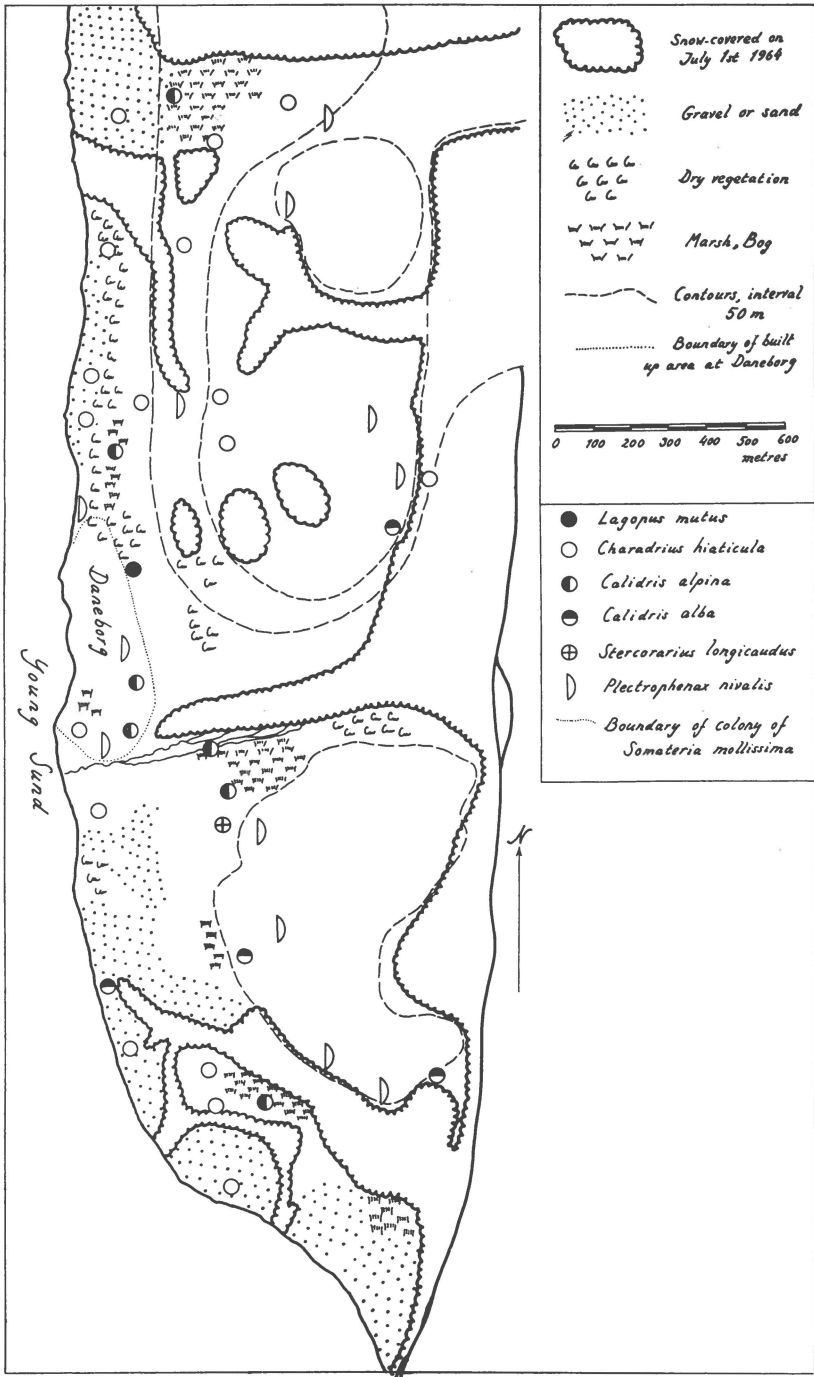


Fig. 19. The distribution of breeding birds in the census area at Daneborg. The map has been drawn on the basis of sketches and notes from the expedition; altitudes were estimated with an aneroid altimeter. The map has later been adjusted by means of aerial photos.

one nest of Sanderling was found, but three more pairs were suspected breeding within the area. This species preferred the same habitat as the Ringed Plover, but moved to damper ground while feeding. 4 pairs of Ptarmigan (*Lagopus mutus captus*) were located within the counting area during the first half of June when the females were completing their moult. After this only very few birds were seen and only one nest was found.

The southern slopes of Zackenberg mountain were also of granitic type, they were less well investigated in the breeding season proper. Here a relatively rich vegetation of *Salix*, *Vaccinium*, *Empetrum* and *Cassiope* was found. Three singing males and a single female of Wheatear were observed here on 15 June, and at the same time 2-2,5 pairs of Snow-Buntings per km were counted on line surveys.

Gravel plains similar to those found in the Daneborg census area extended along the south coast of Wollaston Forland from Daneborg to Herschellhus and also in the neighbouring valleys Lille Sødal and Blæsedalen. In these plains, poor in vegetation, Ringed Plover and Sanderling were observed in numbers corresponding to 1-2 pairs per km (several line surveys in the first half of July). In addition Dunlins were noted, invariably in close relation to rivulets. Turnstones, skuas and Snow-Buntings were absent from these gravel plains.

The coastal plain between Zackenberg and Isdal along Young Sund was of a more clayey character; here neither Ringed Plover nor Snow-Buntings were found, but Dunlins were noted in numbers of 0.5-1.0 pair per km, and 4 pairs of Turnstones were counted along this coast on 11-12 July, but they may not have been breeding birds.

A quite different type of biotope, Storsletten, a tundra plain of the central and northern part of Wollaston Forland, was visited during the last days of June. More than 90 % of the plain was still snow-covered, but on snow-free patches of patterned ground with sparse grassy vegetation Sanderling and Long-tailed Skua were present in numbers corresponding to 3-6 pairs per km<sup>2</sup>, as estimated on the basis of line counts.

At the eastern border of this plain, slate-hills rose to an altitude of 200 metres. These hills were predominantly snow-free, but they contained very few birds except for their coast-nearest parts. Here, at Albrechts Bugt, 7-8 pairs of Turnstones were found within an area of 1-2 km<sup>2</sup>.

The northernmost extension of these hills was selected as a census area, cf. fig. 20. In this area (0.5 km<sup>2</sup>) 7 pairs of Sanderlings (3 nests with eggs), 2 nests of Longtailed Ducks (*Clangula hyemalis*), 1 pair of Turnstones, a pair of King Eiders, odd Long-tailed Skuas and a single Snowy Owl (*Nyctea scandiaca*) were found.

Large parts of the lowland were still heavily covered with snow in the latter half of June, and presumably would not be snow-free in time

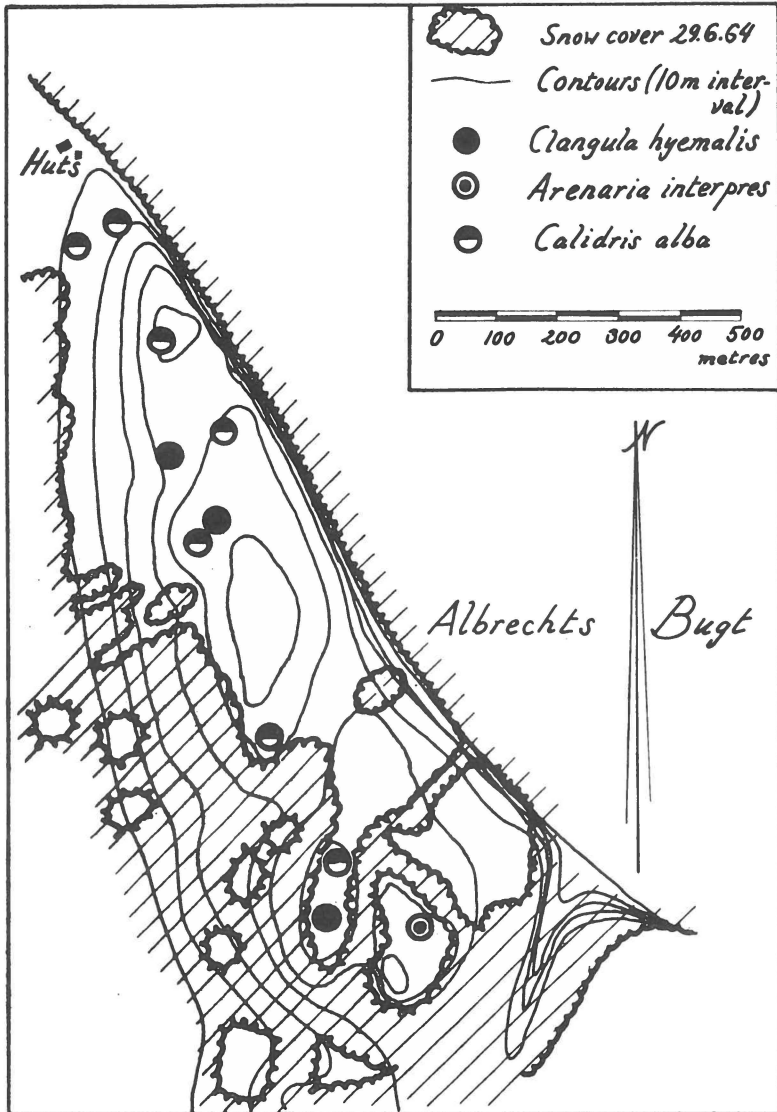


Fig. 20. Distribution of breeding birds in the census area at Albrechts Bugt (at the north coast of Wollaston Forland). The census area was surveyed by a primitive triangulation, and an aneroid altimeter was used.

to sustain a notable bird-life. This applied to Store Sødal, the northern part of Lindemansdalen and most of the coast from Lindemansdalen to Albrechts Bugt (fig. 1-2), along which the snow-cover represented a stage which had been reached 3-4 weeks earlier on the south coast.

Many arctic species are strongly dependent upon the presence of lakes, ponds and bogs, but very few localities, rich in ponds, were found

in Wollaston Forland, *viz.*, those at Zackenberg, Albrechts Bugt and Herschellhus. In the same areas river estuaries offered environmental conditions similar to those of the ponds and bogs.

The only breeding records of Longtailed Duck and Grey Phalarope (*Phalaropus fulicarius*) were made at such localities, one colony of Pink-footed Goose, and pairs of Redthroated Diver (*Gavia stellata*) and King Eider were only found at such localities. However, most of these ponds and bogs could hardly be sufficiently moist for more than shorter periods. The surroundings of such ponds and bogs also had a function as moulting areas for geese.

Another type of lakes, as those at Kuplen and in Lille Sødal, became ice-free very late, and their edges were almost without vegetation. Such lakes presumably had very little importance to the bird-life.

It stands to reason that since the melting and water supplies to the above-mentioned lakes and ponds will depend upon the climatic conditions in winter and summer of the particular year, the breeding of birds depending on such localities may undergo rather great fluctuations from year to year.

#### Non-breeding and similar phenomena

It is a general accepted view that the occurrence of birds is heavily influenced by the amount of more or less specific nutritional sources available. According to this viewpoint the pre-breeding season is the critical period for most birds in Northeast Greenland. Several species seem to have adapted a pattern, so that breeding does not take place in years with extreme food-shortage during the pre-breeding season.

Another consequence is that the accessible food resources in July and August, when the snow-free areas are at a maximum, are much larger than what is needed to nourish the local breeding populations. The moult migration of Pink-footed Geese to Northeast Greenland which was demonstrated by the Daneborg expedition, *cf.* p. 30-33, is an outstanding example of an adaptation to these food resources, but it is conceivable that other species and populations have developed similar habits, *cf.* the northward migration of non-breeding skuas (p. 56) and the summer migration of waders at Jørgen Brønlund Fjord in Peary Land (MØHL-HANSEN, 1949).

Although the year 1964 showed abnormally low temperatures during June-July, *cf.* p. 11, no signs of extensive non-breeding caused by unfavourable climatic conditions was noted.

In accordance with the scarcity of Lemming (*cf.* appendix III) the Longtailed Skua showed non-breeding in 1964. An observation of 13 Longtailed associating with 19 Arctic Skuas (*Stercorarius parasiticus*)

may indicate that the last-mentioned species to a certain degree is dependent on Lemming in Northeast Greenland.

Snowy Owls and Greenland Falcons (*Falco rusticolus candicans*) were only seen in a few cases, always odd individuals.

The Knot arrived a week later than the other high arctic waders. Although the species was rather numerous in the beginning of June, none were found breeding or suspected to breed. As late as 29 June Knots were still in flocks feeding on Storsletten. Possibly 1964 was a non-breeding year for this species, but it may also be that the species do not breed regularly at Wollaston Forland.

Hornemann's Redpoll (*Carduelis flammea hornemanni*) was frequently observed on the expedition, but no breeding was observed. It is commonly assumed that this form breeds at these latitudes or even in northernmost Greenland, but it should be noted that no proof exists of this assumption. It would seem that a re-evaluation of the status of this form in Greenland would be desirable, since the regular occurrence of these birds, even with young, could be attributed to a nomadic behaviour of a southern population.



## APPENDICES

### Appendix I

Completive Bird List of the Region, (74°00'–74°45' N. Lat.)

The list comprises the species which have been noted previously, but which in 1964 were not observed in the regions covered by the expedition (consisting of Wollaston Forland, Pendulum øer, Clavering Ø and corresponding portions of Payer Land and A. P. Olsens Land).

*Gavia immer* (BRÜNNICH), Great Northern Diver.

Observed at Kap Mary, Clavering Ø, 8/7 and 11/7 1930 (LØPPENTHIN, 1932).

*Fulmarus glacialis glacialis* (LINNAEUS), Fulmar Petrel.

1 ad. ♂ in drift-ice about 10 km east of Sabine Ø, 4/7 1930; several in Young Sund 7/7 1930 (LØPPENTHIN, 1932).

*Somateria stelleri* (PALLAS), Steller's Eider.

1 pair, Sabine Ø, June 1922 (KNUDSEN, 1933).

*Mergus serrator schiøleri* SALOMONSEN, Greenland Red-breasted Merganser.

1 ad. ♂, 17/6 1922, Sabine Ø (SCHIØLER, 1926).

*Branta ruficollis* (PALLAS), Red-breasted Goose.

Two individuals seen on Sabine Ø, May-June 1922 (KNUDSEN, 1933).

*Cygnus cygnus* (LINNAEUS), Whooper Swan.

JOHNSON (1953) mentions, that the species was observed by trappers on several occasions in the spring of 1948 in an opening of the ice off Wollaston Forland.

*Tringa totanus* (ssp?), Redshank.

1 specimen at Zackenberg 25/8 1947 (MØHL-HANSEN, 1949).

*Larus glaucoides glaucoides* MEYER, Iceland Gull.

1 juv. ♀, September 1869 and 1 ad. ♀, April 1870 Sabine Ø (FINSCH, 1874).

*Rhodostethia rosea* (MACGILLIVRAY), Ross's Gull.

1 ad. on Sandøen, late spring 1947 (MØHL-HANSEN, 1949).

*Plotus alle alle* (LINNAEUS), Little Auk.

Large flock outside of Lille Pendulum, 1/7 1899 (NATHORST, 1900).  
A few outside of Wollaston Forland, 5/7 1930 (LØPPENTHIN, 1932).

*Uria lomvia lomvia* (LINNAEUS), Brünnich's Guillemot.

2 individuals in Young Sund, 7/7 1930 (LØPPENTHIN, 1932).

*Turdus merula merula* LINNAEUS, Blackbird.

6 specimen on Bass Rock, November 1922 (KNUDSEN, 1933).

*Motacilla alba alba* LINNAEUS, White Wagtail.

At least 5 individuals of this species were reported at Zackenberg, 28/5 1955 (CONRADSEN, 1957).

## Appendix II

### Observations from Daneborg 1965

One of the weather station's employees, IB JENSEN, kept a daily journal of bird observations from the year following our visit. He also captured and ringed a number of Snow Buntings on the station's terrain. His observations are given below in chronological order (rewritten by the authors). Where no locality is given, the point of observation was Daneborg.

- 19/4 The first Snow Buntings, one score (were said by others to have been audible on 16-17 April).
- 27/4 Good catch of Snow Bunting, 30-40 specimens. For the first time this year—many birds.
- 29/4 Recapture of a Snow Bunting ringed in 1964. During the last days of April the temperature has been above freezing.
- 4/5 Another Snow Bunting ringed in 1964, male.
- 7/5 Glaucous Gulls on Sandøen.
- 14/5 8 Glaucous Gulls on the ice outside of Daneborg. A bird was seen today which, according to the description, must have been a Lapland Bunting, male.
- 19/5 Ptarmigan in courtship-flight at Daneborg. The river at Zackenberg west of "Norske hytte" is flowing.
- 20/5 The first geese (Barnacle Geese) 13 + 20 flying toward Zackenberg.
- 21/5 Several geese in passage.
- 22-23/5 Herschellhus: 20 Barnacle Geese, 4 Pinkfooted Geese, 30 Turnstones, and 2 Plovers.
- 25/5 2 Turnstones at Daneborg.
- 28/5 30 Barnacle Geese counted on the shelves on Basaltø.
- 31/5 Zackenberg: Some geese and 2 Long-tailed Skua. Some Sanderlings.
- 8/6 Daneborg: Many Dunlins, 1 pair Eider.

- 10/6 Sandøen: Many Eiders (about 50). Snow melting in the Daneborg vicinity is about 14 days more advanced than in 1964.
- 16/6 2 Long-tailed Skua and many Eiders.
- 18/6 Flock of 10 geese (Pinkfoot) in flight toward Zackenberg. 3 Eider nests with 5, 3 and 1 egg.
- 20/6 50 geese in passage.
- 21/6 7:15 a.m.: 50 geese, 7:00 p.m.: 20 geese, 12 midnight: 12 geese in passage.
- 22/6 18 geese flying toward Zackenberg.
- 27/6 Sandøen: 100 Eiders and hundreds of Terns—Daneborg: 200 migrating geese, including a flock of 34.
- 30/6 17 migrating geese.
- 1/7 29 geese headed north.
- 2/7 17 geese headed north.
- 3/7 25 geese headed north.
- 4/7 To Sandøen by boat from Kap Berghaus. On the island 6-8 Eiders and many Terns, but no nests!! 2 Sabine's Gulls. Hundreds of Eider males in the open water. There are at least 150 Eiders nesting in the station area.
- 10/7 By boat to Zackenberg. Goslings at Dolomitdal, Clavering Ø.
- 14/7 2 coveys Eider ducklings of 3 and 4.

The above observations speak for themselves. The observation of Lapland Bunting and the observations of the Pinkfooted Goose's moulting-flight (a total of 458 birds seen on incidental occasions) are of special interest. This further confirms the regularity and extent of the moulting-flight (see fig. 10).

Finally, the observations from 1965 confirm the suggestion on p. 60 concerning the dubious value of Sandøen as a refuge for Eiders and Arctic Terns.

### Appendix III

#### Notes on mammals

The expedition did not direct its primary attention to the occurrence of mammals in the area, but did make some notes when the opportunity presented itself.

As some of these observations are relevant to ornithological matters, they are cursorily mentioned here:

Lemming, *Dicrostonyx grönlandicus* TRAILL

According to information from the personnel at Daneborg, there were many Lemmings in the area in 1963.

In 1964 the Lemming population was said to be very small.

2/5 2 dead, dried-up specimens were found at Germania Havn.

The first living animals were seen on 15/6, a total of three Lemmings at Zackenberg, two of which were apparently young. One of these was discovered after having fallen prey to two Skuas.

On Storsletten 25/6-1/7 Lemmings were observed 3-4 times, most often in the above-mentioned hillocks (p. 12), which were perforated by their burrows. The fresh pellets of Snowy Owls, one of which resided at this locality, revealed bones of Lemming, often 3-4 animals in a single pellet.

The connection between the number of Lemmings and the species' predators is well known, and the sparse occurrence of Gyr Falcon and Snowy Owl, as well as the ascertained lack of breeding with respect to the Long-tailed Skua, confirm numerous earlier observations. (See, among others, PEDERSEN (1942) and LØPPENTHIN (1932)).

#### Ermine, *Mustela arctica polaris* BARRET-HAMILTON

One specimen was seen at the cottage on Kap Breusing on 1/6. None were then observed until 7/7 and the following days, when at least two specimens were seen in the station-area at Daneborg and in the hills behind the station. The Snow Buntings at that time had large young, and Ermines were often seen reconnoitering cairns and piles of stone, pursued by nervous Snow Buntings. Despite a lack of direct testimony, it is supposed that several young Snow Buntings fell victim to the Ermines in 1964. Possibly the low abundance of the Lemming is of importance in this connection.

#### Arctic Fox, *Alopex lagopus* LINNAEUS

Several white skins and a few silver fox skins at Daneborg bore witness that the preceding winter, 1963/64, had been a good fox season. The animals were all caught in the primitive trap type which had previously been used by trappers: a wooden frame, set on edge, about 45°, and stone-loaded (fig. 14). The expedition met fox at many of the visited localities. On the whole however, the species seemed to be rather sparse. On one occasion a fox was seen with a seal carcass 2 km from land, but besides this there was no opportunity to gather an impression of the animals' choice of food. In connection with the destroyed Eider nests on Sandøen, fox tracks and excrement were found around the nests. Single plundered nests of Eiders were also found on the south-coast of Wollaston Forland.

## LITERATURE

- ATKINSON-WILLES, G. L. (Ed.), 1963: Wildfowl in Great Britain, London.
- BAY, E., 1894: Den østgrønlandske Expedition, udført i Aarene 1891-92 under ledelse af C. RYDER. Tredie Del. — Meddr Grønland, Bd. 19, Nr. 1. 1-51.
- BERGMAN, G., 1963: Ederfuglen. *in* Nordens Fugle i Farver, Bd. 4 p. 234-243, København.
- BERNHOF-Osa, A., 1965: Ringmerkingsresultater fra Revtangen på Jæren i 1964. — *Sterna* 6: 386-394. Stavanger.
- BIRD, C. G. & BIRD, E. G., 1941: The Birds of North-East-Greenland. — *Ibis* 14. ser. V. vol.: 118-161.
- BOYD, H. 1963: The numbers of wild geese in Great Britain. The Wildfowl Trust, 14th Ann. Report: 87-97.
- BULLETIN DU CENTRE DE RECHERCHES sur les Migrations des Mammifères et des Oiseaux. No. 18, Mammalia, 1964, Paris.
- CHRISTENSEN, N. H., 1965: Ornithologisk Ekspedition til Daneborg-området, 1964. — *Tidsskriftet Grønland* nr. 8: 279-295. 1965.
- 1967: Moulting Migration of Pinkfooted Goose (*Anser fabalis brachyrhynchus* BAILLON) from Iceland to Greenland. — *Dansk Ornith. Foren. Tidsskr.* 61: 56-66.
- B. GENSBØL & N. TH. ROSENBERG, 1965: Moulting Migration of Pink-footed Geese, *Anser Arvensis Brachyrhynchus*. — *Ibis* 107: 542-543.
- CLAVERING, D. C., 1870: Journal of a Voyage to Spitzbergen and the East Coast of Greenland. Ref. in Dr. A. Petermanns Mitteilungen, Band XVI: 320-329. Justus Perthe, Gotha.
- CONRADSEN, F. R., 1957: Ornithologiske iagttagelser ved Daneborg. — *Dansk Ornith. Foren. Tidsskrift.* 51: 12-18.
- DEICHMANN, H., 1904: Birds of East Greenland. *in* Carlsbergfondets Expedition til Øst-Grønland, udført i Aarene 1898-1900 under Ledelse af G. AMDRUP. Tredie del. — *Meddr Grønland*, Bd. 29, Nr. 4:141-156.
- DELACOUR, J., 1959: The Waterfowl of the World. Vol. III: p. 60.
- FINSCH, O., 1874: Vögel; mit Noten von Adolf Pansch. Die zweite deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän Karl Koldewey, zweiter Band, wissenschaftliche Ergebnisse. p. 178-239. Leipzig.
- FREUCHEN, P. & SALOMONSEN, F., 1961: Det arktiske År. København.
- GELTING, P., 1934: Studies on the vascular plants of East Greenland between Franz Josephs Fjord and Dove Bay (Lat. 73°15'-76°20' N.). — *Meddr Grønland*, Bd. 101, Nr. 2.
- GENSBØL, B., 1965: På Bramgåsens yngleplads. — *Naturens Verden* 1965: 236-244.
- HALL, A. B., 1966: The breeding birds of an East Greenland valley, 1962. — *Dansk Ornith. Foren. Tidsskr.* 60: 175-185.
- HÖHN, E. O., 1957: Observations on Display and other forms of Behaviour of certain arctic Birds. — *Auk* 74: 203-214.

- JENNOV, J. G., 1963: Bemærkninger om antallet af Bramgæs (*Branta leucopsis* (BECHST.)). — Dansk Ornith. Foren. Tidsskr. 57: 221–228.
- JOHANSEN, H., 1957: Revision und Entstehung der Arktischen Vogelfauna. II. — Acta Arctica, Fasc. IX. København.
- JOHNSON, P., 1953: Birds and Mammals in Peary Land in North Greenland. Including notes from Northeast Greenland. Dansk Pearyland Ekspedition 1947–50. — Meddr Grønland, Bd. 128, Nr. 6.
- JOHNSGARD, P. A., 1965: Handbook of Waterfowl behaviour. Ithaca, New York.
- KNUDSEN, K., 1933: Ornithologiske Notitser fra Nordøst-Grønland. — Dansk Ornith. Foren. Tidsskr. 27: 93–95.
- KOLTHOFF, G., 1903: Bidrag till Kännedom om Norra Polartrakternas Däggdjur och Fåglar. — Kungl. Svenska Vetensk. Akad. Handl. Ny Föjld, 36. Bandet N:o 9: 1–104. Stockholm.
- LÖPPENTHIN, B., 1932: Die Vögel Nordöstgrönlands zwischen 73°00' und 75°30' N. Br. samt Beobachtungsergebnissen von der dänischen Godthaab-Expedition 1930. — Meddr Grønland, Bd. 91, Nr. 6.
- MADSEN, C., 1925: Ornithologiske Iagttagelser fra Østgrønland. — Dansk Ornith. Foren. Tidsskr. 19: 33–41.
- MANNICHE, A. L. V., 1910: The terrestrial Mammals and Birds of North-East Greenland. Biological Observations. — Meddr Grønland, Bd. 45, Nr. 1.
- MØHL-HANSEN, U., 1949: Fuglelivet på Pearyland, Nordgrønland. Iagttagelser på "Dansk Pearyland Ekspedition" sommeren 1947. — Dansk Ornith. Foren. Tidsskr. 43: 109–129.
- NATHORST, A. G., 1900: Två somrar i Norra Ishafvet, senare delen. Stockholm.
- NEWTON, A., 1874: Eier. Die zweite deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän Karl Koldewey, zweiter Band, wissenschaftliche Ergebnisse. p. 240–243. Leipzig.
- NØRREVANG, A., 1955: Rylens (*Calidris alpina* (L.)) træk i Nordeuropa. — Dansk Ornith. Foren. Tidsskr. 49: 18–49.
- 1963: Considerations on Avifaunal Connections across the North Atlantic. — Dansk Ornith. Foren. Tidsskr. 57: 99–109.
- PALUDAN, K., 1965: Grågåsens træk og fædningstræk. — Danske Vildtundersøgelser, hefte 12. Kalø.
- PEDERSEN, A., 1930: Fortgesetzte Beiträge zur Kenntnis der Säugetier- und Vogelfauna der Ostküste Grönlands. — Meddr. Grønland, Bd. 77, Nr. 5.
- 1934: Die Ornis des mittleren Teiles der Nordostküste Grönlands. Treårsexpeditionen til Christian den X's Land 1931–34 under Ledelse af LAUGE KOCH. — Meddr Grønland, Bd. 100, Nr. 11.
- 1934a: Polardyr. København.
- 1942: Säugetiere und Vögel. Dansk Nordøstgrönlands expedition 1938–39. — Meddr Grønland, Bd. 128, Nr. 2.
- PEIPONEN, V. A., 1957: Wechselt der Birkenzeisig, *Carduelis flammea* (L.), sein Brutgebiet während des Sommers? — Ornis Fennica 34: 41–64.
- 1962: Über Brutbiologie, Nahrung und geographische Verbreitung der Birkenzeisigs (*Carduelis flammea*). — Ornis Fennica 39: 37–60.
- PORSILD, A. E., 1955: The vascular Plants of the western Canadian Arctic Archipelago. — Nat. Museum of Canada. Bull. no. 135.
- 1957: Illustrated Flora of the Canadian Arctic Archipelago. — Nat. Museum of Canada. Bull. no. 146.
- ROSENBERG, N., 1966: Daneborgekspeditionen 1964. — Feltornithologen 8: 110–120.
- RØEN, U., 1965: Ornithologiske observationer på 3. Peary Land expedition sommeren 1964. — Dansk Ornith. Foren. Tidsskr. 59: 85–91.

- SALOMONSEN, F., 1950: Grønlands Fugle, The Birds of Greenland. København.
- 1965: Fra Zoologisk Museum XXII. Tiende foreløbige liste over genfundne grønlandske ringfugle. — Dansk Ornith. Foren. Tidsskr. 59: 92–103.
  - 1967: Fuglene på Grønland. Rhodos, København.
  - 1967a: Fra Zoologisk Museum XXIII. Elvte foreløbige liste over genfundne grønlandske ringfugle. — Dansk Ornith. Foren. Tidsskr. 61: 151–164.
- SCHIØLER, E. L., 1922: Nogle Tilføjelser og Bemærkninger til Listen over Danmarks Fugle. — Dansk Ornith. Foren. Tidsskr. 16: 1–55.
- 1926: Danmarks Fugle med Henblik paa de i Grønland, paa Færøerne og i Kongeriget Island forekommende Arter. Vol. II. København.
- SCHAANING, H. T. L., 1933: Zoological Results of the Norwegian scientific Expeditions to East-Greenland I. 1. A Contribution to the Bird Fauna of East Greenland. — Skrifter om Svalbard og Ishavet nr. 49: 1–24.
- SCORESBY, W. jr., 1823: Journal of a Voyage to the Northern Whale-Fishery; including Researches and Discoveries on the Eastern Coast of West Greenland, made in the Summer of 1822, in the Ship Baffin of Liverpool. App. no. III. II, Aves p. 421–422. Edinburgh.
- SCOTT, P. & FISHER, J., 1953: A thousand geese. Collins, London.
- SNYDER, L. L., 1957: Arctic Birds of Canada. Univ. of Toronto Press.
- SØRENSEN, T., 1943: The Flora of Melville Bugt. — Meddr Grønland, Bd. 124, Nr. 5.
- USPENSKI, S. M., 1965: Die Wildgänse Nordeurasiens. Neue Brehm-Bücherei 353. Witttemberg-Lutherstadt.