THE AUK

A QUARTERLY JOURNAL OF

ORNITHOLOGY

VOL. 69 OCTOBER, 1952 No. 4

ZOOLOGY OF THE BAIRD EXPEDITION (1950) I. THE BIRDS OBSERVED IN CENTRAL AND SOUTH-EAST BAFFIN ISLAND

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INTRODUCTION

THE Baird expedition (1950) was based at Clyde, approximately 70° N, on the east coast of Baffin Island. The party was conveyed there by air and landed on the sea ice on May 19 and 20 (Baird, 1950, 1951). Diverse scientific interests were served by the establishment of a number of camps in the interior, during the next few days, by our 'Norseman' aircraft; the zoological unit, consisting of Alexander Anderson and me, took up permanent quarters at Camp B, at the head of Clyde Inlet, on May 24. We stayed there 12 weeks, devoting our attention to the collection of plants, freshwater and terrestrial animals, and above all to a study of the breeding birds.

Between August 14 and 19 we made an important excursion to the south to visit Cape Searle (67° 13′ N, 62° 30′ W), the site of an immense colony of fulmars. The airplane landed us at Padloping, 250 miles southeast along the coast from Clyde; from there we reached Cape Searle Island, about 25 miles distant from Padloping, by boat, and remained there two nights.

Some observations were made at Frobisher Bay Airfield, in southern Baffin Island, where a few days were spent on the inward and outward journeys, and also at other camps of the expedition in the Clyde area.

Previously, in 1937, I had accompanied Commander Donald B. MacMillan on an expedition to Frobisher Bay, in the Gloucester schooner *GERTRUDE THEBAUD*. The vessel reached Acadia Cove, Resolution Island, on July 27, and during the next 12 days made stops at the Lower Savage Islands, York Sound, and other fiords on the south shore of Frobisher Bay, as well as Brewster Point and Peter Force Sound on the north shore. After coasting the north shore of the bay outward bound on August 8, we sailed more than 200 miles to the

northeast in Davis Strait, sighting no land after passing Lady Franklin Island; during the night of August 9–10 we met heavy pack ice about 65° 45′ N (in the latitude of Cape Walsingham), and turned south, on a direct course for Cape Mugford, Labrador.

Though there is a report on file in the National Museum, Ottawa, of my own observations in 1937, some of the material has been included here, since the report has never been published.

I am very grateful to Lt.-Colonel P. D. Baird and the Arctic Institute of North America for inviting Anderson and me to join the expedition, and for the generous and well-planned facilities placed at our disposal; and also to the University of Aberdeen for granting us the necessary leave of absence. Alexander Anderson was the best of companions and most useful of helpers. His excellent field-observations have been freely incorporated in this paper, and the skins he prepared have been indispensable.

The most important, as well as the most recent, contributions to the ornithology of Baffin Island are those of J. Dewey Soper (1928, 1934, 1940, 1946), who noted the publications of most of the earlier naturalists. The areas visited by the present writer happen not to overlap at any point the much more extensive journeys of Soper. Cumberland Gulf was an important base for the latter's work, as it was also for Kumlien (1879), the pioneer naturalist of the region, and again for Hantzsch (1929, 1930). I have not entered Cumberland Sound at any time; Frobisher Bay lies to the south of it, and Cape Searle and Clyde to the north.

Cape Searle was visited in May, 1884, by Franz Boas, the ethnographer, on his sledge journey from Cumberland Sound to Kivitoo (Boas, 1885). An important collection of plants was made there by James Taylor (1863), an Aberdeen surgeon on board the Scottish whaling vessels in the years 1856–61. These seem to have been the only previous visits by naturalists; for though Kumlien (1879: 102) refers to the fulmars, it is evident that he did not see the place with his own eyes.

Clyde was briefly visited (and named) in 1818 on Ross's First Voyage, and again on Parry's First Voyage in 1821. More than a century later, from August 14 to 29, 1934, T. G. Longstaff and C. T. Dalgety, who (with Baird and Hanham) were then members of Wordie's expedition, made observations and zoological collections at Eglinton Fiord and Clyde Inlet (*cf.* Dalgety, 1936).

CAMP B

The largest part of our time was spent in the vicinity of Camp B (69° 50′ N, 70° 25′ W) at the head of Clyde Inlet. When we arrived,

about the same time as many of the migrant birds, the sparse snow-cover was fast disappearing, though spring had barely come. We remained there long enough to see the high ground white again with new snow, and many of the birds already departed for the winter. It may be made clear at this point that the premature arrival of autumnal frost and snow puts into "cold storage" the summer's crop of vegetation, and there is consequently found in early spring an abundant supply of herbage, seeds, buds, and even berries (*e. g.* of *Vaccinium uliginosum* and *Empetrum nigrum*) of which the birds and mammals can take advantage.

Clyde Inlet is a deep, narrow fiord, about 70 miles in length; it is carved through a coastal belt of mountains attaining heights of 1200–1500 meters. The tops of these are mostly capped with continuous, many-domed ice fields of great extent, from which glaciers descend, in some places right into the fiord. The inlet has been cut through the highest parts of this alpine region, and at its head there opens a broader valley, occupied by the Clyde River. To the west, the country is still exceedingly rough and barren, but the relief is lower and there are no glaciated mountain tops until, finally, some 40 miles southwest of the fiord-head, the river takes its source in the Barnes Ice Cap, a "continental" sheet of moderate size, astride the height of land.

Clyde Inlet is but one of scores of long fiords on this coast, but it differs from others seen by us in the oasis-like character of the lowland at its head. Here there are some square miles of country lying below 150 meters; a considerable part, it is true, consists of terraced gravel flats almost devoid of vegetation and exposed to the sand-blast and scouring of frequent gales. But these are bordered by more sheltered pockets of meadow with ponds and marshes, and pasture-like slopes covered with a fairly continuous carpet of vegetation. The flora and insect-fauna both contain species hitherto unknown north of the Arctic Circle in Baffin Island, or in a few cases altogether new to the country. All six of the small passerine birds now known to breed in Baffin Island are locally plentiful, a circumstance never recorded elsewhere, even in the south. (Baffin Island is roughly the area of Texas, and larger than any wholly European state; it extends some 600 miles southward of our position.)

Writing of analogous localities in Greenland, Salomonsen (1950: 8) says: "There is a pronounced difference between the foggy, maritime climate of the coast and the continental climate of the inland belt with intense summer insolation, semi-arid conditions and a mean temperature in the summer months at least 2° C. higher than on the coast. These differences greatly affect both the vegetation and the terrestrial

animals." By way of illustration, mosquitos appeared at Camp B on June 25 and were still troublesome on windless days when we left the camp seven weeks later, on August 12; on the coast at Clyde, by contrast, little account need be taken of mosquitos, which are observed only in small numbers for about two weeks at most. On July 29 the shade temperature reached 70° F. at Camp B, exceeding by 6° the maximum at Clyde the same day, which was the highest yet recorded there.

DAILY TEMPERATURE ANALYSIS AT CAMP B, 1950

	May	*June*	*July*	*August*
Number observation days	7	25	31	30
Minima 32,5° or below	(6)	17	6	5
Minima 40° or above	0	1	10	5
Maxima below 40°	3	1	0	0
40–50°	4	21	10	21
50–60°	0	4	14	9
60–70°	0	1	6	0
above 70°	0	0	1	0
Mean temperature	35.9	38.6	46.2	42.6

These favorable conditions, corresponding to the "grass tundra" of Nordenskjöld (1928) and Soper (1940, 1946) are confined to elevations below about 180 m.; above that height the hillsides are covered with loose stones or bare crags; while the plateaus at 600 m. were snow-free for only 8 to 10 weeks in July and August, sparsely vegetated by only the hardiest of plants, and inhabited by scattered Snow Buntings, larks, lemmings, weasels, and foxes. Within a mile or two of the river therefore, on either side of the valley, were the stone-fields of the "desert tundra," passing higher up to permanent ice-fields of the "polar desert."

Our camp was at first situated on the gravel flats, where from its first arrival the aircraft could land on wheels; but a series of strong and damaging winds drove us to seek a more sheltered site, which we found in perhaps the most densely populated of all the grassy pockets. It was known to us as Falcon Hollow and is a basin of some 200 acres (80 ha.) extent, traversed by a small river (Falcon River) coming from the highlands to the west. The basin is cut off from the main flats by a low ice-smoothed, rocky ridge (Falcon Ridge), through which the river cuts. These names were derived from a Gyrfalcons' eyrie, a conspicuous landmark situated not half a mile from our camp, on a low overhanging cliff of Falcon Ridge, which commands a magnificent view over the terraced flats to the fiord-head a mile away, and the crags and mountains which form the walls of the valley beyond.

Especially in July and August, when the ice-bridges had all disappeared, we stayed chiefly on the northwest side of Clyde River, working regularly west some five miles past "Kranck Lake" and over grassy country, to "Marble Canyon." Eastward a low divide separates Falcon Hollow from "Caribou Valley," watered by a stream of larger volume than the Falcon. This plunges diagonally down the precipitous hillside in a narrow cleft of recent origin, in which there are concealed a thousand feet of beautiful cascades. For a week at the end of June, when the snow was vanishing from the hills above, we were unable to cross the Caribou River, and could cross the Falcon only with difficulty; our movements were then narrowly restricted. Beyond the Caribou Valley, in which the stream runs out to the fiord-head over a braided outwash fan, lie the three "Pipit Lakes," and beyond them the "Pipit Hills," about 300 meters in height; these, three miles from the camp, formed the eastern limit of our intensive work.

The area of most concentrated study was thus about eight miles long, from Marble Canyon to the Pipit Hills, and a mile or two wide. It was bounded on the southeast by the main river and fiord, and on the northwest by the steep hills which we knew as Dyke Mountain (above our camp) and Dryopteris Mountain further east (above the Pipit Lakes). The latter mountain was 950 meters in height, with a 300 meter cliff-face falling to the Pipit Lakes.

Excursions beyond these limits were undertaken rather infrequently, although those made from day to day within them must have totaled 1000 miles by the time we left.

In the course of the summer the permafrost level receded about one meter beneath the ground surface where there was no vegetation. Snow Buntings nested freely in rock-cracks, usually but not always in sunny situations where the cold is kept well back from the surface; and both they and the Wheatears used shallow holes in the ground. A continuous blanket of vegetation, such as that formed especially by *Cassiope tetragona*, conserves the frost, with the result that its gradual thawing can serve as a steady source of moisture within reach of the roots. Lemmings' old winter nests, built in or under the snow and later found lying about, often contained a lump of ice up to the end of June, revealing the great effects of relatively trifling insulation.

We could not cross the Clyde River on ice-bridges after June 10. By June 30, the river, swollen by spring floods, had begun to eat away the fiord ice. In the next few days the open water rapidly increased, by July 7 extending more than 10 miles down the fiord and out of sight. On that day the larger lakes were not entirely free of ice;

Kranck Lake was finally clear on the 17th, after which the surface temperature could rise rapidly above 0° C. (Two days later it was possible to swim with enjoyment at the shallow west end, so hot was the weather at that time.)

We wished to avoid disturbing the birds breeding in our vicinity, and collecting of series of specimens was considered secondary to making observations on their habits and reproduction.

1. COMMON LOON, *Gavia immer* Brünnich.—One seen in small pond at York Harbor, Frobisher Bay, on July 28, 1937; six flying over Peter Force Sound on August 4, 1937.

2. RED-THROATED LOON, *Gavia stellata* Pontoppidan.—First seen at head of Clyde Inlet on June 7, and constantly thereafter.

A bird was sitting on a nest containing two eggs, on a grassy point beside a shallow pond on the East Flats on June 24. A single chick hatched; it was seen first on July 18 and was still on same pond two weeks later. On July 21 it was covered with uniform sooty down, and already held its short beak high in the air like its mother beside it.

A second nest, on damp grass beside one of the south side ponds, was found with two fresh eggs on July 8; on or before August 8 this nest was robbed by an arctic fox, which left its droppings in the nest.

Red-throated Loons were seen in most localities visited, including Camp M_2 at the head of Eglinton Fiord; also in southeastern Baffin Island at Acadia Cove, Resolution Island (July 27, 1937) and Brewster Point, where two almost-fledged young were seen, August 3 to 6, 1937.

3. SMALL-BILLED FULMAR, *Fulmarus glacialis minor* Kjaerbølling.—*Procellaria minor* Kjaerbølling, Danmarks Fugle, 1852: 324 (*cf.* Salomonsen, Birds of Greenland, 1950: 41.)

A fuller account of the Cape Searle colony (67° 13′ N, 62° 30′ W), one of the four or five fulmar colonies at present believed to exist in Canada, has been prepared for publication in 'Arctic' (Wynne-Edwards, 1952). A colored reproduction of the remarkable site appears in Fisher (1951).

Anderson, Hale, and I spent the nights of August 15 and 16 on Cape Searle Island, being taken off in the afternoon of the 17th; on the 19th we flew along the cliffs in the airplane. Owing to their success in a walrus hunt as we approached the island, our Eskimos had to return home to Padloping loaded with the meat, and left us without a boat. From the island itself, which is exceedingly rugged, only part of the Cape is visible. It ends in two massive towers about 425 meters in height, which fall sheer into the sea; the inner one is flat-topped and resembles a Gothic tower of colossal proportions; it entirely conceals the slightly smaller, outer one from view. They are joined together and to the main part of the island by sharp ridges, bearing such bizarre pinnacles that "saw-toothed" would be a misleading understatement. The fulmar colony occupies all sides of the towers, and the cliffs joining and adjacent to them for one to one and one-half miles on each side of the island. We viewed the colony both from the cliff tops, 330 meters up and and still 1000 meters from the great tower, and also from the beach below on the south side. The summits of both towers support a luxuriant growth of nitrophilous vegetation, in spite of the extreme severity of their exposure; and in this vegetation, in an evenly-spaced pattern on each summit there were one or more thousand nests.

The cliffs consist of ancient volcanic deposits, chiefly horizontally-bedded tuffs, weathered into elaborate niches, buttresses, and crumbling spires. Fulmars nest throughout the entire height, but much more abundantly above 300 meters. The upper parts of the cliffs are brilliantly colored by the orange lichen, *Caloplaca elegans*. Suddenly disclosed to us for the first time as we rounded the head of Padloping Island, towering out of the berg-strewn waters of Davis Strait, the Cape presented a scene of surpassing grandeur and beauty.

It was desirable to make some estimate of the population, which I placed after careful consideration at 200,000, being the number of birds supposedly present; in most cases one of each pair is present at the nest, though many chicks were at that time unattended, and a large but unknown proportion of pairs have a nest-site but no egg or chick. The estimate should be accepted only as a well-considered guess, likely to be correct within a factor of two in either direction (*i. e.* 100,000 to 400,000). It is based partly upon sample counts of the visible nearer parts of the cliffs, upon the myriad specks sailing in a cloud over the summit and for half a mile down wind, and partly upon the numbers seen feeding and counted at sea during our approach and departure by boat and airplane.

No description of this site has previously been given, and there appear to be but two references to it in the literature. Kumlien (1879: 102), had he seen the fulmars on the cape himself, would certainly have given some indication of the magnificent setting, as he did in referring to a lesser colony which he had seen on Disko Island, Greenland; the fact that he referred incorrectly to the site as "Padlie Island" is of no significance, since the "Cape Searle" of Ross was not re-identified until several years later, by Franz Boas (1885). Boas came, as we did, along the south side of Padloping Island, and turned west through the narrow passage between it and Cape Searle Island, traveling by dog-sledge on the sea ice a day or two after May 22, 1884. What he saw there we shall never know, for the only reference to the place is the Eskimo name on the map, K'akhodluin, translated in his list of place-names as 'die Sturmvögel' (p. 92), identified with the "Cape Searle" of Ross, and tentatively with "Sanderson's Tower" of Davis, in the "Synomyma" listed on pp. 94–95. My own attention was drawn to Cape Searle (Wynne-Edwards, 1939: 128) by Dr. L. D. Livingstone in 1937, when he was Medical Officer at Pangnirtung.

One other colony in Baffin Island has been reported during this century, namely that discovered by Peter Freuchen facing the open entrance of Admiralty Inlet, between Elwin Bay and Baillarge Inlet (Hørring, 1937: 43). Freuchen remained there from April 23 to May 7, 1924, and reports "so vast numbers . . . as to give the impression of Guillemot cliffs and in some places Little auk cliffs." The birds traveled to and fro across the ice, between their snow-covered nest-sites on the cliffs and the open water.

Dr. Livingstone discovered, about June 1, 1927, a third large Baffin Island colony on the 500-meter cliffs at the mouth of Coutts Inlet (72° N, 74° 30′ W), farther north on the Davis Strait coast. This has not yet been revisited, and his record of it (in the National Museum of Canada) has not heretofore been published. A fourth big Canadian colony was discovered by Capt. O. Sverdrup at Cape Vera, Archer Peninsula, Devon Island (76° 12′ N, 89° 25′ W) on August 8, 1900 (Schaanning, 1933: 162). Other colonies most probably exist, including one recently reported by Eskimos on the Kakhodluin Island in Exeter Sound, Baffin Island (66° 15′ N, 62° 15′ W). Fisher (1952: 335) also refers to "an island off Ellesmere Island." The small rocky islands near Quickstep Harbor, Cumberland Sound, where Kumlien found a few nesting in July, 1878, do not appear to have been revisited, though Soper

was in that neighborhood on a winter journey in January, 1926. Comparable colonies exist in Greenland, notably at Qeqertaq in Disko Fiord; a graphic description of the Greenland colonies, to which Cape Searle bears a close resemblance, may be found in Salomonsen (1950: 33–37).

We gave attention to the proportions of dark- and light-colored birds, confirming the reports of Kumlien (*loc. cit.*) and Dalgety (1936: 585) that dark birds predominate in this area. Since every gradation exists, between the lightest and those so dark that I have on occasion momentarily mistaken them for Sooty Shearwaters, the difficulty is to reduce the proportion to figures. In British waters only "light-phase" or white-bellied birds normally occur, though there is a small but quite perceptible range of individual variation (*cf.* Witherby, Vol. 4: 79, footnote, 1940). We counted as "light" birds any which would have passed without comment around the Scottish coast or in the North Sea; all others were "dark"; and the latter therefore include the main bulk of gray-headed intermediates as well as the true "blue-phase" or fully melanic birds. On this basis 67 of a total of 499 birds were "light"; that is, 13 per cent "light," and 87 per cent so-called "dark." Extremely dark birds are nevertheless far from predominant, perhaps no more common than those called "light."

The chicks near enough to examine with binoculars appeared mostly one-half to two-thirds the size of the adults; that is, they were about two weeks old (the growth-rate being remarkably rapid in the fulmar), having hatched in the first days of August from eggs laid about the second week of June. A few chicks may have been a week older, and in some it was possible to see the first growth of quill-feathers on the manus. The color of the (first?) down was French gray or dove-gray, slightly variable, but not more so than in Scotland and not nearly as variable as in the adults; in particular, the chin and breast may be paler than the upper parts, or they may be the same color. There were no chicks with white heads (Witherby, *loc. cit.*).

Looking down, we saw an arctic weasel hunting the ledges near the top of the cliff, scrambling with no apparent concern for the fact that the loose pebbles it dislodged fell some 150 meters. It was perfectly evident that, after two months and more of diligent search, no nests remained anywhere within its reach. Other predators seen there include 20 or more pairs of Glaucous Gulls, a pair of Ravens, a White Gyrfalcon, and at least two Peregrine Falcons. At the foot of the tower on the south side there is an acre or two of level ground covered with huge boulders, and among these we found scores of wings and corpses of fulmars, besides rusty cans and other signs of Eskimo visits. We collected three specimens, and, eating the breast-meat, found it delicious, and preferable to Brünnich's Murres and Black Guillemots which we ate at the same time. This does not accord with opinions frequently expressed, though it confirms my experience on the Grand Bank, where the Newfoundland fishermen prefer shearwaters to any of the auks.

There were no other sea fowl sharing this colony, except the Glaucous Gulls, which kept to themselves on some lower cliffs on the south side, and a few Black Guillemots, which may or may not have been breeding.

I am in agreement with Salomonsen (1950: 41) and others in recognizing the fulmars of Baffin Island as *Fulmarus glacialis minor* Kjaerbølling. When North American specimens are compared with those from Europe (for which Witherby (*op. cit.*: 80) gives "bill from feathers" in males 38–43 mm., females 36–40 mm.) the smaller bill-size of the former is immediately apparent, as the figures on the next page show.

Salomonsen re-measured the specimens of the 5th Thule Expedition from Admiralty Inlet and found the average bill-length of 21 males was 35.9 and of 6 females 33.1 mm. (Hørring on the same specimens obtained 36.0 and 34.1). These are

perhaps even smaller than those from Cape Searle (one male 37.9, two females ave. 34.2).

The wing-lengths of the Cape Searle birds fall within the range of East Atlantic fulmars; but I note that the overall length of the skull, and not merely the bill, is some 15 per cent greater in typical *glacialis* than in my specimens of *minor*.

That both subspecies occur in temperate waters off the eastern seaboard of Canada and the United States is to be expected: confirmation is given by a bird I received in the flesh through the courtesy of Dr. V. D. Vladykov on November 29, 1935, taken

Fulmarus glacialis minor

No.	*Locality*	*Year*	*Color*	*Sex*	*Culmen in mm.*	*Wing in mm.*	*Body weight in grams*	*Rectal temperatures Cent.*
A 76	Cape Searle	1950	dark	♀	32.8	314	565	38.9
A 78	Cape Searle	1950	dark	♀	35.5	329	595	41.0
A 79	Cape Searle	1950	intermediate	♂	37.9	314	740	41.0
	Cape Searle (Skull, with bill scales in place)	1950	—	—	34.3	—	—	—
3	Cape Bauld, Newfoundland	1934	dark	♀	33.5	(molt)	625	—
5	Cape Bauld, Newfoundland	1934	light	♀	36.6	333	765	—

on the deck of a steam-trawler 85 miles east-southeast of Chebucto Head, Nova Scotia, at about 44° 10′ N, 61° 50′ W. This bird's culmen measured 41 mm; it was a male, light-phase, weighing 795 grams when received in Montreal; it is interesting to record that the stomach contained 80–100 bladders of gulf weed, apparently *Sargassum vulgare*, besides a few small stones.

Fulmars are numerous and well-distributed in the summer months in Davis Strait and Baffin Bay, not penetrating as a rule into Cumberland Sound or Frobisher Bay much beyond the limit of floating ice. We saw two in Clyde Inlet on August 5 about 50 miles "inland" among the mountains and glaciers of the "alpine zone," and Mr. George Riley, one of our geologists, saw one a number of times in a similar situation, where the fiord walls are 1200–1500 meters high, near the head of Walker Arm, Sam Ford Fiord, about July 23.

4. ?CANADA GOOSE, *Branta canadensis* (Linnaeus).—At Camp B on May 31, I saw two large dark geese flying east-northeast, and thought I could discern the black and white pattern of the head and neck. Another, still less certainly identified, was seen with four Snow Geese on June 11. If these were not Canadas, it is difficult to know what other goose they could have been. Canada Geese have in recent years established themselves in west Greenland (Salomonsen, 1950: 86), and may be extending their range in the "Eastern Arctic" also.

5. SNOW GOOSE, *Chen hyperborea* Pallas.—At Camp B first seen (by Mr. Mason Hale) on May 29, 1950, and thereafter in parties of one to seven on June 1, 4, 5, 8, 10, 11, and 26. At this time they settled several times near the camp and once remained overnight.

At Refuge Harbor on Gibbs Fiord, Riley saw a flock of some 400 geese, which he believed to be Snow Geese, flying north on May 31. Riley also discovered, and photographed recognizably, a pair of Snow Geese with seven downy goslings, each

about 20 cm. long, at the head of McBeth Fiord on August 4. This is 30 miles southeast of Camp B.

At Frobisher Bay Airport an adult and three young birds in gray plumage were seen, flying down the bay, on September 6.

6. BRANT, *Branta bernicla* (Linnaeus).—A bird which remained 30 minutes in his vicinity at the head of Gibbs Fiord on June 21 was confidently identified by Riley as a Brant. It would presumably have been the white-breasted form.

Clangula hyemalis COLLECTED AT THE HEAD OF CLYDE INLET

Number	*Date*	*Sex*	*Wing*	*Weight*	*Body temperature*
A 70	August 15	♀	205 mm.	650 g.	—
A 71	August 15	♀	203	750	—
A 82	August 30	♂ imm.	—	600	42.0° C.

7. OLD-SQUAW, *Clangula hyemalis* (Linnaeus).—A pair appeared at the ponds on the East Flats near Camp B on June 15. A duck was found sitting there on six eggs on July 10. The nest was in a sedge tussock beside a shallow pond, and composed chiefly of dry sedges, without much down. The duck fouled the eggs when flushed.

Ducklings were seen at the "Lepidurus Pond," two miles west of the fiord-head, on August 2, and there were molting adults there from July 18 onwards.

A party of 17 drakes, 13 in full nuptial plumage, was feeding among boulders in shallow water at the head of the inlet on July 8. Nineteen drakes, eight having long tails, were seen in Cormack Arm on August 5. It appears that the characteristic long central rectrices may be lost by some birds even before they start breeding, but there is some variation; adult birds with and without them were seen in June, July and August.

Old-squaws were seen at Clyde on August 31, and reported by other members of our party from Bray Island and Lake Gillian, Foxe Basin, on August 10 (hundreds of birds), and Gibbs Fiord. None were seen by me in Frobisher Bay in 1937 or 1950.

8. COMMON EIDER, *Somateria mollissima borealis* (C. L. Brehm).—In 1950 these birds were identified with certainty only along the northwest coast of Padloping Island, where 50 or more were seen, including drakes in eclipse. Owing to the difficulty of distinguishing female and immature birds of this species from those of the King Eider, some doubt must be attached to the record of 18 female eiders, and 2 downy ducklings, on Cormack Arm, Clyde Inlet, August 5.

In 1937 Common Eiders were seen daily at York Harbor, Brewster Point, and Peter Force Sound (all in Frobisher Bay), July 28 to August 7. Two small rafts of ducklings were seen at York Harbor on August 2 and a nest composed of *Cladonia* and down and containing 5 eggs was found on a hillside some 500 meters from the sea at Brewster Point, August 6.

Eight females collected in Peter Force Sound, August 4, had the following weights: 1.84, 1.68, 1.53, 1.47, 1.45, 1.39, 1.30. 1.22 kg., average 1.485 kg. (= 3 lbs. 4 oz.). The stomach of one contained recognizable remains of the polychaete *Aphrodite* sp., the gastropods *Littorina rudis* and *? Buccinum* sp., and the amphipod *Caprella* sp.

9. KING EIDER, *Somateria spectabilis* (Linnaeus).—On the afternoon of July 19, after about three hours spent at the mouth of the river near Camp B, we were surprised by a flight of 150 to 200 King Eiders, all drakes in full plumage, presenting a remarkable sight as they flew 6 to 10 meters above the water, more or less in line abreast, to disappear into the distance down the fiord. This was our first intimation

of what developed thereafter into an important migration. On July 21 and 23 more flocks totaling many hundreds were seen, some passing on and others resting on the fiord in close-packed formation, evidently feeding; watched from high on the mountainside the latter appeared now white, as all the heads and breasts turned towards us, and now black, as they turned the opposite way. An hour before midnight the same evening I happened to see a dense flock (traveling north-eastwards like all the others) passing across the face of the opposite cliffs some 500 to 600 meters above the fiord. On August 4, as we traveled down the fiord by canoe during the "night," flock after flock overtook us, some merely skimming the water, some as high as three or four thousand feet. These birds were adult drakes, excepting one bird in brown plumage seen on July 23, and a small proportion of the thousands seen on August 4. On August 7 a flock of over 100, passing down the river at 10:30 a.m., consisted exclusively of adult males. Anderson collected a year-old male there on August 30.

A more remarkable impression was obtained at Camp A_2, at the southeastern extremity of the Barnes Ice Cap, 40 miles southwest of Camp B. Dr. W. H. Ward informs me that the birds were first noted passing east on July 14; thereafter they were seen regularly in fair weather, chiefly between 8 p.m. and 3 a.m., and usually in batches up to about 500 at a time. In fine weather he estimates there would be on the *average* 500 to 1000 a night. (A flock was seen to pass in the reverse direction on one occasion, August 11.) The last observation of which a written note was kept by him was on August 17.

Most of these flocks passed low over Camp A_2, following the shores of the lake there; they had evidently skirted the southern edge of the ice cap, after crossing the main divide from Foxe Basin some 12 miles to the west, where "Flyway Lake" has been named accordingly. The height of land is here only 440 meters, probably the lowest crossing to be found in this narrow central waist of Baffin Island. From A_2 there is no reason to doubt that they followed the course of Clyde River, passing over us at the head of the fiord and continuing out to Baffin Bay. On September 5, just after taking off from Clyde for the last time, we flew above dense flocks of black-looking ducks, almost certainly of this species, resting on the water near the fiord mouth.

Away from this narrow route only one observation was made, by Mr. George Riley who saw a flock of between 30 and 100, consisting mostly but not entirely of birds in adult male plumage, at the head of Gibbs Fiord on June 20. These birds stayed there all day and *returned inland* in the evening.

It is interesting to notice briefly how these observations are related to previous knowledge of the distribution and movements of the species. The King Eider breeds commonly all around the shores of Foxe Channel and Basin (Soper, 1946: 23; Bray, 1943: 513), northwards to Admiralty Inlet (Freuchen *in* Hørring, 1937: 18), and thence further to Ellesmere Island, North Greenland, and the central Arctic.

The spring arrival on the breeding grounds takes place from April, onwards. Very probably the migration is over the frozen sea and not across the interior, so far as Baffin Island is concerned; Soper (1946: 24) says "the species prevails in large numbers all along the south coast during early spring, and then in most sections vanishes . . ." It does not reappear in the fall. Arrived at the breeding grounds "the sojourn of the drake is very short" (Salomonsen, 1950: 135); they stay for some time after the nest is established and the eggs are laid, however, "but early in July they disappear" (Bray, 1943: 513).

In west Greenland the July movement of males is to the south; they begin to arrive as early as July 6 in the Upernavik District, and by July 16 in Disko Bay

(Salomonsen, *loc. cit.*). "The maximum density is reached in the first half of Aug. when enormous flocks are congregated in the southern parts of Upernavik District, in the northern parts of Disko Bay, on all coasts of Disko Island and in Egedesminde District as far south as Kangatsiaq" (*op. cit.*: 136). The females do not leave the nesting grounds until September and October when the young are fledged and accompany them. In these months there is a gradual southward movement of males, females, and young to the winter quarters in southwest Greenland, from Cape Farewell to Holsteinsborg. "In S. W. Greenland the King Eider is extremely common in winter and is intensively hunted by the Greenlanders. The large number of males summering in the Disko Bay region and the vast multitude of birds wintering in S. W. Greenland cannot possibly all come from N. Greenland but comprises probably a large percentage of the population of the Canadian Eastern Arctic. Interesting evidence of this was the capture in early Jan. 1897 at Kangeq (Godthåb District) of an adult female carrying a copper arrow-head of the type used by the Eskimos of King William Land. A similar arrow-head was found in about 1850 in an Eider shot at Kangamiut (Sukkertoppen District), but it is not known whether this bird was a Common Eider or a King-Eider" (Salomonsen, 1950: 137).

Clyde Inlet lies exactly opposite Disko Island where (Salomonsen, 1950: 136) "the flocks are especially large . . . , often numbering thousands of birds"; the distance across is about 300 miles. Our observations fall perfectly into Salomonsen's pattern, and it seems not at all impossible that the route across the waist of Baffin Island, via Clyde River and Inlet, is followed by most of the drakes from the vast region of Foxe Basin, and even further west. Probably they generally continue their journey unbroken, since the period of our observations coincides exactly with the time of arrival in Greenland, and no great concentrations have ever been observed at this time on the Baffin coast. Whether the same route is subsequently followed by the females and young we did not remain long enough to discover. Dalgety (1936: 584) saw in mid-August huge flocks of *females* in Eglinton Fiord and Clyde Inlet; it seemed to him "that 1934 was a 'non-breeding year' for King-Eiders in Baffin Land, that the males had flocked and gone away at their usual time, and the females were remaining near their breeding ground." This explanation may well be substantially correct for in 1950 the flocks at the same date still consisted entirely of males.

This migration preceding the eclipse molt, resulting in a tremendous concentration of the species at that time, is a close counterpart, on a larger scale, of the molt-migration of the Sheld-duck, *Tadorna tadorna*, in western Europe, recently brought to light (Coombes, 1949 and 1950). Nothing corresponding to it is at present known to occur in the case of the King Eiders breeding in the Old World Arctic.

10. ROUGH-LEGGED HAWK, *Buteo lagopus sancti-johannis* (Gmelin).—There seem to be no records of this species in southeast Baffin Island though it is known from Lake Harbor west to Cape Dorset. I observed one at Frobisher Bay Airfield (63° 45′ N, 68° 33′ W) on September 7, 1950, and on July 28, 1937, I climbed to a nest situated on a low cliff, near the northwest shore of York Sound, Frobisher Bay (62° 27′ N, 66° 30′ W). The nest contained five young birds in white down, with the wing-quills visible, and one infertile egg. There were remains of lemmings around the nest.

11. GREENLAND FALCON, *Falco rusticolus obsoletus* Gmelin.—The falcons' nest, overlooking the bare gravel flats from its secure position on "Falcon Cliff," was one of the landmarks of Camp B. It was placed in a niche about 20 meters up on a vertical, wind-eroded rock-face, overhung by the upper 12 meters of the cliff, and was inaccessible to us. By crouching on the edge of the overhang above, as far out

as caution admitted, a view could be had of more than half the actual nest. The eyrie showed up as a prominent white mark, seen immediately on our first arrival on May 24, when the falcons were already sitting.

The site was well chosen, not only for the commanding view, security and shelter it provided, but also for its southerly aspect. No rain could wash away the guano, which had accumulated for years. Down the steep slope at the foot of the cliff there were huge boulders, interspersed with rich vegetation. The ground was littered with remains of prey of bygone summers and harbored a den of the arctic fox. Shelter and sun perhaps accounted for the numerous droppings of arctic hare and Ptarmigan; and, with the important additional effect of the manured ground, the same circumstances were no doubt responsible for the presence of such noteworthy plants as *Taraxacum lapponicum, Ranunculus pedatifidus, Arnica alpina,* and *Arabis Hookeri* (the last being previously unknown in arctic Canada), besides *Potentilla nivea, Cochlearia officinalis,* and *Poa glauca.* A pond containing landlocked char lay at the foot of the slope.

On June 2 we looked into the nest for the first time; it contained three eggs, two of them being dark like those of the peregrine, and the third very much paler. On June 10 there were still three eggs, but on the thirteenth the young had hatched (though only one could actually be seen, since they had been moved back in the nest), and were being fed meat from a cock ptarmigan. By June 29, still sprawling, the young birds had begun feebly to work their wings. On July 10 I first heard them calling from the nest. On the eighteenth they were taking turns to stand on the edge of the ledge, and the down floated off their wings as they stood vigorously exercising their muscles. By July 24 they looked ready to fly, but did not do so until the twenty-ninth and thirtieth. I watched one take what appeared to be its first flight on the latter date, from the nest down to the gravel terraces 200 meters below. Thereafter the birds continued to frequent the cliff, sometimes standing on the nest ledge merely as one of a number of convenient perches.

The fledging period was at least 46 days, and at most 49 days.

The female was the parent usually seen at the nest, both incubating and feeding the young, although on May 29, when we put her off the nest, the male appeared, and soon after took her place, while she flew out of sight. Both adults were undergoing a molt of the flight and tail feathers during the period of incubation.

Remains of prey identified below the nest included *Lepus arcticus, Lemmus trimucronatus, Dicrostonyx groenlandicus, Lagopus mutus,* and *Calcarius lapponicus.* Lemmings were exceedingly scarce in 1950 and were not seen in the nest; the only species observed there were Rock Ptarmigan and a duck with yellowish toes and dark webs, almost certain to have been a King Eider. The male was seen hunting on a number of occasions, often standing motionless (like a peregrine) on a vantage point, waiting for something to show itself, and at other times sailing along the face of cliff and mountainside.

There was a second, unoccupied eyrie in a rather similar situation about two and one-half miles distant, on an overhung, almost cave-like cliff ledge about 15 meters above the waters of the fiord at Pipit Point. This nest was composed of old twisted willow sticks, buried in guano, and of great size; castings and remains found on the rock ledges below were very similar to those described above. It is possible that in good lemming years both these sites would be used; or they might be alternative sites, such as may not uncommonly be established by eagles, ospreys, and other large raptors.

A single white falcon was seen above the Glaucous Gull colony, near the landward end of the Fulmar cliffs at Cape Searle.

12. PEREGRINE FALCON, *Falco peregrinus anatum* Bonaparte.—Single peregrines were seen in the vicinity of Camp B on June 16, 28, and 30. On July 8, Dr. Pierre Dansereau and others found a hawks' nest in a rocky gully at the west end of Kranck Lake. This nest was on an open grassy ledge, easily seen from the opposite side of the gully; it contained four eggs when visited on the 9th, and on the 17th one egg and three young. Beneath the ledge was a luxuriant growth of nitrophilous plants, the principal species being among those already recorded as predominating below the Greenland Falcons' nest, namely *Taraxacum lapponicum*, *Potentilla nivea* and *pulchella*, and *Arabis Hookeri*.

Mr. Riley regularly observed a pair of Duck Hawks at the head of Gibbs Fiord, between June 27 and July 12. These appeared to be nesting low down on a high cliff, about one-half mile from the water. This appears to be the most northerly breeding station so far observed in Baffin Island (70° 37′ N, 72° 30′ W).

At Cape Searle single falcons were seen on August 15 and 17, 1950, and single birds were seen at Lower Savage Islands and Brewster Point, Frobisher Bay, August 1 and 7, 1937.

13. ROCK PTARMIGAN, *Lagopus mutus ?rupestris* (Gmelin).—Although Rock Ptarmigan are celebrated for their cryptic habits and coloration, courting and breeding adults call attention to themselves by croaking; and young birds, when present, may be easily found as soon as they can flutter. However, not one single brood of young, or any nest or group of more than a pair of birds together, were seen by any member of our expedition. My daily excursions on foot during the summer added up, as has been said, to about 1000 miles, yet the total number of ptarmigan seen was only nine. (In the Scottish Cairngorms I can normally see more than that in a day.) Moreover, 1950 seems to have been a complete blank in this area as far as reproduction is concerned, and contrasts with 1934 when Dalgety (1936: 590) records having seen in the Clyde district in August "coveys of eight to fourteen," and "thirty-five . . . in about half a square mile." According to information received by Anderson at Pond Inlet in September, 1950, however, the population round Navy Board Inlet was above average, flocks numbering up to 100 birds having been seen between September 1 and 6.

A pair shot at Clyde on May 21 showed no outward sign of molting into summer plumage. Another pair was collected near Camp B on May 29; the male was unmolted, but the female had more than half the feathers replaced on the crown, back of the neck, shoulders, and back. A hen seen on June 9 was more or less in summer plumage, but as late as June 23 one cock had dark feathers only on the crown and nape, and a spot on the breast. Its white plumage was yellowed and soiled. Salomonsen (1950: 172–173) has called attention to this long retention of the white plumage in the cock birds of high-arctic races. The cocks molt a month later than the females; it provides a remarkable contrast to the molt-cycle familiar to us in the Scottish Ptarmigan, *L. mutus millaisi*, in which cocks and hens molt simultaneously in April, before nesting begins.

The spring molt of the ptarmigan is a timely resource for the redpolls, Snow Buntings, and longspurs, whose nests are invariably lined with white ptarmigan feathers.

On August 27, while ascending Eglinton Tower Glacier, we followed the tracks of two ptarmigan a long way over the snow. Evidently they were molting rapidly, for there were contour-feathers dropped every ten yards or so, and a dozen around the two depressions in the snow where the birds had rested, perhaps for the night.

Two males shot on May 21 and 29 weighed 525 grams each, and two females, their mates, weighed 510 and 525 grams. At 3 p. m. the crops of the second pair were full and contained: (male) berries of *Vaccinium uliginosum* and *Empetrum nigrum*, numerous buds and a few unopened catkins of *Salix callicarpaea*, bud tips of *Saxifraga oppositifolia*, and leaves of *Dryas integrifolia;* (female) leaves of *Dryas* constituting 90 per cent of the bulk, otherwise the same except that there were no berries (Gelting, 1937: 102 ff.).

Scattered far by the gales from beneath the falcon's cliff, we found a number of old detached ptarmigan wings with white-shafted remiges. These we supposed at first to belong to Willow Ptarmigan (*L. lagopus*), which might have been expected as autumn visitors at the head of Clyde Inlet. But a careful examination of these wings convinced us that the original dark pigment of the shafts had been more or less completely bleached by the sun, perhaps in the course of several years, and that they belonged in fact to the Rock Ptarmigan. We imagined also that we could distinguish the fecal pellets of the supposed Willow Ptarmigan as being twice the common size and consisting of coarser fibers, and accumulated year by year on the ground in the willow thickets and among large boulders where the snow drifts deeply in winter because it is sheltered from the wind. (In this dry cold climate animal feces may easily endure five years; in many places, acres in extent, the ground beneath the vegetation is entirely covered, where the stones permit, by a layer of lemming droppings.) There is no doubt that these places are much used by ptarmigan in winter, but a careful comparison of the feces of ptarmigan and Red Grouse, *L. lagopus scoticus*, in Scotland, since I returned, has sufficed to show that they are indistinguishable in size, and extremely variable in both size and texture in either species.

14. LITTLE BROWN CRANE, *Grus canadensis canadensis* (Linnaeus).—At Camp B the first crane was seen on June 1, flying west up the valley, making a far-away piping call, *tinkerer, tinkerer, tinkerer* . . . One or both members of a pair, presumed to have been the same two birds, appeared on June 8, 17, 20, and 25. On the last date they passed overhead five times, evidently engaged in their courtship flights. When they appeared at 10 a. m. they circled close overhead, and then planed majestically away for a couple of miles without beating a wing; one was calling *choo-r-r-r-oo*, owl-like and far-carrying. They flew almost wing to wing, one slightly ahead; sometimes they raised and lowered their heads, and once together lowered their feet.

Unfortunately they did not remain to nest, as had appeared to be their early intention, and they were never seen thereafter. Brown Cranes appear to be very uncommon in Baffin Island at the present time, the few recent records all coming from Pond Inlet and Bylot Island (Hørring, 1937: 46; Bray, 1943: 517).

15, 16. RINGED AND SEMIPALMATED PLOVERS, *Charadrius hiaticula hiaticula* Linnaeus and *Charadrius h. semipalmatus* Bonaparte.—Previous knowledge of the ranges of these two forms indicates *semipalmatus* as the type found throughout south, central, and western Baffin Island; *hiaticula* has been taken in recent times only at Arctic Bay (Bray, 1943: 518), Pond Inlet (Soper, 1928: 103), and Clyde Inlet (Dalgety, 1936: 585), all in the north and northeast. In Kumlien's time, 70 years ago, both forms were found by him breeding in Cumberland Sound, *hiaticula* being "apparently more common" (1879: 83), though Soper found only *semipalmatus* in that and other regions of southern Baffin Island in 1923 to 1931.

It was with interest that we examined the first two Ringed Plovers obtained at Camp B on June 26 and found them to be *hiaticula*. Another was shot on June 30, and a fourth on July 7. All these were in the same general locality, and all were males judged to be non-breeders.

Two plovers collected on July 12, after they had put on a decoy display, at another place about one and a half miles up the river, turned out to be *semipalmatus;* a second group of these was located on July 18 not far away. There Anderson found two chicks in down on July 26. This is our only direct evidence of breeding; prolonged search on the *hiaticula* grounds revealed no nests, and none of the eight specimens of *hiaticula* collected had brood patches or enlarged gonads. However, Anderson was decoyed by a plover, with fanned tail and trailing wing, on the *hiaticula* ground on

SPECIMENS OF *Charadrius h. hiaticula* TAKEN AT HEAD OF CLYDE INLET

No.	*Sex*	*Wing length in mm.*	*Rectal temperature in degrees C.*	*Date*
A 30	♂	126	42.3	June 26
31	♂	130	42.3	June 26
40	♂	129	39.3	June 30
46	♂	128	41.4	July 7
51	♀	128	39.8	July 14
52	♀	134	41.4	July 14
53	♂	130	41.8	July 14
54	♂	129	40.5	July 18
		Mean 129.3		

SPECIMENS OF *Charadrius h. semipalmatus* TAKEN AT HEAD OF CLYDE INLET

No.	*Sex*	*Wing length in mm.*	*Rectal temperature in degrees C.*	*Date*
A 48	♂	124	—	July 12
49	♀	122	39.1	July 12
55	♀	123	39.2	July 18
56	♀	123	—	July 18
59	♂	120	39.2	July 21
		Mean 122.4		

July 18, and our first encounter with the plovers on the *hiaticula* grounds, on the evening of the day we arrived at Camp B (May 24), was to watch the courtship chase of a pair, which continued for 20 minutes while the birds flew back and forth a few feet above the bare gravel flat, keeling over from side to side. One of them flew 10 meters behind the other, and one kept up the low piping "song," *tchu-ka, tchu-ka, tchu-ka* . . .

The proportion of non-breeders was high among *semipalmatus* also. The evidence indicates that the areas occupied by the two species, though ecologically indistinguishable and extending to several hundred acres in each place, were perfectly distinct. Eight specimens from the flats at the head of the inlet and adjacent Caribou Valley were all *hiaticula;* five from the terraces on both sides of the river one and a half miles west were all *semipalmatus.*

Salomonsen (1950: 184) has pointed out that in *hiaticula* there is a size-cline, diminishing to the northwest. Wing-measurements given by him for the Greenland population average 128.87 mm., compared with 129.3 in our series—a close agreement considering the small number measured in our case.

C. h. semipalmatus is a considerably smaller bird, with a narrower black breast-band and generally less white on the head, secondaries, and tail. (Witherby's

usually authoritative and accurate 'Handbook of British Birds,' 4: 354, 1940, gives a detailed description of *semipalmatus* which by no means applies to summer adults. In the latter, several of the alleged differences from *hiaticula* do not hold, and in fact the birds are more alike in color pattern than is there suggested.) These differences are barely sufficient for field-identification and, after many years experience of both birds, I can detect no voice-differences, for example, in the well-known, soft call *tooi*, and the series of grating and nasal notes, which seem common to both. There is no sign of hybridization or intergradation, however, and individuals of all ages can immediately be identified in the hand by the clear-cut difference in the amount of webbing between the toes.

The situation presented by these two birds, occurring in about equal numbers at the head of Clyde Inlet, is an interesting one. Normally allopatric and very properly regarded as subspecies, their formerly distinct ranges have evidently come to overlap in Baffin Island, as a result of post-glacial extensions of range by both Old and New World stocks. It appears that the birds can recognize members of their own race; each race avoids the other on the breeding grounds, a situation which might quickly arise through selection if mixed matings are infertile. They behave in fact as distinct species, and return of course to winter quarters separated by the Atlantic Ocean. The question of competition in their arctic home is a matter deferred for later discussion.

The gizzard of A40 (*hiaticula*) was crammed full of insect remains, including at least a dozen of a carabid beetle, *Pterostichus* sp., and one fritillary butterfly, *Boloria freija*. In A46 there was little recognizable, other than a few remains of the same beetle.

17. BAIRD'S SANDPIPER, *Erolia bairdii* Coues.—This, the only breeding sandpiper found by us, was a common bird both at Clyde on the coast and at the head of the inlet. The first migrants arrived at Camp B on June 6. Calls heard included the soft *twee-e, twee-e*, with a rising inflection, which gives the bird its Eskimo name, and a reeling trill suggestive of a cricket or cricket-frog, *e. g. Pseudacris nigrita*. This trill was heard on only two days (namely on June 14 at Camp B, and repeatedly on the 17th at Clyde) in spite of the constant presence of a breeding pair within a few hundred yards of our tents. There was also a harsh screeching during the distraction display.

We had at first no success in finding nests, but succeeded on July 10 in finding, first, two lately-hatched chicks, and later, in another place, a nest with three chicks and an unhatched egg. The nest, on a grass tussock containing prostrate willow-stems, was a slight depression lined with dead leaves of *Salix arctica*. The site was moist and well covered with herbage, on the fringe of the pond area of the "East Flats." The egg and the chicks were very beautifully marked, the black, buff and tawny speckling of the latter suggesting the color combination of a fritillary butterfly. All five chicks were banded.

At the same place the following day one bird put on a vigorous distraction display, screeching and trembling with the wings arched, and all the feathers raised. Four others flew around together meanwhile. On July 17, Anderson caught an unbanded chick close to the same place, and was greeted with another very similar display.

Pairs were found occupying sites not only on the wet flats, but also on the slopes and terraces up to say 60 meters, always where there was moist ground and fairly continuous vegetation.

A male collected on July 10 had brood-patches and was beginning to molt. Body temperature was 42.0° C. This bird had had the tibio-tarsus of one leg broken and

healed; it was very fat beneath the skin on the breast and back and in the body cavity. Its stomach contained fine insect remains. On August 7 Anderson watched one bird, in company with two Ringed Plovers, taking small flies washed up in a windrow on the strand near the river mouth.

18. WHITE-RUMPED SANDPIPER, *Erolia fuscicollis* Vieillot.—A party of five was seen by Anderson at Clyde on September 3.

19. PHALAROPES, *Phalaropus* sp.—Unidentified phalaropes were seen in Davis Strait by me on August 8 and 11, 1937, in the waters off Frobisher Bay and Hudson Strait, and by Anderson in Admiralty Inlet on September 8, Lancaster Sound on the 9th, and in Frobisher Bay on the 13th, 1950.

About 2:30 a. m. on June 16, when flying southeast along the sea-shore, which served to guide us between Capes Eglinton and Christian in thick weather with a ceiling at 30–60 meters, we met head-on flock after flock of northbound shore-birds of phalarope size, navigating along the coast like ourselves in the thin clear stratum between the mist and the ground.

20. POMARINE JAEGER, *Stercorarius pomarinus* (Temminck).

21. PARASITIC JAEGER, *Stercorarius parasiticus* Linnaeus.

22. LONG-TAILED JAEGER, *Stercorarius longicaudus* Vieillot.—Jaegers of all three species were seen by me in Baffin Bay off Hudson Strait and northward, August 8 to 11, 1937. In 1950 Anderson recorded *parasiticus* and *pomarinus* at Navy Board Inlet, September 7, and in Frobisher Bay on the 15th and 16th.

Jaegers, probably Parasitic, were seen on several occasions on July 12 by members of the expedition occupying the ice-cap station, 850 meters above sea-level and nine miles from "land" on the southeast lobe of the Barnes Ice Cap. Two or three were seen by Col. P. D. Baird at Bray Island, Foxe Basin, August 9 and 10.

23. GLAUCOUS GULL, *Larus hyperboreus* Gunnerus.—This was the only gull certainly identified in the Clyde region. We were not so fortunate as Dalgety (1936: 587) who twice saw single Sabine's Gulls on migration there, or Shortt and Peters (1942: 345) who saw one Sabine's Gull and several Kittiwakes.

The Glaucous Gulls arrived before us, although on May 22 when the first pair was seen there was no open water whatever, either in the fiord or the rivers. From May 26 onwards we saw them in ones, twos, or threes hunting along the course of the ice-bound Clyde at Camp B, though there can have been virtually nothing for them to eat during the succeeding 2 to 3 weeks.

On June 6 a solitary pair had taken up its position on a nest-ledge on the cliffs forming the west wall of Marble Canyon, about five miles up the Clyde River from its mouth. This was evidently a regular site, marked by an accumulation of guano and the lichen, *Caloplaca*, and some old egg-shells. Incubation was in progress there on July 3.

Sites containing one and two nesting pairs were found on south-facing cliffs a few miles down from the head of Clyde Fiord; the first of these on August 5.

There was a solitary nest on a boulder 6 meters high on the shore of Eglinton Fiord close to Eglinton Glacier. A single young bird fledged on August 23 or 24.

Riley reported small colonies of about 5 and about 12 pairs nesting near the heads of Gibbs and McBeth fiords. Eleven birds were noted in Inugsuin Fiord on September 5.

On the southeast side of Padloping Island, three to five miles east of the Meteorological Post, we saw on August 15 a colony of about 50 pairs on a 600-meter cliff, some of the nests being 300 meters up on the cliff. Several young were on the wing on that date. There was also a colony of over 20 pairs on Cape Searle Island on the

south side where begin the cliffs which run out to the cape itself; it is outside the limits of the Fulmar colony. A solitary nest was seen at the Lower Savage Islands and a colony on the cliffs just east of the entrance to York Sound, Frobisher Bay, on August 1 and 2, 1937.

The voice and calls of the Glaucous Gull resemble those of the Herring Gull, *L. argentatus*, much more closely than those of the Great Black-back, *L. marinus*.

24. KUMLIEN'S GULL, *Larus glaucoides kumlieni* Brewster.

25. HERRING AND THAYER'S GULLS, *Larus argentatus smithsonianus* Coues and *L. a. thayeri* Brooks.—No gulls of the *glaucoides-argentatus* group were found breeding in the Clyde region, nor at Padloping or Cape Searle. A scrutiny of the literature fails to reveal records of *kumlieni* on the coasts of Baffin Bay north of the entrance to Cumberland Sound (Soper, 1928: 83), or of *thayeri* south of Eclipse Sound (Milne Bay) and Pond Inlet (Hørring, 1937: 72). There seems in fact to be a gap of at least 500 miles without any gulls of this group on the east coast of Baffin Island. [Kumlien's statement (1879: 99) that '*argentatus*' "breeds north to lat. 67° N." has never been substantiated.] *L. g. kumlieni* is evidently a low-arctic race, the counterpart of *glaucoides* in Greenland; and the interval separating its range from that of the high-arctic and continental *thayeri* on this coast is greater than that separating *glaucoides* and *thayeri* on the opposite Greenland coast (Salomonsen, 1951).

On August 8, 1937, as we coasted the north shore of Frobisher Bay, a number of adult Kumlien's Gulls circled about the vessel from time to time, from Brewster Point to Lok's Land. The legs of these birds appeared a "rather deep color, perhaps brownish pink."

L. argentatus smithsonianus also occurs in Frobisher Bay; I identified one near Jackman Sound on July 28, 1937. Two dozen gulls of this group, adults and juveniles, seen by Anderson at Frobisher Bay Post on September 13 to 15, 1950, appear to have included ordinary Herring Gulls. Of the juveniles, however, he noted: "four of these look almost black at a distance, and rather like young herring gulls, but plumage is more contrasted, by means of black and slate-greys of the back, and whitish underparts." Kumlien (1879: 99) wrote of the gull William Brewster named after him, "full-grown young of this species were shot in the first days of September; these were even darker than the young of *L. argentatus*, the primaries and tail being *very nearly black*" (his italics). There is a certain correspondence between these two observations and, since no one but Kumlien has ever certainly identified a juvenile *kumlieni*, it might well turn out to be entirely different from *glaucoides* in this plumage. Hørring (1937: 70) found unexpected features also in the juvenal plumage of Thayer's Gulls from Melville Peninsula, including incidentally "far more mottled" back and shoulders than in the Herring Gull, again recalling Anderson's description. Future travelers should pay particular attention to these September young birds.

Regarding *thayeri*, Anderson observed a few from the *C. D. HOWE* on September 7 to 9, 1950, in Lancaster Sound, and a juvenile "with dark secondaries and primaries, uniformly mottled all over," was seen at Arctic Bay. There is finally the bird seen by Anderson at the head of Clyde Inlet on July 31, "like a herring gull, the black wing tips quite noticeable, seen near glaucous gulls." This is more likely to have been *thayeri* than *smithsonianus*. It is not impossible that in a year of abundant lemmings Thayer's Gulls might prove to be numerous in the Clyde region.

26. KITTIWAKE, *Rissa tridactyla tridactyla* (Linnaeus).—Kittiwakes are numerous, especially offshore, in Baffin Bay and Davis Strait in August and September, but no breeding stations are certainly known on the Baffin mainland. Freuchen (Hørring, 1937: 65) found them in association with murres and Sabine's Gulls at Button Point,

Bylot Island. J. C. Ross (1835: xxxv) states that they breed "in inconceivable numbers" along the west coast of Prince Regent's Inlet, which means, I think, Somerset Island and not Baffin (Soper, 1928: 82; and Bray, 1943: 529). Bray was told by an Eskimo, however, of "white gulls with black legs" nesting in enormous numbers in the interior of Brodeur Peninsula and on the cliffs in Port Bowen region.

It is thus interesting to record that a small colony of a hundred nests or so was passed on the port hand as we entered Acadia Cove, Resolution Island, on July 27, 1937.

27. ARCTIC TERN, *Sterna paradisaea* Pontoppidan.—The writer has not seen the Arctic Tern in Baffin Island. However, Col. Baird's party which visited Bray Island, Foxe Basin, by airplane on August 9 and 10, 1950, found them in plenty. Riley and Eade reported finding about 20 terns on August 31, 1950, at the mouth of a small river entering Clyde Inlet, 15 miles southwest from the Post at Clyde. Dalgety (1934: 587) found terns fairly numerous on the rivers and lakes round Eglinton Fiord, but I spent eight days there at exactly the same date (August 20–27) in 1950, and undoubtedly visited the same lakes, without seeing any sign of them.

28. BRÜNNICH'S MURRE, *Uria lomvia lomvia* (Linnaeus).—We saw an immense number of Brünnich's Murres in the waters around Padloping Island and Cape Searle on August 15 to 18, 1950; many carried a silver capelin in their bills as they flew swiftly homewards to the southeast. It was a disappointment to find that they did not nest at Cape Searle, but instead on a distant headland in the vicinity of Reid Bay, 15 or 20 miles southeast, according to the Eskimos. There must be a very large colony there. I understood the place to be on the large island in the mouth of Reid Bay, marked (as a peninsula) on Boas' map as "Agpan," which means the murre-place.

Kumlien (1879: 105) mentions large breeding-places in Exeter Sound and about Cape Walsingham and Cape Mercy.

On August 8, 1937, we passed some 25 miles off Monumental and Lady Franklin islands and noted a large number of murres coming and going, as Kumlien did in the same region "about Grinnell Bay." Evidently no colony is situated on Lady Franklin Island, because Kumlien, as is well known, passed close enough to it to be able to report (erroneously, as is now universally believed) that the Great Skuas "had young ones on the rocks"; he would certainly have mentioned any breeding murres. Many murres were seen by us that day along the north side of Frobisher Bay, and they were especially numerous off the southeast coast of Lok's Land.

On July 27, when off Acadia Cove, hundreds were seen proceeding to and from Hatton headland, the southeast point of Resolution Island. They would have been obliged to round the headland in order to reach a colony somewhere on the east side of the island. Soper (1946: 238) had reason to believe that breeding places might exist there.

29. DOVEKIE, *Plautus alle* (Linnaeus).—Large numbers of Dovekies were seen off shore in Baffin Bay by Anderson, "in parties of 5–10 as far as the eye can see," immediately outside Clyde Inlet (September 5, 1950) and between there and the entrance to Pond Inlet; again in Eclipse Sound (7th), Lancaster Sound (9th), and southward to Davis Strait (lat. 65° N) on September 10 to 12 (Shortt and Peters, 1942: 346). On August 9 and 10, 1937, I saw small numbers (about 20 in all) in summer plumage in Davis Strait in about lat. 64° N.

Anderson was informed by Father Daniello of Pond Inlet that Dovekies breed near the murres, but in smaller numbers, at Cape Graham Moore, southeast Bylot Island. Freuchen visited the bird-cliffs north of Button Point, which is evidently the same

location, in August, 1922, and again in July, 1924, but makes no mention of having seen Little Auks there (Hørring, 1937: 92–93). There are other murre colonies on the east coast of Bylot however, and it would not be unexpected if Dovekies were to be found in them, as well as on Devon Island. No breeding places are certainly known, and no specific sites in Canadian territory have even been suspected up to the present.

30. BLACK GUILLEMOT, *Cepphus grylle* (Linnaeus).—At Savage Harbor, Lower Savage Islands, on August 1, 1937, we found a considerable colony, of the order of 100 pairs, nesting in low cliffs. Many were carrying food to their young. A colony of the same size, together with Glaucous Gulls, was seen on August 15, 1950, some five miles northeast of the Meteorological Station on Padloping Island, and there were a few on the water below the cliffs of Cape Searle.

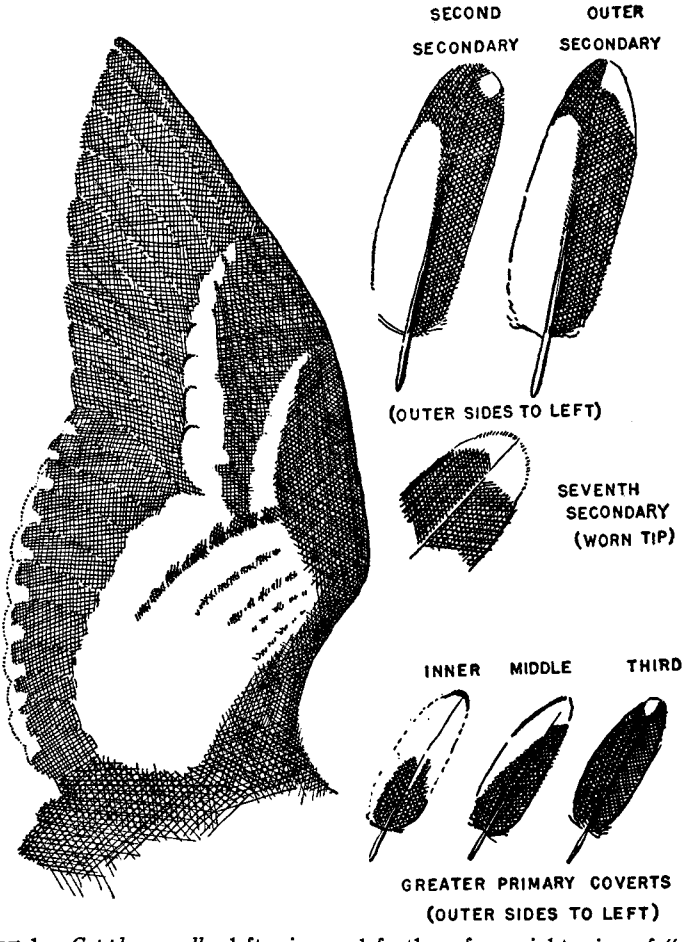

FIGURE 1. *Cepphus grylle:* left wing and feathers from right wing of "extreme *mandtii*" female in first summer (one year old), Brewster Point, Frobisher Bay, Baffin Island, August 7, 1937.

Riley and Eade, who traveled largely by canoe after the fiord ice disappeared, reported seeing occasional Black Guillemots in Gibbs, Sam Ford, and McBeth fiords, all in the Clyde region, in July and August, 1950.

A male and female collected at Padloping agree, within the wide limits of common variation, with fresh specimens studied by me in 1937 in Frobisher Bay and northern Labrador and fall between *mandtii* and *atlantis* into what is now usually called *arcticus*. The Padloping specimens measure: ♂—culmen, 25.5; wing, 156 mm.; ♀—culmen 24.5, wing, 158 mm.

The following paragraphs are adapted from my report to the National Museum of Canada, 1937.

None of the specimens examined in northern Labrador and Frobisher Bay was typical of *atlantis* or *mandtii;* in fact, as shown by specimens collected for Bowdoin College by J. R. Forbes during our voyage, a complete range of intergrades exists there, forming a heterogenous population.

The differences between *atlantis* and *mandtii* are recognizable in the field in summer only in immature one-year-old birds. In *mandtii* at this age the secondaries have prominent white tips, like those present in most other alcids; these form a narrow white bar on the closed wing, behind and separate from the white wing-patch, and easily seen in life. The tips of the greater and median primary coverts are also white, and increasingly so towards the innermost ones, which are mostly white; this is likewise conspicuous in the bird in flight (see Fig. 1). These extra white markings are lacking in the adult *mandtii* and in both the immature and adult *atlantis*.

Four specimens of this age were obtained at Brewster Point, August 7, 1937. The one nearest to *atlantis* showed no white at all on the tips of the secondaries; the two nearest to *mandtii* had large oval white "mirrors" at the tips of the inner vanes; and the fourth bird was intermediate. The extremes embrace a most conspicuous range of variation.

Other variable characters both in juvenal and mature plumages include the amount of black on the concealed bases of the white secondary coverts, and the extent of the white tongues, visible from below, on the inner vanes of the primaries. These were found to be generally correlated, so that a bird with longer white tongues on the primaries has a shorter, narrower, dark stripe along the shafts of the white coverts.

The above notes were written without regard to the more recently accepted nomenclature, according to which all these birds would be included in *arcticus* C. L. Brehm. It appears to me that certain reservations are called for in applying a subspecific name to so heterogeneous a population, many members of which could individually be ascribed either to *mandtii* or to *atlantis*. The taxonomic situation presented bears a certain resemblance to that of the Horned Larks, described below (p. 375).

31. PUFFIN, *Fratercula arctica* (Linnaeus).—Puffins seen in the coastal waters of northern Baffin Island may be presumed to come from Greenland, and such may have been the case with the single individuals observed by Anderson at sea from the *C. D. HOWE*, north of Bylot Island on September 9, 1950, and off Cape Adair the next day.

On July 27, 1937, near Acadia Cove, Resolution Island, I saw a single Puffin among the hundreds of murres coming from and going to their distant breeding stations. On making inquiries ashore I was informed by the R.D.F. station operators that there was a "considerable" colony of Puffins on the east coast of Resolution Island. This report may turn out in the end to be unfounded, and must for the present be regarded with reserve, although it certainly deserves investigation. If there is a

colony on Resolution Island, then it is almost sure to be small, and certainly very isolated; the most northerly one seen by me in Labrador was a very small one at Akpalik or Tinker Island, near Davis Inlet, 55° 57′ N, over 300 miles to the south; at the time I saw the latter (August 21, 1937) some 200 Razor-billed Auks were present, and only 10 to 20 Puffins were seen.

Anderson saw a Puffin off Hudson Strait on September 16, and Kumlien (1879: 103) says he observed the species "northward to Hudson's Straits."

32. SNOWY OWL, *Nyctea scandiaca* (Linnaeus).—No owls were seen until August, when breeding was presumably over, and the birds on the move. There was one at Clyde on August 13; and the following day, as we flew south over the broad low-lying foreland of Cape Hewett, between Clyde and McBeth fiords, three solitary white owls were seen, 300 meters below, quartering low over the ground, rocking from side to side as they flew in the characteristic manner, which makes it possible to identify the Snowy Owl almost as far away as it can be seen. These coastal barrens are evidently a preferred habitat; Dalgety (1936: 383) saw two owls at Clyde on August 28, 1934.

33. HORNED LARK, *Eremophila alpestris hoyti* × *alpestris*.—The first Horned Lark was not seen until June 6, two weeks after our arrival at Camp B. Towards the end of the month they had become moderately common, and conspicuous on account of the wide-ranging song-flights of the male.

SPECIMENS OF HORNED LARKS

No.	*Locality*	*Date*	*Sex*	*Culmen*	*Wing*	*Color of face*
A 41	Head of Clyde Inlet	30 June	♂	13.0 mm.	110 mm.	extremely pallid
58	Head of Clyde Inlet	21 July	♂	12.5	115	medium yellow
69	Head of Clyde Inlet	1 Aug.	♀	11.5	105	very yellow
50	Head of Clyde Inlet	12 July	Juv. ♂	(not full-grown)		

In the population there was a complete mixture, in so far as the intensity of yellow pigment on the face is concerned, between birds having a white eye-stripe and forehead and the faintest suggestion of yellow on throat, and those described as "*very yellow* on the face, no different from *alpestris*." In fact, the experiences of Soper (1928: 109 and 1946: 418) in southern Baffin Island were exactly duplicated, even to the predominance of pallid types. In my field notes there are references to the facial coloring of 13 individuals, 9 of which were "pale" and 4 "yellow." Only three adult specimens were collected, and these include a moderately yellow and a pallid male, and a very yellow female. The length and breadth of the bill, the extent of whitish coloring on the outer tail feathers, and the color of the feathering of the tibiae exhibit equally wide variation in our specimens, the whiter face being correlated with much more white on the outer tail feathers and pale buff (rather than pinkish-brown) tibial feathers in the pallid male. The finest and sharpest bill, however, is that of the other, yellower male.

Mating was apparently random, for both mixed and similar pairs were found, and intergradation was continuous.

This admixture of racial types appears to be found over two-thirds or more of the immense area of Baffin Island, and to reappear again at Churchill, Manitoba (Taverner & Sutton, 1934: 63, and Bent, 1942: 323). North of Churchill, from Eskimo Point north to Chesterfield, Baker Lake, Southampton Island, Melville Peninsula, and westwards, the breeding form is generally nearer to *hoyti* (Hørring, 1937: 109; Bray,

1943: 531–532; and Sutton, 1932: 211–218); throughout Ungava and Labrador it is *alpestris* (Manning, 1949: 203).

The pressure of selection on the different variable characters of the hybrid population does not appear to be rigorous. The present situation has possibly arisen from the recent expansion of the ranges of the two subspecies, formerly separated (perhaps by Hudson Bay), which has given them equal access to some of the same areas; in the absence of barriers to reproduction and of adaptive differences leading to competition, they have produced a hybrid swarm. It is interesting to compare this case (and possibly that of the Black Guillemots) on the one hand, with those of the Ringed Plovers, already mentioned, and of the Red-polls on the other. The historical antecedents are no doubt basically the same in all, but in these latter cases the development of reproductive isolation has caused forms, elsewhere recognizable as subspecies, to behave with full specific independence; whereas in the larks (and guillemots?) two forms elsewhere distinct are here united into a single population.

Horned larks at the head of Clyde Inlet were distributed not only over the lower ground but also on the plateaus up to 750 meters, above which the snow probably lies too extensively through July. They appeared on the high ground as early as June 14, when it was impossible for us to travel without skis and there were few bare patches and no new growth of vegetation. They were generally very shy and unapproachable. A number were heard singing on June 9 by the Pipit Lakes, flying about at a considerable height, repeating over and over the staccato flinty song. It consists of about eight notes, quickening in pace and finishing on a very high note, the whole being repeated at five-second intervals; the wings are held motionless during each emission of song. During their song-flights the birds often wander many hundreds of meters. On the night of June 23–24 we noted a lark in song at midnight, following a lull during the previous hour. Song had almost ceased by July 11, though one cock was heard to sing on July 26. They very frequently sing on the ground.

On July 1 one was observed collecting food, and on the 7th we found a nest, situated on an almost bare gravel-covered clay flat in the outwash fan of Caribou River. On one side of the nest were a few plants of *Epilobium latifolium*, arctic poppy, and grasses, and on the other (bare) side a broad rampart of loose tufts of *Cetraria* and balls of clay, such as might be seen surrounding a Prairie Horned Lark's nest. The nest was of dry grasses and dry leaves of *Potentilla pulchella* and contained five eggs.

On July 8 an adult was found feeding a young bird already able to fly; on the twelfth in another place a juvenile was collected in the same circumstances, and on the thirteenth Anderson found three young being fed. As late as July 29 a young bird was seen still unable to fly. (As is well known, the young of Horned Larks, as well as those of Skylarks and probably other species, may leave the nest several days before they can fly.)

Horned Larks were observed on the coast at Clyde on various dates from August 12 to September 4, when we left; they were noted at Frobisher Bay Airport from September 6 to 14. None was seen in the Frobisher Bay area in July and August, 1937. On August 13 and 19 at Clyde, larks were observed eating the seeds of the small grass *Puccinellia phryganodes*.

34. NORTHERN RAVEN, *Corvus corax principalis* Ridgway.—The raven was absent as a nesting bird from the head of Clyde Inlet, though we were visited by one or two birds on nine different dates during the 80 days of our residence at Camp B. They seem to have been scarce throughout the whole region; there were none at Clyde Post until August, when three appeared and lived as scavengers at the

settlement. They were plentiful at Frobisher Bay Airport, where a dozen could sometimes be seen at the garbage dump.

In 1937 one or two ravens were recorded at York Sound, Brewster Point, and Savage Harbor.

35. GREENLAND WHEATEAR, *Oenanthe oenanthe leucorhoa* (Gmelin).—At the head of Clyde Inlet the wheatear was certainly more abundant than anywhere else in Baffin Island for which records exist. I was with Forbes (1938: 492–495) at Brewster Point, Frobisher Bay, where we saw 12 wheatears in two days, 9 or 10 of which were all associated with one nest, as described below. At Camp B, however, twice that number could very easily have been seen, and within our regularly frequented ten square miles there were of the order of 20 breeding pairs.

A male was found singing on May 25, the day after our arrival, but it had possibly only just arrived, for no others were seen until the 29th. A pair was seen on the 30th. We had the misfortune to catch in a lemming-trap the female of one of the two pairs nearest our camp, and were unsuccessful in finding the nest of the other pair, on the slope beneath the falcons' cliff, until they were feeding young on June 29.

The spirited singing of the males was superior in quality, and more persistent in output, than that of the typical *oenanthe* in Britain. They sang almost always in flight, our best-known cock starting very often by rising from a boulder on top of a rocky ridge, and dropping slowly down 50 meters to the meadow below; the tail is fanned out, and the wings planed or flapped in "slow motion" as it sings. The song has great variety and continuity; one continuous burst was timed for 27 seconds. The rapid warbling phrases have some qualities of the Skylark's, mixed with harsh chatter-notes, reminiscent of the House Wren, *Troglodytes aedon*, or Sedge-Warbler, *Acrocephalus schoenobaenus*. The song-period lasted until July 12; in June it might be heard throughout the 24 hours.

In Britain the ordinary call-note is the well-known *weet-chack, chack*, and we remarked with surprise that for seven weeks we did not hear this call at Camp B, though we saw wheatears every day. The alarm notes were *zee-tu*, or *ze, ze, ze*. But on July 12, the day we found the young birds gone from the nest, we heard for the first time the *weet-zhack* alarm call, which the female kept up continuously.

The relations of the adults to one another are at times puzzling, but could be explained in part by the presumption that there is a considerable excess of males. The cock mentioned above as losing its mate in a trap on June 7 never attracted another, though it sang for an additional three weeks. Of the five adult birds collected by Forbes and me at Brewster Point in 1937, no less than four were males, as were also both the fledglings collected from the nest.

On June 25, I watched a cock displaying to an almost motionless hen on a large boulder. He stood bobbing the tail up and down, from time to time making a quick curtsey by flexing the tarsal joints. At the same time, within a couple of feet, another male sat as an interested onlooker. The second male, incidentally, had a much brighter and more rosy brown breast than the first.

The nest found on June 29 was in a chamber underground between small boulders, the entrance between the stones being just large enough to admit the hand but not the arm. The boulders were largely overgrown with turf, and the situation as sheltered and sunny as could be found, on the slope below the Gyrfalcons' cliff. Both parents were busy flycatching to feed the young, of which four could be counted, appearing to be several days old. The young were still in the nest on July 10,

but on our return on the 12th, hoping to band the fledglings, we found nothing but the anxious parents and concluded that the nest had been found by a weasel.

When this nest was collected on July 25 for examination and collection of nest-parasites, the remarkable fact was disclosed that it had been used this year for the eighth time, having eight clearly distinct layers and linings. Feathers, of which there were numbers scattered everywhere near by, from the falcons' prey, constituted about 40 per cent of the bulk of the material, vegetable matter (dry grasses, willow leaves, etc.) 40 per cent, hare and lemming wool (and a piece of new red darning wool), and miscellaneous matter including pieces of crushed egg-shell, constituted the remaining fifth.

The re-use of the nest is a habit, perhaps developed in adaptation to the short breeding season and the urgency of getting started, to which reference will be made again under the redpolls and longspur.

As an indication of family size, broods of flying young accompanied by, or being fed by, one or both parents were seen from July 26 to August 11, and numbered 1, 2, 2, 3, 3, and 3. The one nest, as just mentioned, appeared to contain four nestlings, as did that found by J. R. Forbes (*loc. cit*) at Brewster Point on August 6, 1937.

When Forbes took me to the latter nest that evening there were two (possibly three) young still in the nest and two on a little ledge just outside it. There were probably six full-grown birds in attendance; five were seen together at one time, and, in addition to the two "parents" which were present, four birds were collected the next morning, all molting from juvenal to adult plumage. Two of the latter were actually seen to feed the nestlings, and probably all were doing so. Nicholson (1930: 306), in the last week of July, found three or four birds trying to feed nestling wheatears at the head of Godthaab Fiord, West Greenland, and he concluded that this particular pair was raising a second brood, while still accompanied by the young of the first—an explanation which perfectly fits the circumstances of our case also, and may be readily accepted. At Camp B there were no indications of double or late broods in 1950, and the phenomenon is probably not very common. The simple statement "double-brooded" in Witherby (vol. 2: 150, 1938) under Greenland Wheatear is presumably based on Nicholson; it might be modified, at least for Baffin Island, to read "usually single, but apparently sometimes double-brooded."

The wheatears were the only passerine birds to leave the country before we did. About July 20 we noticed that they seemed to have become scarce, possibly a premature impression resulting from the molt which would keep them subdued and secretive; but the last seen by either Anderson or me was on August 11.

36. AMERICAN PIPIT, *Anthus spinoletta rubescens* (Tunstall).—Bent (1950: 35) includes Arctic Bay and Pond Inlet in the breeding range of the American Pipit, but prior to this Dalgety's mention (1936: 582) of it, as "the commonest bird" in August at Ravenscraig Harbor, 32 miles northwest of Clyde, was the most northerly published record in Baffin. Bray (1943: 532–533) observed pipits north to Fury and Hecla Strait and inferred that they bred in Cockburn Land (Baffin Island). None were recorded by the Fifth Thule Expedition anywhere north of Danish Island (Hørring, 1937: 113).

We noticed their absence from the coastal lowlands at Clyde Post during the breeding season, though they appeared there on migration in late August and early September.

At the head of Clyde Inlet pipits were unexpectedly abundant. The earliest migrant was a male found singing on May 27, and this being the notable event of

the day to us, we called the nearby lakes the "Pipit Lakes," and later extended the name to the "Pipit Hills" and "Pipit Point" beyond. On June 1 at least eight cocks were heard singing, in a walk of five miles. Thereafter pipits stood third in order of abundance of the birds at Camp B, the longspurs and Snow Buntings alone exceeding them. They were most plentiful on the lowest slopes, but were observed singing as high as 825 meters on Dyke Mountain. (Late in August while climbing Eglinton Tower I disturbed several resting at about 900 meters, where the ground was composed of clean exfoliated slabs of rock covered by a few inches of new snow. They were quite possibly on migration.)

Pipits are most at home on rather steep, but not necessarily high, slopes, either somewhat stony or wholly turfed over; they do not nest in flat country. The site is chosen so as to be overhung by a roof of stone or vegetation, and according to Pickwell (1947: 8) may be excavated to some extent by the birds themselves.

Nest 1, overhung by *Cassiope tetragona*, was found on June 13, when it contained six eggs. Neither the parents nor the nest could be found on our next visit, and we presumed that it had been robbed by a weasel, one of which was hunting within a few yards of it on our first arrival, or perhaps by a fox.

Nest 2, also overhung by *Cassiope*, and containing seven eggs, was found on June 22; it was not revisited.

Nest 3 was about 300 meters above sea-level, in a gully near a small stream on the south slope of Dyke Mountain. When discovered on June 23 it was recorded as containing six eggs; subsequent visits showed five eggs on June 30 and July 3, and young on July 13.

Nest 4, somewhat lower on the same slope, contained four eggs on June 23 and five on the 25th. Something displaced our markers and it was not subsequently relocated.

Nest 5, about 30 meters above sea-level, and overhung by *Cassiope*, contained seven eggs on June 25, and the young on July 4 were about three days old. When I went to band them on July 11 only four were left, and they "exploded" out of the nest but were safely replaced.

A sixth nest was found at 400 meters on Dyke Mountain on August 11, overhung by *Cassiope* and *Ledum;* it was empty.

Without exception these nests faced between southeast and southwest. Clutches known to be complete contained 5 (? 6), 7, and 7 eggs.

(Two other nests found in former years were at Komaktorvik, North Labrador, on July 19, 1937, containing two young just hatched and four eggs; and on Mount Albert in Gaspé, Quebec, on June 26, 1932, containing five eggs somewhat incubated.)

Our notes show that in the week following July 4 a great many pipits hatched, and parents carrying food were to be seen everywhere. (An adult collected on June 30 had fed on *Tipula arctica* and other insects.) From about July 16 to 23 the majority were ready to leave the nest, and there is some evidence for believing that, like the Horned Larks and longspurs, the young pipits do so before they can fly. On July 16 Anderson found one in the grass being fed by its parents, and he was easily able to catch and band it; the following day he came upon six barely able to fly and squatting on the ground.

Few pipits were to be seen around Camp B in August; the birds were possibly moving off as soon as the molt was completed. A female shot on August 9, but not preserved, was in wing molt.

Measurements of five specimens, all from the head of Clyde Inlet, are given below:

No.	*Date*	*Sex*	*Temp. degree C.*	*Wing in mm.*	*Culmen in mm.*	
32	June 27, 1951	♂	40.3	83	12	Spots on breast large and conspicuous.
38	June 30, 1951	♂	37.8	86	11	Spots on breast very small
39	June 30, 1951	♂	39.9	87	11	Spots on breast scarcely visible
61	July 26, 1951	♂	40.3	86	11	Spots on breast large and conspicuous
65	July 29, 1951	♀	40.7	82	11½	Spots on breast numerous, not quite so large as in No. 32

All the above have more or less of a distinct notch on each edge of the upper mandible about one millimeter from the tip. Numbers 38 and 39 were in very fine plumage, with the breast almost immaculate. The legs of all the males were black, and those of the single female brown-black.

Small numbers of pipits were seen quite frequently at the head of Eglinton Fiord, August 21 to 27, including one party of six. They were noted on June 4 and 28 by Riley at Gibbs Fiord. In 1937 they were found in small numbers wherever we went ashore in Frobisher Bay, namely, Resolution Island, Savage Harbor, York Sound, and Brewster Point. Pipits were seen on Frobisher Bay Airfield on September 6, 1950.

37. HORNEMANN'S REDPOLL, *Acanthis hornemanni hornemanni* (Holbøll).

38. GREATER REDPOLL, *Acanthis flammea rostrata* (Coues).—These two species are treated together because they present the most interesting relationship to be found among the birds we studied. Measurements of specimens given below reveal that our populations do not differ significantly in size from those found in Greenland, and should be designated by the trinomials given above. In the succeeding pages, however, the specific names (*hornemanni* and *flammea*) alone have been used, because they are the most widely known and the least confusing.

The involved relations of the various forms of redpolls have provided a subject of discussion, and a puzzle, dating back at least to the publication of Coues' Monograph of the Genus Aegiothus . . . in 1861. Salomonsen (1928, 1951) adheres to the view that *hornemanni* is a mutant of *flammea* and that all redpolls belong to a single polymorphic species. *Hornemanni* and *flammea* may exist, he states, as allopatric geographical races, or allegedly in Iceland as members of an interbreeding polymorphic population or, again, they may overlap without interbreeding.

In fact, *flammea* extends further southward than *hornemanni*, and there are great temperate and even subarctic tracts of both New and Old Worlds where *flammea* alone is found as a breeding species. On the other hand, the northern limit of *flammea* extends well beyond the tree-line and is roughly coincident with the northern limit of *hornemanni*.

Almost everywhere that *hornemanni* is found, therefore, *flammea* is either mixed with it or is in more or less close proximity. This is true in Scandinavia and the valleys of Siberia (Swanberg, 1951: 14), western Alaska (Turner, 1886: 171–172, and later authors), Mackenzie delta (Clarke *in* Porsild, 1943: 34), southern Keewatin (Manning, 1948: 20–21), Churchill (Taverner and Sutton, 1934: 73–74) and York Factory (Preble, 1902: 118), Chimo (Turner, 1885: 239) and Baffin Island. Except northeast and northwest Greenland (Salomonsen, 1951: 516–517) I am not able to cite any considerable region where *hornemanni* is found alone.

This and certain additional facts, namely, that the two species habitually flock together from August to June, and that the song, call-notes, nests, eggs, and food are indistinguishable (to me at least), are most easily explained by supposing the two types to be forms of a single dimorphic species. But this explanation seems to fall to the ground on account of other considerations: namely, (1) that the two differ not in one but in a number of plumage and structural characters; (2) that their geographical variation is not exactly parallel; (3) that the relative proportions in which they occur in any plane (*e. g.* Churchill) are subject to much variation from year to year (Grinnell, 1943: 156); (4) that they have never been shown to interbreed although Salomonsen (*op. cit.*, p. 518) actually shot a mixed pair in copulation in west Greenland; and (5) that over much of the range intermediates or hybrids are rarely found. Stejneger (1885: 259) says: "I have . . . handled about two hundred and twenty specimens of both forms, and among the whole lot there was hardly more than one specimen the identification of which gave any *serious* trouble, that being an adult male with red breast, and showing intermediate features suggesting its probable hybrid origin." It is in fact the almost universal opinion of taxonomists, Salomonsen being the notable exception, that *flammea* and *hornemanni* are distinct species.

It was our experience in Baffin Island that all birds, even in juvenal plumage, could be identified in the field, under normally favorable conditions, without difficulty, *flammea* being always much more "saturated" and coarsely streaked than the corresponding plumage of *hornemanni*. The red of the cap, and of the breast and rump of the male, varies very much, from a shade with more yellow, which might be described as coral or fiery red (or in some females even red-brown), to one with much less yellow, namely a carmine or crimson red; and my impression is that this reflects individual rather that specific physiological differences (as in, for example, *Carpodacus*, *Pinicola*, and *Loxia*). Under *hornemanni* I find, for example, the following field-notes: "♀; red crown is lighter in *hornemanni*" (July 7); "a ♂ the most brilliant I have ever seen; red on head and breast is more vermilion and less crimson than in [*flammea*]" (July 12); "♂ with deep carmine breast" (July 31).

The first redpolls seen at the head of Clyde Inlet were a pair of *hornemanni*, attempting coition on a boulder, on May 27. *A. flammea* was not of course expected, and not detected till June 9 when the erratic behavior of small groups of redpolls excitedly flying over the immense boulder-strewn slopes seemed so different from the quiet domestic activities of the nesting pairs of *hornemanni* previously seen, that we collected one and found it to be *flammea rostrata*. These birds were new arrivals which, to our surprise, shortly settled down to nest also.

Freuchen records (*in* Hørring, 1937: 113): "Ponds Inlet: 18.6.1924, 4 pairs breed here, all dark ones like those I observed at Milne Inlet." There are no other records of redpolls breeding in Baffin Island, and no actual nests have heretofore been found. During June and July at Camp B we located six nests of *hornemanni* and two of *flammea*.

Redpolls normally nest in trees or bushes, accepting mats of dwarf birch and willows, or occasionally grass tussocks (Grinnell, 1943: 157; Witherby *et al.*, vol. 1: 66, 1938). Our first nest, belonging to a pair of *hornemanni*, was found on June 6, perched in a small bracket-like notch near the top of a boulder and on its southwest corner, about two meters from the ground. The hen was on the nest which contained six eggs; only the Gyrfalcons were earlier than this in egg-laying at Camp B.

The body of the nest was composed of coarse materials, largely *Cassiope tetragona*, grass stems, and one piece at least of *Cerastium alpinum*, and the cup was lined

thickly with white Ptarmigan feathers. The outer materials struck me at the time as looking very gray and ancient, but it was not until later that we discovered that the redpolls, like the wheatears, use the same nest for a number of years. This accounts for the remarkable fact that a pair of birds which can barely have arrived before May 27 could have produced a nest complete with a full clutch of eggs in the course of ten days or less. Every one of the eight redpolls' nests mentioned had been previously used, and we found only one additional nest, unoccupied during 1950. Though I have not found this habit referred to in the literature, my friend, Dr. Jas. W. Campbell, informs me that a pair of Lesser Redpolls, *A. fl. cabaret*, relined a used nest and brought off a brood of young in it at Scatwell, Ross-shire, Scotland, in the spring of 1950.

Two other nests were found on hummocks formed by boulders more or less turfed over, one belonging to *flammea* and one to *hornemanni*. All the remaining nests, namely four *hornemanni*, one *flammea*, and one not in use, were in willows (always *S. cordifolia* var. *callicarpaea*), varying in position between the *Cassiope*-mat beneath the bushes, the base of the bush, and up to a height of 25 cm. The materials used were always much the same, except that in two cases seed-wool of *S. cordifolia* (of the previous year) formed an important part of the lining, and in one willow-roots were noted. All the nests were more or less conspicuous and easy to find.

The eggs of the two species are indistinguishable. Clutches known to have been complete numbered: *hornemanni*, 6, 6, 5, 5; and *flammea*, 7, 5.

Incubation is done entirely by the female. No precise determination was made of the incubation period, and in the only nest (*flammea* no. 2) watched with sufficient regularity there were still seven eggs on July 5, three were hatched on the ninth, four by the tenth, six by the eleventh, and seven by the twelfth. Hatching thus occupied a minimum of four days. In another brood (*hornemanni* no. 3) it was noted on July 11, "all hatched except one; young various sizes;" and of this brood one subsequently died (of suffocation ?) on the twentieth, three left the nest on the twentieth, and two were still in it on the twenty-first. It is easy to understand that in this arctic climate the eggs must be covered from the time they are laid because the temperature in June is below freezing for much of the 24 hours. This will explain the considerable spread in hatching-time. The same spread was found to occur with the Snow Buntings and longspurs.

Out of 20 eggs laid, the subsequent fate of which is known with reasonable certainty, all hatched; one chick died just after hatching, one (mentioned above) died at fledging, and 18 fledglings left the nests. The fledging period is variable, with a minimum apparently of 10 days; 12 days is probably about the average. Towards the end of the fledging period nests on or near the ground may become fouled by a ring of accumulated feces; one blowfly hatched from a nest collected for examination. The nest becomes full to bursting also, on account of the number and size of the young. Flying young were first seen on June 25 (*hornemanni*), when a specimen was taken together with the female.

Obvious family parties were evident until the first days of August, and on the 11th Anderson noted that the young were already in various stages of molt, some beginning to show the red crown. A female taken on that date had also begun to molt. It may be noted here that the bills of both species, predominantly yellow or horn-colored in winter, become wholly or almost wholly dark in the breeding season and with the yellow correspondingly evanescent—a fact which, if understood, is not clearly stated in our handbooks; it finds a close parallel in the Snow Buntings. The bill of the juvenile is at first wholly dark also, but shows yellow after the August molt.

The only food visibly given to the young, actually to a bird out of the nest and able to fly, was seeds of *Salix cordifolia* (to *hornemanni*); the crop of the female (*hornemanni*) mentioned above was packed with seeds, among which were those of *Carex misandra*, grasses, and probably *Cassiope tetragona*, and also two small spiders. A cock *flammea* on July 5 had the gizzard filled mostly with vegetable matter, including parts of flowers and seeds, with some traces of insects. A juvenile *hornemanni* on the same date yielded a few seeds and remains of minute insects.

SPECIMENS OF *Acanthis hornemanni hornemanni*

No.	*Locality*	*Date*	*Sex*	*Wing mm.*	*Temp. °C*
A 25	Head of Clyde Inlet	June 22	♂	84	—
34	Head of Clyde Inlet	June 29	♂	84	38.4
28	Head of Clyde Inlet	June 25	♀	81.5	—
29	Head of Clyde Inlet	June 25	Juv. ♂	—	—
45	Head of Clyde Inlet	July 5	Juv. ♀	79	35.0
	SPECIMENS OF *A. flammea rostrata*				
A 24	Head of Clyde Inlet	June 9	♂	81	—
44	Head of Clyde Inlet	July 5	♂	81	36.4
73	Head of Clyde Inlet	Aug. 11	♀	74	37.1

Nothing has yet been said about song and other vocal notes. To these careful attention was given, with the result that after 8 to 10 weeks Anderson and I were forced to conclude that all the notes are held in common, and that there are none in which the species can be differentiated by ear. The flight twitter is very well known, being the call most often heard in winter, and whenever the birds are in parties. The plaintive note I render *diar-ee*. There is also a note rendered *tr-r-r-r-r-r-r-r-r-er*. The song may be given either from a perch or in flight; one transcription of it (in *hornemanni*) is as follows: *lil-lil-lil-tw-r-r-r-r-r-r-ee*, and repeat.

Early in July the frequency of singing rapidly diminished, though the last was not noted until the 26th. As early as July 5 we came upon a mixed party consisting of two adult *flammea*, one adult *hornemanni*, and five juveniles representing both species, signifying the end of the breeding regime.

Redpolls were heard at the head of Eglinton Fiord on August 28, but they were not seen at any time near Clyde Post; nor did Dalgety (1936) find them in the coastal lowland. I noted none in the Frobisher Bay region in 1937, but saw two (one a male) at Frobisher Bay Airfield on September 7, 1950. These were *flammea* but, evidently as a result of the molt, of a much warmer and less gray brown than any of the Camp B birds.

In my opinion, it is possible to treat *flammea* and *hornemanni* only as distinct species, in Arctic America at least, and this underlines the exceedingly delicate question of competition between them, for they differ so little in adaptations and habitat that they live perpetually intermingled in a single community. Redpolls do not seem anywhere to be rigorously territorial and are said to become almost sociable nesters in some places. They were not very thick on the ground at Camp B, having available something of the order of (10 to 20 ha.) 25–50 acres of suitable habitat per pair; and (being if necessary vegetarians) it is certain that food was superabundant during the whole of their sojourn there. Their staple winter food, in eastern Canada at least, is the seeds of the white birch, *B. papyrifera*, and, unless this crop fails entirely, it is sufficient to supply vast numbers of siskins as well.

Except perhaps among carnivorous predators, competition between individuals for space and nourishment seems commonly to be reduced to a low level among members of the arctic flora and fauna; they live somewhat like weeds, the secret of whose success lies in their ability to exploit transient conditions while they last, in the absence of serious competition. In the Arctic the struggle for existence is overwhelmingly against the physical world, now sufficiently benign, now below the threshold for successful reproduction, and now so violent that life is swept away, after which recolonization alone can restore it. Populations of animals and plants there attain a frontier which ever advances towards the threshold of habitability, in the face of recurrent and more or less devastating set-backs. By much of the vegetation no "climax" is ever reached, but rather it consists of perpetual pioneers, compensated for their physical hardships by the absence of mutual competition. Among the animals, instead of the stable population held in check by density-dependent factors (predation, disease, demands for food or space), we find increasingly (and indeed characteristically) in high latitudes immense fluctuations in numbers from year to year, reflecting the impact of the physical environment, which is the immediate cause, upon the multiplication or recovery rate of the species concerned.

Where a surplus is locally produced, it may serve at once to expand the frontier, restock adjacent regions, or, in the more nomadic species, depopulated areas further away. There are certain well-known examples of wholesale, and ultimately destructive, emigration as immediate sequels to local or regional population excess, for example in the Rock and Willow ptarmigan, Brünnich's Murre, the Dovekie, and the Scandinavian lemming. For these species emigration may serve as a check on the increase of population beyond a critical density. It should be noted, however, that emigration may also follow a failure of the food supply, as in the case of the Snowy Owl which, it is believed, appears in greatest numbers in southern Canada and the United States in winters following a sharp decline in the lemming population. Under the pioneering conditions of the Arctic these two causes appear to be perfectly distinct, and the Snowy Owl type of emigration may be confined to a few species of predators; but in the more densely populated subarctic and temperate environments population excess and inadequate food may be closely related and scarcely distinguishable causes of emigration. There is no reason to think that such vegetarian birds as ptarmigan and Willow Grouse, which feed on an enormous range of leaves, buds, stems, flowers, seeds and bulbils of abundant plants, ever over-eat their food supply, though circumstances may occasionally arise, such as exceptional winter ice-storms, which deny them access to it with disastrous results.

Like the plants of the tundra stone-fields, therefore, the population of certain birds such as redpolls, which undergo perpetual ups and downs, may never reach a density at which mutual competition for space actually limits reproductive success and further increase of numbers. In certain directions the pressure of natural selection may consequently be relaxed. Some such explanation is demanded in many parallel cases, either of extraordinary individual or local variability, evidently not rigorously selected about a single optimum type, or of the similar cohabitation of very close allies, such as the lemmings *Lemmus* and *Dicrostonyx*, or species for example among the butterfly-genera *Oeneis*, *Boloria*, and *Colias*, or among the plants *Salix*, *Draba*, and *Potentilla*. A number of arctic and alpine plants will flourish in temperate gardens, provided they are merely protected from competition; their natural distribution is curtailed more by their inability to face competition than by physiological restrictions. Some animal species may be very much the same. It is at least possible that where conditions do permit the population-

density to reach the threshold at which mutual competition is felt, then one of the competitors is able to supplant the other; and this could provide some explanation of the differences in range of *Lemmus* and *Dicrostonyx*, and of the absence of *Acanthis hornemanni* from the low arctic and boreal range of *A. flammea*.

39. LAPLAND LONGSPUR, *Calcarius l. lapponicus* (Linnaeus).—On the low ground at the head of Clyde Inlet the Lapland Longspurs were the commonest birds, and in the most suitable habitats, which are wet tussocky meadows such as those found in Falcon Hollow, they reached a density of one pair in 5–15 acres (2–6 ha.) They became rare away from the valley floor and lowest slopes; a male was noted at nearly 600 meters on June 24, but at no other time, and on August 3 several strays were seen at 250 meters in a place we had previously visited on a number of occasions throughout the season.

The first migrant, a single male, appeared on May 29; three days later the main body of males had arrived and a female was seen. Thereafter their songs became the best-remembered sounds of Camp B.

There was evidently a preponderance of cocks, and on one occasion three were seen attending a nest-building hen. Two could sometimes be found singing close together; and no sign of territorial disputes was observed, perhaps because the population was not sufficiently dense. The cock's normal behavior was to follow a human intruder a long way from the nest, for example, 250 yards or even quarter of a mile (200–400 m.) and as often as not, if we were making our rounds, into the vicinity of another nest. On July 5, in the height of the breeding season, I noted two male longspurs and one male Snow Bunting all on the same stone, and a few minutes later there had assembled near by another male of each species and a Greater Redpoll.

Eleven nests were found and of these ten were under more or less close observation. A summary of the information obtained can most conveniently be given.

The nests were usually to some extent concealed by the surrounding vegetation, composed predominantly of grasses, together with some leaves, and lined with a few feathers of ptarmigan and sometimes of longspur; one nest had also some wool of willow seeds and of arctic hare. One of two nests broken up after use, in order to be searched for ectoparasites, looked as if it had been used before; it is a noteworthy fact that only one old nest from a previous year was ever found, in spite of the way such things are preserved for year after year in this cold and arid climate. Possibly the longspurs share the adaptation previously discussed in the case of the wheatear and redpolls.

Nest no. 1 was found to contain three eggs on June 10, so the first egg was probably laid on the 8th. It may be inferred that laying began in nests 6 and 7 as early as June 6. Eggs were of course laid daily, though in one case a day was missed and in another two were deposited between 10:45 one morning and 10 a. m. the next. Incubation begins with the first egg, for reasons already explained in the case of the redpolls (p. 382), and hatching was found to occupy from two to four days (six cases, distributed as follows: certainly two days, two; two or three days, two; three days, one; four days, one). The incubation period, from the last egg laid to the last one hatched, was 12 days in each of two exactly known cases.

Although two of the nests were not found until the young had hatched, enough is known about all to calculate the date of laying of the first egg within a day or two. Clutch-size appeared to decline with the season's advance; five clutches begun between June 6 and 15 numbered 5, 6, 6, 7, 7, and five begun between June 19 and July 2 numbered 4, 4, 5, 5, 5. (The probability is about 30 to 1 against the apparent difference being due merely to chance.)

We never once put the male off the nest, and assume (with Grinnell, 1944) that he normally takes no part in incubation; Blair (1936: 103), however, records both sexes being found incubating and covering the young in arctic Norway.

The most interesting observations we made of the longspurs relate to the normal desertion of the nest by the young on about the 9th day, with the wings still in pin feathers and three to five days or more before they can fly, in a manner characteristic of larks, and perhaps not uncommon in other Emberizinæ, though seldom mentioned (*cf.* Nice, 1937: 130, and 1943: 18, 69). This had nothing to do with our interference in banding the young, for more than once they deceived us by leaving before we came to band them, and in one case by searching we found an unbanded chick not far away. In the case of nest no. 5, two had already gone on the date decided upon for banding, July 21 (at 3:30 p. m.); and one (99844) could not thereafter be induced to remain any longer in the nest, though 99845 and 99846 did so. On July 24, 99844 was caught, and later recaught to make doubly sure, 350 meters from the nest and still unable to do more than flutter; an adult cock was with it. No. 99846 was still in the nest on the 22nd, and was caught on the 27th not far away, "not yet able to fly; it could flutter a few feet." This bird had probably been four days out of the nest and would require a couple of days longer before passing muster as a normally-fledged bird.

The spread of hatching led to broods of chicks of varying sizes, and the differences were not evened up during the nestling period. We have no records proving a spread of more than 48 hours in the time of abandoning the nest, though I suspect in some cases it involved a third day.

Grinnell (1944: 558) can scarcely have been unaware of the precocious dispersal of the nestlings, since he describes the state of feathering on "Day 10 (Date of leaving nest)"; but he makes no comment on it, and seems to have been mystified by the fact that the brood of nestlings he had been weighing daily "prematurely disappeared" before he visited their nest on the 8th day. Nicholson (1930: 295) also noted that "the young had rather prematurely left the nest." In our nest no. 2, four chicks just hatched and still wet at 1 p. m. on June 24 had gone before 7 p. m. on July 3, a maximum interval of nine days and some hours; the two remaining young of this brood hatched early on the 25th and left some time between 7 p. m. on July 3 and 8 a. m. on the fourth, a nestling period of 8.5 to 9 days.

As to the causes of this habit, it could perhaps in part be directly correlated with increasing the clutch size without increasing the size of the nest. Certainly towards the end the impression was given, both by the redpolls and the longspurs, that the nest was ready to burst and I was prepared at once to assume that dead chicks found in redpolls' nests had been suffocated. There is moreover the growing danger of attracting the arctic weasel as the young become daily noisier and as the odor of feces mounts. (The latter probably also attracts the blow-flies, whose larvae were found in all the examined nests of longspurs, Snow Buntings, redpolls, and wheatears.) It is not difficult therefore to see advantages in scattering the brood as early as possible, since it reduces the danger both from predators and from overcrowding in the nest. But the parents are probably presented with a more difficult task in providing enough food for each of the young after they are scattered, and the young are also deprived of the protection from cold and wet, and in general the uniform environment which they have previously enjoyed in the nest. It may be presumed that the advantages outweigh the dangers, and that once the young have acquired sufficient control of body-temperature their chances of survival are increased by dispersal.

Of 29 eggs whose history is known, all hatched; a brood of five chicks got wet

in a shower when one to two days old, were forsaken, and perished; one chick a few days old was found dead beside its nest, and one was accidentally crushed by one of us the day after it left. The chick last mentioned was preserved; its longest primary is 19 mm. from root (pulp cavity) to tip, of which 5 mm. is buried in the follicle, 10 mm. is ensheathed, and 4 mm. forms a brush at the tip. This emphasizes the callow state of the young at the time of leaving the nest.

Three males collected at the head of Clyde Inlet in June had wing-lengths of 91, 92, and 93 mm. (ave. 92), and three females of 86, 86 and 87 mm. (ave. 86.3). These accord with Hørring's (1937: 120) series taken further west and south, and with the measurements of the typical race.

Two females taken on July 23 and 26 were beginning to molt the flight feathers, but showed none of the body plumage yet renewed. Thereafter the birds became very secretive and a great many of them undoubtedly departed; we found them abundant on reaching Clyde Post on August 19, though only an occasional bird was then to be seen at Camp B. On August 10 there was a cock with no tail; and one or two were still left at Camp B on August 28. Meanwhile those at the coast had molted, and no males in summer plumage remained. Migration was well advanced, and the numbers considerably diminished, when we left on September 5. The following two days they were fairly numerous at Frobisher Bay Airfield.

The stomachs of three birds were examined. Those of a male and female on June 9 contained many identical seeds, perhaps from a *Carex*, the remains of beetles and a single large tipulid larva. The recognizable stomach-contents of a male on June 30 consisted entirely of insects, including one tipulid imago and one larva besides other fragmentary material. *Tipula* imagines were also commonly brought to the nestlings.

40. SNOW BUNTING, *Plectrophenax nivalis nivalis* (Linnaeus).—These were the most widely distributed breeding birds at the head of Clyde Inlet, being established almost wherever there were steep rocks from sea-level to 1000 meters. They were however much commoner at low elevations, and appeared to avoid the gigantic precipices of the fiords, which in places rise 1000–1500 meters out of the water.

Snow Buntings were seen more frequently than any other birds by our party on the Barnes Ice Cap, at a height of 850 meters above sea level, and 9 miles from "land." Six were reported on May 30 and "large flocks" on June 16; they had also been seen many times in the interval.

They were already established and singing by the time of our arrival at Frobisher Bay Airfield on May 19, at Clyde Post on May 22 and at Camp B on May 24. At this time their displays and song-flights at times resembled some loosely communal or sociable activity; they constantly quarreled and scolded one another, though their territorial claims were exceedingly small (Tinbergen, 1939: 20).

Although Snow Buntings are by far the earliest passerine migrants to arrive, their nesting is no earlier than that of the other species. A nest containing four young two or three days old was found on June 25 (first young Hoary Redpolls on 13th, longspurs on 22nd, etc.), and other young in inaccessible nests were being fed on the 29th and 30th. On the 24th we found a nest still being built, in which the first egg was not laid till the 26th; the fifth and last egg was almost certainly laid on June 30, and hatching occurred on July 11 and 12 (period from last egg laid to last chick hatched was 12 days). The chicks grew exceedingly fast and were almost ready to fly when banded on the 10th day.

Another nest found on July 28, containing six partly-incubated eggs, was deserted immediately (the only case out of 40 nests of all species under observation,

where our activities resulted in desertion). Three days later it was found that some animal, which could only have been a lemming or a weasel, had despoiled the nest and broken and eaten most of the eggs. These last two late nests were in crevices in the ground among boulders, both on steep north-facing slopes; the earlier one, in contrast, was open to the south on an unusually exposed ledge, which, although roofed over, allowed us a view of the whole nest and its contents. The nests were built chiefly of grasses, with other plants including *Cassiope*, moss, and roots (and in one case some pieces of mud), and lined with dry grass, ptarmigan and other feathers, and sometimes willow seed, or hare or lemming wool. After use one nest contained the pupae of 30 blow-flies, and a maggot was lodged in the feathers of one of the chicks we banded. Undoubtedly the commonest nest sites were in cliff-cracks, to which we could not obtain access.

In fine weather in July the Snow Buntings reveal themselves as adept fly-catchers, rising every few seconds to snap at a passing insect, and returning to their perch, with little if any more effort than a phoebe or a flycatcher. They frequently catch the large *Tipula arctica*, and I watched one on July 18 catch, fight with, and carry off an *Oeneis peartiae*, one of the large arctic "black" butterflies.

After July 20 there was a sharp reduction in the number of Snow Buntings to be seen at Camp B. A female collected there on July 29 had just begun to molt; by the end of August at Clyde Post only fully molted adults or young birds were seen.

SUMMARY

The writer, assisted by Alexander Anderson, resided at 'Camp B' at the head of Clyde Inlet (69° 50′ N, 70° 25′ W) from May 24 to August 12, 1950. The locality was biologically rich compared with either the adjacent coastal belt or with the interior. In mid-August a visit was made by plane and boat to the immense fulmar colony at Cape Searle. Observations made during the Macmillan Expedition to Frobisher Bay in August 1937 are also incorporated. The material relates to 40 species, and is arranged in systematic order.

Special attention may be directed to the following items.

1. The number of Small-billed Fulmars found at Cape Searle was about 200,000. White-headed birds constitute about 13 per cent, the remainder being intermediate and dark. The nesting colony is one of four or five thought to exist in arctic Canada (Pp. 358–361).

2. A great number of drake King Eiders passed eastward across the waist of Baffin Island in July and August, following a narrow route leading to Baffin Bay through Clyde Inlet. Observations by Salomonsen and others make it appear probable that the migration witnessed by us continues directly to West Greenland where the birds join others from further north and undergo their eclipse molt. King Eiders from arctic lands lying west of Baffin Island appear to share in this "molt migration." Later in the fall they move to their winter quarters in southwest Greenland. A different route is followed on return in spring (Pp. 362–364).

3. White Gyrfalcons and Duck Hawks were both breeding at Camp

B. The fledging-period of the former was 46–49 days, and three young were reared (Pp. 364–366).

4. Rock Ptarmigan (and both species of lemmings) were at a very low ebb of numbers in our vicinity in 1950 (Pp. 366–367).

5. Both Ringed and Semipalmated plovers were found to be present in similar numbers, but keeping strictly segregated. Both appeared to be breeding though this was proved only of the Semipalmated. Barriers to the formation of mixed pairs evidently exist, so that in spite of their extreme resemblance the two birds act like distinct species (Pp. 367–369).

6. In the case of the Black Guillemots, it is pointed out that what is known as *arcticus* in fact resembles a hybrid swarm in its variable recombination of the characters of *atlantis* and *mandtii* (P. 374).

7. The Horned Larks clearly present a hybrid swarm, the extreme or parental types being the very distinct forms *alpestris* and *hoyti*, as previously found in southern Baffin Island by Soper. Interbreeding occurs at random, and the population shows gradation between the extremes (Pp. 375–376).

8. The redpolls, *A. h. hornemanni* and *A. flammea rostrata*, behave as distinct species in that they do not interbreed or hybridize. No differences whatever could be found in their ecology, however. Consideration is given to the operation of natural selection in cases such as this, and to population dynamics in the Arctic (Pp. 380–385).

9. Particular attention was paid to the breeding-biology of the small passerines, and it was found, for example: that wheatears, redpolls, and perhaps Lapland Longspurs generally re-use old nests, merely relining them each year and evidently saving valuable time thereby; that in small birds some incubation is necessary from the time the first egg is laid to keep it from freezing, and hatching in consequence is usually spread over two to four days; that Lapland Longspurs, like various larks, leave the nest some days before they can be said to fly; and that there is an excess of males and a notable absence of territorial disputes in all six species of small passerines.

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