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SYSTEMATIC AND BIOLOGIC  
NOTES ON THE LONG-TAILED SKUA  
*STERCORARIUS LONGICAUDUS* VIEILL.

BY

BERNT LØPPENTHIN

WITH A DANISH SUMMARY

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WITH 4 FIGURES IN THE TEXT

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## Introduction.

The present paper is an extension and continuation of some investigations on the Long-tailed Skua, *Stercorarius longicaudus*, made in 1931—1932 in connection with the study of the avian fauna in a part of Northeast Greenland. The author visited this region from July 7th to August 19th 1930 as a member of a summer expedition under the leadership of Dr. LAUGE KOCH (cp. LØPPENTHIN, pp. 85—99).

Besides a number of young birds, 71 specimens in all of the Long-tailed Skua, especially from Greenland and Scandinavia were investigated; they are now preserved in the Zoological Museum of Copenhagen. Forty one nearctic birds of this series proved to be distinctly lighter on the underparts than the remaining 30 skins from North Europe. In the lightest specimens from Greenland not only the entire belly but also the undertail coverts were yellowish white; in the Scandinavian specimens the underparts were more or less grey, and in the darkest ones this colour extended to the throat. Four individuals with different belly colour were selected from this series and used for types with which the remaining skins were compared (fig. 1); they are all stated to have been shot in July. As there is no difference of colour between the two sexes, the males and females were treated together.

On the basis of 40 breeding birds or summer guests from different regions in Greenland and 29 Scandinavian specimens (breeding birds from Lappland, migratory birds from Iceland, the Faroes, and Denmark) a graphic account was made of the relative frequency in the two groups of populations of the different colour types, in the present paper given by broken lines in fig. 2 (p. 8). The curves of the western and eastern populations overlapped only slightly, thus showing a distinct difference. Two individuals from more distant areas (Novaya Zemlya, Barren Grounds in Canada) were not included in this calculation. The lighter nearctic birds I segregated as a special subspecies to which was given the name *Stercorarius longicaudus pallescens* (l. c.). The type specimen, an adult female, was killed by the author on Cape Stosch in

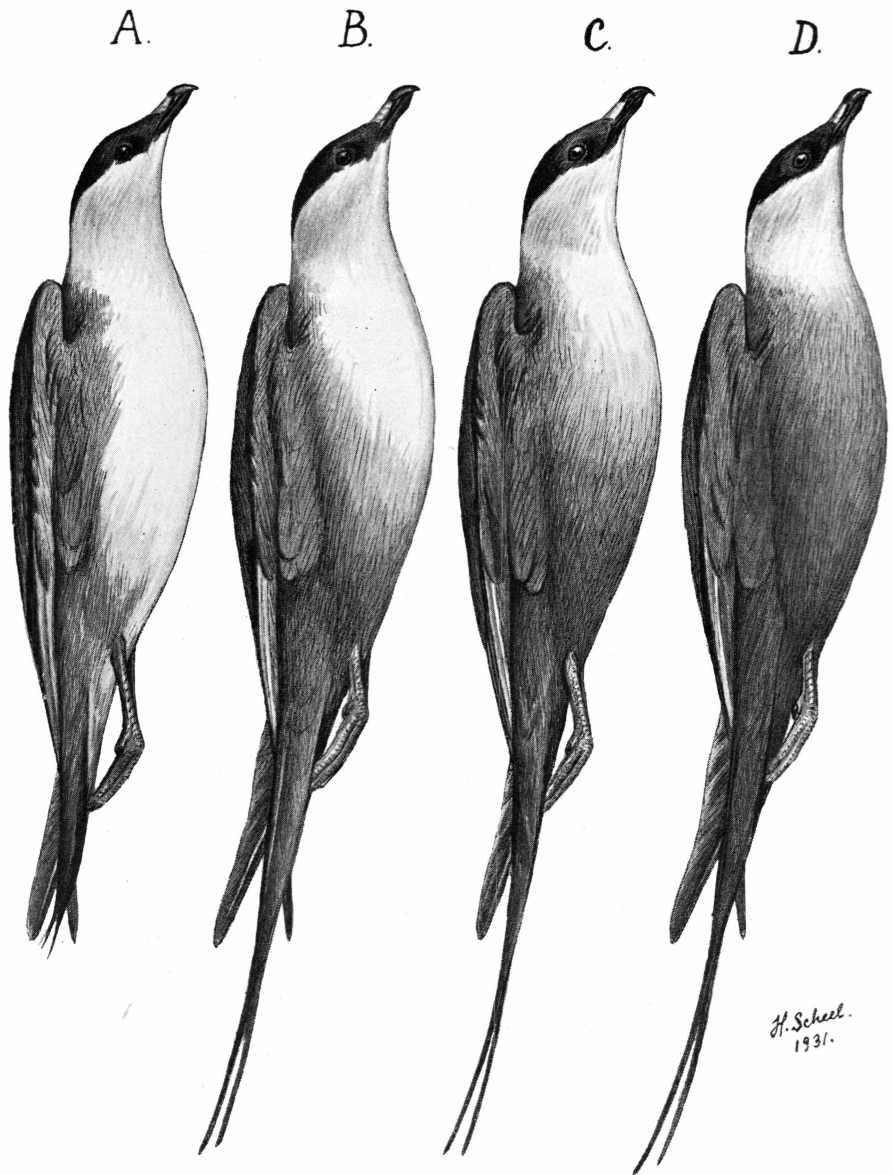


Fig. 1. Colour types.

- A. ♂ ad., Cape Stosch, Northeast Greenland, July 25th 1930.
- B. ♀ ad., Danmarkshavn, Northeast Greenland, July 31st 1919.
- C. ♀ ad., Lule Lappmark, North Sweden, July 9th 1906.
- D. ad., Ringkøbing, Denmark, July 18th 867.

Northeast Greenland on the 1st of August 1930, and is kept in the Zoological Museum of Copenhagen.

In the following I shall reply to some criticisms which have appeared.

### Literature and critical remarks.

Of previous investigators HARTERT (p. 1763) should especially be mentioned, he says among other things that it seems "als fänden sich unter den Stücken aus dem fernen Osten, Spitzbergen und Alaska mehr unterseits helle, während unter den norwegischen Vögeln die dunkelsten beobachtet wurden; indessen variiert dies individuell und nach dem bisher [towards the end of 1916] untersuchten Material ließen sich keine lokalen Formen abgrenzen."

When I had described the nearctic birds as a special sub-species with *Terra typica* in Northeast Greenland, LÖNNBERG compared the collection of skins of this species in the Naturhistoriska Riksmuseum of Stockholm, with the drawing of the colour types (l. c., p. 88), also reproduced in the present paper, and wrote (in litt., February 27th 1933): "... At the same time I want to draw your attention to the fact that your segregation of the Skuas cannot be completely upheld, since we have here Long-tailed Skuas having, it is true, their undersides equally white as yours. The variation in this respect may be considerable." [Original in Swedish]. Almost at the same time STONE (1933) wrote: "... Long-tailed Jaegers of arctic America and Greenland he has described as a distinct light-bellied race, *Stercorarius longicaudus pallescens*. It would seem doubtful however, if this difference is really a geographic one [;] as in the allied *S. parasiticus* and *S. pomarinus* [!] there are dark and light phases of plumage occurring side by side and the reviewer forty years ago described a dark breasted *longicaudus* from West Greenland." This specimen is one out of seven birds [a female No. 26,904 (dusky phase?)], all from the Melville Bay July 16th 1891 (STONE, 1893, p. 147—148). In this region the coast consists for the greater part of glaciers (or more correctly the edge of the inland ice), and as a breeding area it can unquestionably be left out of consideration, since the conditions for breeding and rearing the young are the worst possible. The icefree land is of small extent, and small Rodents—here the Greenland Lemming, *Dicrostonyx groenlandicus*—on which the Long-tailed Skua seems to depend largely in the breeding time, do not occur here. No doubt they were only stragglers which spent the time away from the breeding grounds, having had no young in that summer (1891). This year the RYDER Expedition visited East Greenland, and BAY (p. 32) writes that the Long-tailed Skua was "very common near the place of wintering, where it was supposed to breed, though it was not, it is true, seen in juvenile plumage." [Original in Danish]. No doubt conditions resembled those prevailing in Northeast Greenland in the summers of 1899, 1929, and 1930 (see later), in which the Skuas of this

region hardly had any young; at any rate only a small number got young on the wing.

STONE's birds presumably were stragglers from the breeding areas in northeastern or northern Greenland or from the arctic Canadian islands. As regards the above mentioned dark female from the Melville Bay in July 1891 he writes (1893, p. 147—148): "In No. 26904, female, (dusky phase?) the whole lower surface is suffused with sooty gray, though this color is not uniform, as there are a considerable number of white feathers scattered over the breast. The upper surface is mottled with slate-gray and dusky feathers. The under tail coverts and flanks are transversely barred with white and the under wing coverts are plain dark slate. . . . The specimen may, I think, represent a partial dusky phase as the suffusion of sooty feathers on the under surface is very decided, much more so than in any of the young birds, with which I at first placed it. The dusky feathers moreover, do not form transverse bands as in the young birds and the under wing coverts are uniform slate colored like those of the adults. . . . If this really represents a dusky phase, it seems to be the first recorded instance of this species. . . . If, however, we consider this as a young bird it would indicate that the adult plumage is assumed very differently by different individuals . . ." In 1893 STONE was evidently not quite as sure of the age of this bird as forty years later (l. c.). He did not think that it was a young bird, but the numerous white feathers on the breast as well as the said transverse bars on the flanks and under tail coverts more strongly indicate that it is a young bird than an adult bird. Moreover the under wing coverts may very well be uniformly coloured in the young bird (see also WITHERBY, p. 788). It may have been a one year old bird (in its second summer). In its dark juvenile plumage the Long-tailed Skua shows some individual variation, but among the hundreds of adult birds which the author has seen in the field (Northeast Greenland) and in the different museums, it has not been possible to find a single one which deserved the designation "dark phase" like that known from the two dichromatic species, Arctic Skua and Pomatorhine Skua.

In the Zoological Museum of Copenhagen is a skin of a highly melanistic, nearly uniform dark young bird of the Long-tailed Skua with uniform dark-brown underwing coverts. Presumably it is a bird of this or a very similar type which WYNNE-EDWARDS (p. 308) saw on the Atlantic on May 25th 1933, where he "had the rare good fortune to see a bird of this species in the dark phase, in company with nine normal birds." He gives, however, the following comment: "Unfortunately I cannot claim to have seen its diagnostic tail, for it did not turn sufficiently broadside, though I saw those of its companions and was able to make a direct comparison of size." This observation does

not give any conclusive evidence for the presence of a dark phase in *Stercorarius longicaudus*. An adult bird which NEWTON (p. 217) saw at Spitzbergen in 1864 presumably was a dark *Stercorarius parasiticus* which was somewhat carelessly and therefore erroneously determined.

### Renewed investigation.

After LÖNNBERG's letter quoted above I resolved to examine more material, and in the course of 1936 I compared 102 adult specimens in all of Long-tailed Skua from the museums in Copenhagen, Stockholm and Helsingfors with my four colour types. On the request of Prof. E. STRESEMANN I asked Prof. B. STEGMANN to go through the collection in the Museum of Leningrad. STEGMANN's answer was received, but after that the matter was put aside for various reasons for a rather long time, during which Prof. FR. STEINBACHER—shortly before his death in February 1938—had my notes for perusal, after which time he mentioned and acknowledged *Stercorarius longicaudus pallescens* LÖPP. (cp. STEINBACHER, p. 502). STEGMANN's accounts are however still unpublished, and as the investigations is deemed to be of interest, the author has examined the material afresh, the collection having been augmented by 18 birds from Greenland and Arctic Canada kept in the Zoological Museum of Copenhagen. A number of biological data have also been added<sup>1)</sup>.

The 120 available skins were arranged according to the colour types as shown below. Only adult individuals were included; males and females were treated collectively.

	Colour types						
	A	A—B	B	B—C	C	C—D	D
Northeast Greenland (breeding birds)..	5	14	15	3	4	..	..
Southeast Greenland (straggler).....	..	1	..	..	..	..	..
West Greenland (summer visitors) ....	..	7	7	..	1	..	..
Arctic North America .....	..	1	3	2	..	..	..
Spitzbergen .....	..	1	..	..	..	..	..
Iceland (migrating birds) .....	..	..	..	..	5	4	1
The Faroes (migrating birds).....	..	..	..	..	2	1	2
Dovre, Norway .....	..	..	..	..	..	1	..
North Sweden (breeding birds) .....	..	..	2	4	8	5	1
North Finland (breeding birds).....	..	..	3	1	3	..	..

<sup>1)</sup> For loan of material, information and all courtesies received I extend my best thanks to Dr. N. GYLDENSTOLPE, Stockholm; R. HØRRING, M. Sc., Copenhagen; Mr. ALWIN PEDERSEN, Holte; Prof. B. STEGMANN, Leningrad; Prof. E. STRESEMANN, Berlin; Dr. I. VÄLIKANGAS, Helsingfors.

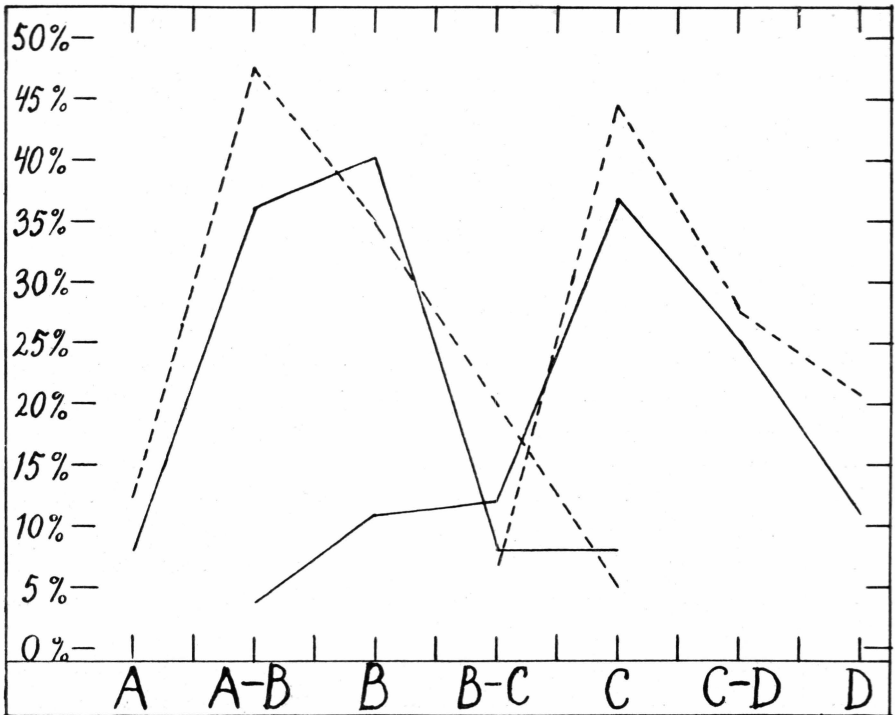


Fig. 2. Relative numbers of the different colour types from two investigations of skins of Long-tailed Skua.

To the left: *Stercorarius longicaudus pallescens* VIEILL. Greenland, Arctic North America.

To the right: *Stercorarius longicaudus longicaudus* LÖPP. North Europe.

Broken lines: Investigations from 1932. Full lines: Renewed investigations.

	Colour types						
	A	A-B	B	B-C	C	C-D	D
Kola (breeding birds).....	..	1	1	2	3	1	..
Novaya Zemlya (breeding bird) .....	..	..	..	..	..	1	..
South Finland (migrating birds).....	..	1	..	..	..	1	..
Denmark (migrating birds).....	..	..	..	..	..	..	2

As it will be seen none of the Lappland birds (from the Riksmuseum in Stockholm) were lighter than type B. The two lightest of the European specimens (one breeding bird from Kola and one migrating bird from South Finland) are kept in the Museum of Helsingfors.

On the basis of the above collection I have given a new graphic account of the distribution of colour types in the two groups of populations (fig. 2); only the bird from Spitzbergen is left out of consideration here. Of the rest none of the 63 nearctic specimens examined (from Greenland and Canada) were darker than the majority of the 56 birds from North Europe, and of these only two were lighter than type B. The new

curves, drawn from 119 individuals, are more flat than those of 1932 drawn from 69 birds; they overlap more, and the percentage of B-birds in the nearctic collection has been increased, but the two groups of populations of the Long-tailed Skua from America including Greenland and North Europe respectively are however so different that it seems justifiable to uphold a special determination of race for the nearctic birds.

As regards the populations of the Long-tailed Skua in the Soviet Union STEGMANN (in litt., January 28th 1937) wrote as follows:

“Unser Material an *Stercorarius longicaudus* habe ich schon vor Jahren durchgesehen und gefunden, daß die von Ihnen beschriebene Form volle Anerkennung verdient. Sie ist nämlich auch bei uns vorhanden und als Brutvogel über die Tschuktschenhalbinsel, das Anadyr-Gebiet, die Kommandeur-Inseln und Kamtschatka verbreitet. Nach Westen geht sie bis Indigirka. Von den Neusibirischen Inseln stammen außer dunklen auch einzelne intermediäre, während von der Lena bis Lappland die typische Form verbreitet ist. Daß diese Art eine ziemliche Weite in der Variation der Färbung der Unterseite besitzt, ist bekannt, unsinnig wäre es deshalb, die geographisch gesonderte helle Unterart nicht anzuerkennen.

Eben habe ich unser gesamtes Material (91 Stück, darunter 22 *pallescens*) nochmals durchgesehen und muß hinzufügen, daß die Vögel von Alaska (Kodiak-Ins., Norton Bay — 4 St.) auch hell sind, etwa 1 A-B, 1 B, 2 zwischen B und C. In N-O Sibirien herrschen A und B vor. Von 18 Stücken gehören bloß 2 zu C. Von der Lena an herrschen die Typen C und D vor; B ist schon äußerst selten, und A fehlt ganz. Mit einem Wort: Wenn auch einzelne (verschwindend wenige) Stücke unbestimmbar sind, so ist doch die helle Form in Serien sehr gut unterscheidbar. Es scheint mir, daß bei *pallescens* auch der Rücken ganz wenig heller ist, als bei der typischen Form.”

Below is given a short summary account of the colour of the feathers of the adult birds and the distribution in the breeding season for the two subspecies of the Long-tailed Skua and a few special remarks on their occurrences in Spitzbergen:

*Stercorarius longicaudus longicaudus* VIEILLOT. Nouv. dict. d'hist. nat., nouv. éd., XXXII, p. 157, 1819, (North Europe, North Asia, North America, limited terra typica: North Europe).

Colour description: crown, nape and lores very dark brown. Throat, cheeks and neck white with yellowish tinge. Breast of same colour as throat or grey. Belly grey. Under tail coverts as belly. Upper parts brownish-grey. Primaries blackish-brown; shafts of 1st and 2nd primaries white; shaft of 3rd primary with a brownish tinge. Rectrices blackish-brown, lighter at their roots.

Breeding area: Mountain and tundra areas of North Europe and North Asia from Norway to Lena. Hereto Novaya Zemlya and Kolguev and—possibly—Severnaja Zemlya (Emperor Nicolaus II Land). On Franz Josef Land the species occurs as stragglers, but does not breed. (GORBUNOW, pp. 139 and 224).

*Stercorarius longicaudus pallescens* LÖPPENTHIN, Vögel Nordostgrönlands, p. 85, 1932. (Arctic areas of western hemisphere. Terra typica: Northeast Greenland.)

Colour description: Head, neck, back, wings and tail as in the typical form. STEGMANN (in litt., see above) however believes that the east Siberian birds have slightly lighter upper parts than the north Russian. Breast and anterior part of the belly white with yellowish tinge. Posterior part of the belly generally grey, but in extreme cases the yellowish-white colour extends right to the undertail coverts.

Breeding area: East and north coasts of Greenland from Scoresby Sound to Washington Land, arctic Canada with adjacent islands, Alaska, eastern part of Siberia with Kamtschatka to Indigirka in the west and possibly Wrangel Island.

The area between Lena and Indigirka—including the New-Siberian Islands—is inhabited, according to STEGMANN (in litt.) by an intermediate form.

The present author examined only a single skin from Spitzbergen (see the scheme on p. 5), apparently a *pallescens*, but a larger collection is required for a more exact statement. KOENIG (LE ROI, p. 202) says about 26 fully plumaged birds from Spitzbergen: "Das Aschgrau der Unterseite zieht sich mehr oder weniger weit nach vorne." According to this one would rather presume that it was the typical form, but the figure in plate 15 gives no safe indications, since only the anterior part of the birds is shown.

KOENIG did not find the Long-tailed Skua breeding on Spitzbergen, and he is completely justified in doubting the correctness of a statement of a breeding occurrence given by TREVOR-BATTYE (p. 594) who visited Spitzbergen in 1896 with the Conway Expedition. He says in plain words (LE ROI, p. 202): "Es ist überhaupt etwas fraglich, ob TREVOR die Art richtig angesprochen hat, da er in auffallendem Gegensatz zu unseren eigenen Beobachtungen und denen sämtlicher anderer Forscher behauptet, *L. longicauda* sei auf Spitzbergen ebenso häufig wie *L. parasiticus*." It is however possible that the Long-tailed Skua was more numerous on Spitzbergen in the summer of 1896 than usual owing to poor feeding conditions (absence of Lemmings) elsewhere, but at any rate no proof of breeding occurrence has been given.

KOLTHOFF (1903, p. 70) expressly mentions that the bird was not rare in 1898, but none of some ten specimens killed by NATHORST and himself in the beginning of July that year had bred, and all of them had undeveloped genital organs. In 1900 (which year was a lemming-year in East Greenland) the Long-tailed Skua obviously were rarer on Spitzbergen; 2 old animals were however shot in June.

In 1931 a nest with one egg was found in Spitzbergen (TOMKINSON, p. 82), but this seems to be unique; the find will be mentioned further below (p. 17). The Long-tailed Skua often reaches Spitzbergen as stragglers, often even in rather considerable numbers, but as a breeding bird it is very rare and sporadic.

### Food.

When the Long-tailed Skua stays in the breeding area it seeks its food on land, and here it is primarily dependant on Lemmings. It takes however also many insects and birds and eggs. Fishes and other aquatic animals are also taken to some extent, but in the breeding season the products of the sea seem to come second in rank. Moreover it is not reluctant to feed on carcasses of any kind whatever.

Some accounts of the food of the Long-tailed Skua are quoted here:

HOLBØLL (p. 427) found fish remains and crustaceans in the oesophagus of birds from West Greenland.

BAY (p. 32) found in the Scoresby Sound district 1891—1892: "remains of plants, beaks of cuttlefish, fish bones, and once only a complete, adult Lemming." (Original in Danish). He believes however that this last had not been killed by the Skua itself, but the bird may very well have done so.

KOLTHOFF (1903, p. 70) first states, in general words, presumably based on observations from Spitzbergen, that the species lives on fish and crustaceans, but that it also feeds greedily on dead animal bodies, presumably remains from game killed by the expedition. In East Greenland, he writes, it caught small Polar Cod and crustaceans which lived near the surface of the sea, and on land Lemmings and insects.

DEICHMANN (p. 153), whose observations also were made in East Greenland and are from the same summer as those of KOLTHOFF (1900), states that the Long-tailed Skua caught insects and small Chars, *Salmo alpinus*, which it took by diving like a Tern. He says nothing of Lemmings, but stomach analyses also do not seem to have been made.

MANNICHE (p. 173 and following pages) states from Danmarkshavn that both young and old birds live principally on Lemmings, if these

are present in sufficient numbers. This especially was the case in 1906, partly in 1908 also, but in 1907 there were practically no Lemmings in this neighbourhood; the Skuas tried to subsist on insects, but they soon gave up and disappeared from the country without breeding. Stomach analyses from this summer gave only insects, sometimes mixed with leaves of polar willow, *Salix arctica*, no remains of Lemmings. The young seemed to feed mainly on insects at first, but even when quite young they are able to devour the Lemmings which their parents disgorge for them.

KOENIG (LE ROI, p. 203) in stomachs from birds from Spitzbergen found remnants from game killed by the people, grit, egg shells and leaf fragments.

FREUCHEN (HØRRING, p. 84) reports from Genboøen, visited during the 5th Thule Expedition in 1921—1924, that one specimen had its stomach full of Lemmings, and another of crustaceans.

ALWIN PEDERSEN'S observations from East Greenland 1924—1925 (1926, p. 235), 1927—1929 (1930, p. 480) and 1931—1933 (1934, p. 26) agree well with those of MANNICHE. In 1938—1939 (1942, p. 105—106) he found remains from fish, crustaceans, insects and vegetables in the stomachs of killed birds, no Lemmings owing to the scarceness of these animals during this time. He states however probably from earlier observations, that the young is able to swallow a Lemming, brought by one of the parents, when it is 10—12 days old. When the whortleberries are ripe, the birds may feed on these.

In 1930 when Lemmings were scarce in East Greenland, the author (LÖPPENTHIN, p. 93) found only scarce remains of these animals in the stomachs of shot birds, once a whole Lemming and a few times hairs of Lemming. I found however numerous hairs of Lemming in some fresh pellets which I collected on the heath.—A single time I found a living Lemming.—This summer the Long-tailed Skua subsisted mainly on insects; stomach analyses showed that it were mainly Butterflies and Moths (*Noctuidae*, *Argynnis*, *Dasychira groenlandica*) and their larvae, as well as Daddy-long-legs (*Tipula*). Grit was also found, once a small marine snail, and one individual which was found recently dead (cause unknown, perhaps after being wounded), had some green crow-berries in its bill. I never found remains of fish. Once I saw a Long-tailed Skua eagerly preying upon a Snow-bunting, but without success.

BENT (p. 25) states according to other investigators that the species to a great extent lives on Lemmings, Voles (*Microtus*) and other small mammals, takes Flies, Butterflies and other insects and their larvae. In summer they rob birds' nests, taking eggs and young, and sometimes they pursue and kill wounded birds. Crustaceans, worms and various offal are also mentioned, and during summer a number of crowberries,

*Empetrum nigrum*, is taken. BENT perhaps is less right in the last part of his remark that "probably a few fish are caught and many are stolen from gulls and terns." That the Long-tailed Skua can fish for itself has often been seen, e. g. by HOLBØLL (p. 427), KOLTHOFF (1903, p. 70) and PEDERSEN (1942, p. 105). I do not however remember having seen it dive like a tern as HOLBØLL, DEICHMANN (p. 153) and PEDERSEN mention, but only that a Long-tailed Skua now and then collected small animals on the beach at the ebb; it was far more common to see the birds hunting on land in a low flight over the heath after insects, or they stood lonely on the ground looking for Lemmings. The Long-tailed Skua hunts its prey itself, and it is a question if it does actually pursue other birds in order to rob them of the food which they have in their bills more than does any other species of bird, from the tame chicken and upwards; I do not remember having seen this. LAUGE KOCH informed me verbally that he also did not see the Long-tailed Skua rob other birds of their prey on the east or north coast of Greenland. Corresponding records are available from different arctic regions given by HOLBØLL (p. 427), HEUGLIN (p. 195), KOLTHOFF (1903, p. 70), KOENIG (LE ROI, p. 203) and FREUCHEN (HØRRING, p. 83).

Statements to the effect that the Long-tailed Skua does, to a great extent, rob other birds of their prey unquestionably are due to confusion with the Arctic Skua, *Stercorarius parasiticus*, of which especially pale specimens may be difficult to distinguish from the former species in the field, and further there is in the literature some confusion in the nomenclature, since the Long-tailed Skua is sometimes called "*Lestris parasitica*" and Arctic Skua then "*Lestris crepidata*", but it is usually obvious from the record which species has been meant. However the highly developed robber technique of the Arctic Skua has often been attributed to the Long-tailed Skua. The Arctic Skua is well known by laymen, and this habit has often been the reason for the popular names of this bird, thus in American: Parasitic Jaeger, German: Schmarotzer-raubmöwe etc., but especially descriptive is the designation used on the Danish group of islands the Ertholme "Maagehøg" (Gull-hawk). The Long-tailed Skua however is no "gull-hawk". On the other hand, it can very well itself be a victim of the attack of its allies. It is an excellent flyer, though it cannot compare with the Arctic Skua in quickness and manoeuvring ability. A couple of this species, which is comparatively rare in Northeast Greenland, and which KOLTHOFF (1901, p. 137) had under observation in 1900 thus seemed to have parasitized on the population of the Long-tailed Skua which was rather numerous at the place (Mackenzie Bay).

### Dependence on Lemmings.

A short summary—with comments—will now be given of the observations of various authors on the occurrence of the Long-tailed Skua in the breeding areas in proportion to the abundance of Lemmings:

#### Ellesmere Land.

1876 (FEILDEN, pp. 202 and 214): Lemming-maximum. Numerous broods of Long-tailed Skua.

#### Northeast Greenland.

- 1822 (SCORESBY, pp. 416 and 422): Some Lemmings were found. (The animals were not hitherto known from Greenland). Long-tailed Skua was seen, but was not abundant. Nothing is said of breeding.
- 1869 (PETERS, p. 164; PANSCH, p. 237): Lemmings seen. No information about the Long-tailed Skua this year.
- 1870 (id. *ibid.*): Pronounced lemming-minimum. The Long-tailed Skua has, clearly enough, not bred. Altogether 5 specimens are reported from 18th to 25th of July.
- 1891 (BAY, pp. 15—16 and 32): Lemmings were no doubt very scarce. Long-tailed Skua was abundant, but no bird was seen in the juvenile plumage. The species had hardly been successful in its breeding this year. Probably conditions resembled those in 1899, 1929 and 1930.
- 1892 (id. *ibid.*): Lemmings no doubt were more abundant than the previous year; numerous foot prints were seen and a few animals found. Long-tailed Skua was common and unquestionably had bred. BAY seems however not to have been near the nest, but probably he did not visit the preferred type of locality.
- 1899 (NATHORST, II, pp. 96, 172, 185, 241, 287—290 etc.): Few Lemmings. Long-tailed Skua was abundant in some places, but eggs or nestlings were not seen and are not likely to have been there. 1 young bird, seen on July 26th (p. 185) certainly was one year old.
- 1900 (KOLTHOFF, 1903, pp. 5 and 69 etc.): Good lemming-year, probably lemming-maximum. Long-tailed Skua bred commonly.
- 1906 (MANNICHE, pp. 22 and 173 etc.): Lemming-maximum. Many broods of Long-tailed Skua.
- 1907 (id. *ibid.*): Lemming-minimum. Long-tailed Skua arrived in spring, but disappeared completely from the district in the last few days of June. No brood.
- 1908 (id. *ibid.*): Rather good lemming-year. Long-tailed Skua bred as in 1906.

- 1925 (PEDERSEN, 1926, pp. 162 and 235): Rather poor lemming-year. Only a few broods of Long-tailed Skua.
- 1928 (id., 1930, pp. 378 and 476): Good lemming-year. Many broods of Skua.
- 1929 (id. ibd.): Poor lemming-year. No brood of Long-tailed Skua, but the birds stayed in the area.
- 1930 (LØPPENTHIN, p. 85 etc.): Very few Lemmings were seen. Long-tailed Skua was abundant, but only two-year-old birds or older birds. Of ten males killed only two had slightly enlarged testes. Eggs or living young were not seen; once a dead young one was found.
- 1933 (PEDERSEN, 1934, p. 26): Fairly good lemming-year. Long-tailed Skua bred abundantly.
- 1938 (PEDERSEN, 1942, pp. 14 and 105): Poor lemming-year. No broods of Long-tailed Skua.
- 1939 (id. ibd.): Poor lemming-year. No broods of Long-tailed Skua.

#### North Scandinavia.

- 1903 (WESSEL, p. 107): Good lemming-year. Long-tailed Skua bred commonly.
- 1905 (SUOMALAINEN, p. 68): The quantity of Lemmings is not stated. Long-tailed Skua bred commonly.
- 1909 (id., p. 67): Poor lemming-year. A few specimens of Long-tailed Skua were seen, no breeding.
- 1931 (SWANBERG, 1939, p. 37). Few Lemmings. Few breeding couples of Long-tailed Skua.
- 1932 (HORTLING, p. 36): Lemming-minimum. One Long-tailed Skua seen, no brood.
- 1932 (SWANBERG, 1936, p. 24; 1939, p. 37): Lemming-minimum. Long-tailed Skua arrived in spring, but strayed about without breeding; it became scarcer during the observer's stay in this district, and in the middle of July it had disappeared.
- 1936 (id. ibd.): Lemming-minimum. A few nests with eggs were found of Long-tailed Skua, but they were abandoned and no young were reared; in the middle of July the birds had disappeared.
- 1939 (id., in litt., 16.1.1942): Very few Lemmings, none seen, but lots of excrements showed that the animals had been numerous in the previous year. A number of Long-tailed Skuas were seen, but there was no sign of breeding.

#### Norvaya Zemlya.

- 1902 (SCHAANNING, p. 165): Lemming-minimum. Long-tailed Skua was not seen at all. The birds may however have been there earlier in the year; observations did not start till August 10th.
- 1903 (id. ibd.): Good lemming-year. Long-tailed Skua bred abundantly.

The above clearly shows that the Long-tailed Skua on the breeding grounds is pronouncedly dependent on the occurrence and number of Lemmings. This is clearly borne out by SCHAANNING's observations from Novaya Zemlya 1902—1903 and those of MANNICHE from Danmarkshavn 1906—1907. Records of constant breeding occurrences in regions where Lemmings are absent may therefore give rise to doubt,

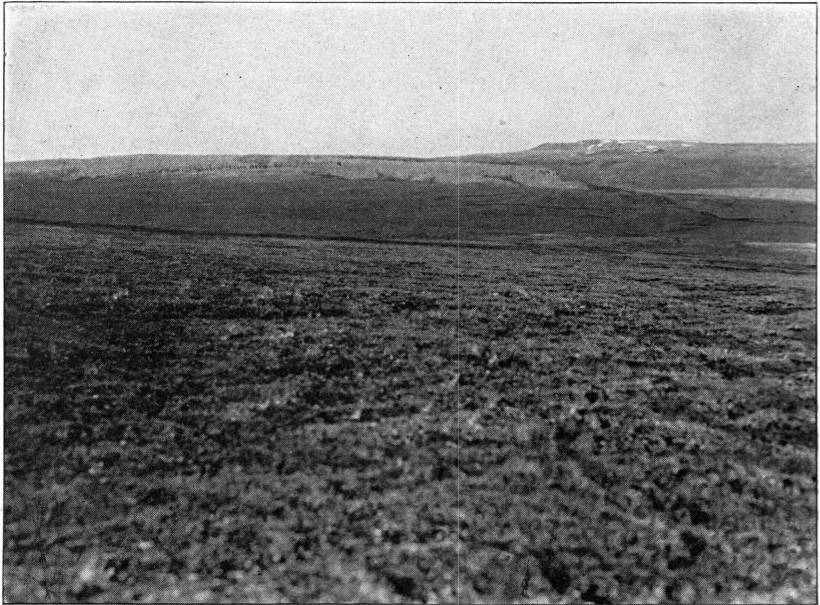


Fig. 3. Cassiope heath in Northeast Greenland. Loch Fyne about July 30th 1930. Locality preferred by *Stercorarius longicaudus pallescens* (B. Löppenthin phot.)

and an account of the gregarious occurrence of the birds will support this doubt.

In good and average good lemming-years when the species breeds abundantly the birds spread over the land, but there is no question of any formation of colonies. Every pair has its area which is defended.

In poor lemming-years (e. g. East Greenland 1891, 1899, 1929, 1930; Lappland 1939) the birds remain in the breeding area, but most of them stray about with a tendency to gather in small flocks. Only a few pairs go breeding, but do not rear any young, at any rate only exceptionally.

If the conditions for feeding are adverse when the Skuas arrive at the breeding ground they stray about without breeding; a few pairs may lay eggs, but they soon abandon them, and a shorter or longer time after their arrival the birds will disappear completely (e. g. Novaya Zemlya 1902, Northeast Greenland 1907, Lappland 1932 and 1936).



Fig. 4. Rivulet. Preferred resort for small flocks of *Stercorarius longicaudus pallescens*. Loch Fyne, Northeast Greenland, July 30th 1930 (B. Løppenthin phot.).

In areas which border regions inhabited by Lemmings the Long-tailed Skua may certainly breed. On the north coast of Greenland the Lemming occurs north of  $80^{\circ}$  N., i. e. east of the Humbolt Glacier which it has not been possible for it to pass. In these regions LAUGE KOCH states (verbal record) that the Long-tailed Skua was numerous and numerically superior to all other species of birds. The Crooker Land Expedition found the bird to be very common in the same regions and also near Etah (MACMILLAN, p. 404) which, like Inglefield Land, lies west of the Humbolt Glacier; but it is doubtful whether it breeds regularly here. In Thule the Long-tailed Skua does not breed. (F. SALOMONSEN, verbal information).

The Long-tailed Skua may prepare breeding in an area where Lemmings are absent as shown by the find made by TOMKINSON from Spitzbergen in 1931. The species has been looked for as breeding bird here by several expeditions, but in vain. On June 20th 1931 two couples were seen which did not seem to breed, and the next day one nest with one egg on which the bird was sitting was found. The find does not however show any sort of a permanent settlement, only an attempt at breeding. Possibly the egg had at any rate been abandoned (compare SWANBERG's statements from Swedish Lapland 1936). Fully fledged young of Long-tailed Skua have not been found in Spitzbergen<sup>1</sup>).

<sup>1</sup>) There are no recent records of Lemmings from Spitzbergen, but there are a few records from the past, on account of which the occurrence of the animals on this group of islands has been regarded as probable; but none of them give any conclusive evidence. A skeleton mentioned by Ross (p. 190) in 1827 has hardly any connection with Spitzbergen, but was carried there by the ice, and HEUGLIN's record (p. 8) gives less confirmation; it runs as follows: "In der Advent-Bai im Is-Fjord stieß ich übrigens an günstigen, sommerlich gelegenen Oertlichkeiten öfter

On Jan Mayen where Lemmings also do not occur DEICHMANN p. 152) says that a nest with one egg was found on June 27th 1900. This record may be reliable, but it may also be possible that there is a confusion with very pale individuals of the Arctic Skua, *Stercorarius parasiticus*. It should be borne in mind that 1900 was a good lemming year in Northeast Greenland.

West Greenland where Lemmings are also absent the Long-tailed Skua only visits on migration and as a straggler. HOLBØLL may have met it on its breeding haunt a hundred years ago, but this cannot be proved, and it can only have been a sporadic occurrence, which however he did not believe himself; he wrote (p. 427): "The only nesting area which I know for this bird is on some islands some miles south of Upernavik, in about 72°40' N. When I was at the nest there were only downy nestlings." (Original in Danish). HOLBØLL had an excellent knowledge of the avian fauna of Greenland and it is therefore hardly imaginable that he confounded the adult individuals of *Stercorarius longicaudus* with those of *S. parasiticus*; he studied the two species very carefully and he gives both morphologic and biologic distinguishing marks; it is however justifiable to doubt whether the said young were of the Long-tailed Skua. This bird lives on tundras in the breeding time, and in Greenland it therefore stays mainly on the *Cassiope* heaths. HOLBØLL does not, it is true, describe the landscape of these islands, but they can hardly be supposed to have been of the tundra type. Probably the young were of *Stercorarius parasiticus*, but as *Stercorarius longicaudus* was present in some numbers in this locality, they were referred to this species. In the summer of 1930 the present author himself made a similar mistake at Cape Stosch in Northeast Greenland where the Long-tailed Skua was common and where a big nestling (cp. LÖPPENTHIN, p. 85, fig. 22) at first was supposed to belong to this species. The mother bird, a very pale *Stercorarius parasiticus*, was not identified as such at once, but later examination, both of this (Zool. Mus., No. 139) and the young (Zool. Mus., No. 138) removed all doubt (cf. LÖPPENTHIN, p. 83—85). HOLBØLL goes on: "Next year two of its eggs were brought me, they had the same colour and shape as those of *L. pomarina*, but they were nearly 1/2 inch shorter. It breeds in company and it is nearly always seen in company with its congeners." (Original in Danish). These eggs certainly were small eggs of *Stercorarius pomarinus* or of *S. parasiticus*,

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auf Lemmingbaue und unser Harpunier versicherte mich, in derselben Gegend diese Thiere ausgegraben zu haben." At any rate HEUGLIN did not himself see the animals, and also he did not see their nests which are found on the surface of the ground in summer when the snow has melted. Some holes in the ground are not sufficient evidence, and the record by the unnamed whaler probably or certainly due to a misunderstanding.

and the remark about gregarious occurrence of *S. longicaudus* distinctly indicates straggling summer guests more than regular breeding birds which—as said previously—live in couples and defend their territories.

During his stay in Umanak [about 71° N.] for many years BERTELSEN (1921, p. 173) found no indication that the Long-tailed Skua had bred in this district, but later he quotes an account (1932, p. 46) from FENCKER on a breeding occurrence near Egedesminde, in about 69° N. Two eggs from this locality kept in the Zoological Museum of Copenhagen are labelled "*Lestris buffonii*, 2 i. K. Akudlik, Juni 1882 (FENK. Coll.)" [WINGE (p. 211) writes 1880]. They measure  $51.6 \times 37.8$  mm and  $55.0 \times 37.6$  mm, which agrees with the eggs of Long-tailed Skua, and compared with the Arctic Skua they are rather small, but not below the known minimum measurement; the small size thus does not exclude the possibility that they may be eggs of *Stercorarius parasiticus*. Even if it may be a clutch of *Stercorarius longicaudus* it can only be a question of a sporadic breeding occurrence; the species does not breed regularly in Disko Bay. — — A similar doubt may also be exercised as to the identification of another clutch of eggs in the Zoological Museum labelled "*Lestris longicauda*, Lille Kjøve, Grønne Ejland, Juni 1890" with measurements:  $55.3 \times 38.3$  mm and  $59.1 \times 41.0$  mm.

The Lemming certainly immigrated to Greenland from Grinnell Land over the Kennedy Channel and has been followed by the Ermine and the Long-tailed Skua. The last can of course more easily move from one place to another than the two first mentioned, but its ecology seems to testify that it followed the same route.

It is however a question whether the Long-tailed Skua in its breeding time cannot feed on other small Rodents as well as on Lemmings. There is no doubt that it could if only they were present in sufficient numbers in the areas, mountain heath and tundra, in which the Long-tailed Skua prefers to breed. Of other "lemming-birds" can be mentioned the Snowy Owl, *Nyctea nyctea*, which on account of its size can naturally manage prey larger than Lemmings, and Rough-legged Buzzard, *Buteo lagopus*, which however belong to open fields to a smaller extent as it prefers cliffs or trees on which to place its nest. In Iceland *Stercorarius longicaudus* does not breed, and here no Lemmings are found, but a Field Mouse, *Apodemus sylvaticus grandiculus* DEGERBØL is very common there, at any rate in certain districts of the country (cp. SÆMUNDSSON, p. 15). It may be found far away from human habitations, but it certainly prefers birch shrub and grassy fields, and in winter it seeks the farms, in certain years in considerable numbers. The occurrence of the Mice and their possible frequency on Ódádahraun and elsewhere in the interior of the country seems however not to be sufficiently studied, and if possibility of the breeding of the Long-tailed Skua in Iceland

should be discussed the bird must be expected to be found here. At any rate it seems improbable that the Mice should be so common on the desolate mountain fields as to support a breeding population of *Stercorarius longicaudus*.

The unmistakable dependence of the Long-tailed Skua on Lemmings is no doubt due to the fact that these animals are just those small Rodents which naturally belong to the type of landscape which the *Long-tailed Skua* requires for its breeding biotope.

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SYSTEMATISKE OG BIOLOGISKE BEMÆRKNINGER  
OM LILLE KJOVE  
*STERCORARIUS LONGICAUDUS* VIEILL.

Ved Behandlingen af Fuglefaunaen i en Del af Nordøstgrønland (1932) undersøgte Forf. et Materiale paa 71 voksne Eksemplarer af Lille Kjove og opstillede paa Grundlag heraf de nearktiske Fugle som en særlig Underart, *Stercorarius longicaudus pallescens*, kendelig fra Nominatformen paa den lysere Bug. Eksemplarer fra Nordeuropa var enten helt graa paa Undersiden eller havde paa Brystet samme gullighvide Farve som paa Forhalsen (Fig. 1, p. 4, Type C og D). Kun paa meget faa grønlandske Fugle var hele Bugen graa; paa de allerfleste var mere eller mindre af Bugen af samme Farve som Brystet, og i ekstreme Tilfælde — hos 5 af 40 Individuer — strakte den gullighvide Tone sig helt ud paa Underhalefjerene (Fig. 1, Type A).

Fra svensk Side (LÖNNBERG) blev det hævdet, at der i Riksmuseets Samlinger fandtes Eksemplarer af Lille Kjove [fra Lappland], der var lige saa lyse paa Undersiden som de grønlandske Fugle, og fra amerikansk Side (STONE) drog man ligeledes i Tvivl, at Forskellen virkelig var geografisk betinget. STONE diskuterede endvidere Tilstedeværelsen af en mørk Fase hos *Stercorarius longicaudus*, hvilket dog sandsynligvis beror paa Forveksling med Ungfugle af denne Art eller med mørke *Stercorarius parasiticus*. Blandt voksne Fugle findes utvivlsomt kun den lyse Fase hos Lille Kjove, svarende til de lyse Individuer af *S. parasiticus* og *S. pomarinus*.

Ved en fornyet Gennemgang sammenlignedes 120 voksne *Stercorarius longicaudus* fra Museerne i Helsingfors, Stockholm og København med de samme 4 Fugle, der var anvendt som Farvetyper ved første Undersøgelse (Fig. 1); Resultaterne ses paa Fig. 2 (p. 8). Selvom Kurverne fra sidste Gennemgang faktisk griber mere over hinanden end de, der optegnedes 1932, viser de dog stadig en tydelig Forskel paa de 2 Grupper af Bestande. Endvidere har Prof. B. STEGMANN sammenlignet 91 Skind paa Museet i Leningrad med den ogsaa her gengivne Figur af Farvetyperne og bekræftet de af mig gjorte lagttagelser samt sup-

pleret dem med væsentlige Oplysninger om Lille Kjoves Raceforhold i Sovjetunionen.

De 2 Underarters Udbredelsesomraade er i Korthed følgende:

*Stercorarius longicaudus longicaudus* VIEILLOT: Fjældmarker og Tundraer i den palæarktiske Region fra Norge i Vest til Lena i Øst, endvidere Øerne Kolgujev og Novaja Semlja.

*Stercorarius longicaudus pallescens* LÖPPENTHIN: Grønlands nordlige Østkyst og Nordkyst fra Scoresbysund til Washington Land, Arktisk Amerika med tilhørende Øer, østligste Del af Sibirien med Kamtschatka til Indigirka i Vest.

Strækningerne mellem Indigirka og Lena og de Nysibiriske Øer bebos ifølge STEGMANN af en Melleform, *S. l. longicaudus*  $\geq$  *pallescens*.

Indenfor ovennævnte Omraader ruger Arten dog kun, hvor og naar Lemminger er til Stede i nogenlunde antagelig Mængde. Der foreligger ganske vist Beretninger om Yngleforekomster fra Spitzbergen, Jan Mayen og Vestgrønland, hvor der ingen Lemminger lever, men de fleste er tvivlsomme, og selv et sikkert Fund af Æg fra de senere Aar (Spitzbergen 1931) beviser kun et Forsøg paa Rugning; store Unger af Lille Kjove er hidtil kun kendt fra Egne med Lemminger, og kun i Lemmingaar forplanter Fuglene sig talrigt. Er omtalte Gnaveres Antal den paa-gældende Sommer under en vis Grænse, yngler Kjoerne ikke; de begynder maaske paa det, men Forsøget mislykkes eller opgives i Regelen; de bliver dog i Yngleomraadet, hvor de færdes enkeltvis, parvis eller

	Lemming	Lille Kjove		Lemming	Lille Kjove
Nordøstgrønland			Ellesmere Land		
1822.....	+	+ (÷?)	1876.....	+++	++
1869.....	+	?			
1870.....	÷	÷	Nordskandinavien		
1891.....	+	+÷	1903.....	++	++
1892.....	++	+ (+?)	1905.....	?	++
1899.....	+	+÷	1909.....	(+?) ÷	+÷
1900.....	+++	++	1931.....	+	+
1906.....	+++	++	1932.....	÷	÷
1907.....	÷	÷	1936.....	÷	÷
1908.....	++	++	1939.....	+	+÷
1925.....	+	+			
1928.....	+++	++	Novaja Semlja		
1929.....	+	+÷	1902.....	÷	÷
1930.....	+	+÷	1903.....	++(+?)	++
1933.....	++	++			
1938.....	÷	÷			
1939.....	÷	÷			

i Smaaflokke og opretholder Livet ved Insekter, Aadsler, Fisk osv. Er Ernæringsforholdene imidlertid helt umulige og Lemmingernes Antal et Minimum, tages sikkert intet Ynglerevir i Besiddelse; Kjoerne ankommer som sædvanlig om Foraaret, men de giver sig kort Tid senere til at flakke om, og de forlader Omraadet tidligere, til Tider endog meget tidligere end normalt og uden at have ruget.

Lille Kjoves Afhængighed paa Ynglepladsen af Lemmingernes Mængde illustreres af foranstaaende Sammenstilling<sup>1)</sup>.

Sandsynligvis kunde Lille Kjove lige saa godt ernære sig af andre Smaagnavere som af Lemminger. Det iøjnefaldende Afhængighedsforhold beror sikkert paa, at blandt Smaagnaverne er det først og fremmest Lemmingerne, der hører hjemme paa Fjældmarkerne og Tundraerne, hvor den Lille Kjove søger hen i Yngletiden.

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<sup>1)</sup> Betegnelserne i Skemaet maa ikke tages for helt eksakte Angivelser. I Litteraturen kunde større Klarhed ofte være ønskelig, og endvidere maa man regne med en forskellig Iagttagelseevne og Indstilling hos de forskellige Meddelere.

? antyder, at Oplysninger mangler, (?) udtrykker et af Forf. tænkt Supplement til en — Del af en iøvrigt reel — Angivelse (sml. foran p. 12—14).

Betegnelserne tydes iøvrigt som følger:

Lemminger: +++ godt Lemmingaar eller -maximum, ++ jævnt godt Lemmingaar, + Lemminger faatallige, ÷ Lemmingbestanden decimeret til et Minimum.

Lille Kjove: ++ talrige Kuld, + faa Kuld, +÷ Kjoerne opholder sig i Terrænet, men yngler ikke, ÷ Kjoerne forlader Yngleomraadet meget tidligt uden at have ruget.

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