

FALKLAND ISLANDS DEPENDENCIES SURVEY

SCIENTIFIC REPORTS

No. 22

THE INTRODUCED REINDEER  
OF SOUTH GEORGIA

*By*

W. NIGEL BONNER, B.Sc.

*Falkland Islands Dependencies Scientific Bureau*



LONDON: PUBLISHED FOR THE COLONIAL OFFICE  
BY HER MAJESTY'S STATIONERY OFFICE: 1958

# THE INTRODUCED REINDEER OF SOUTH GEORGIA

By W. NIGEL BONNER, B.Sc.

## CONTENTS

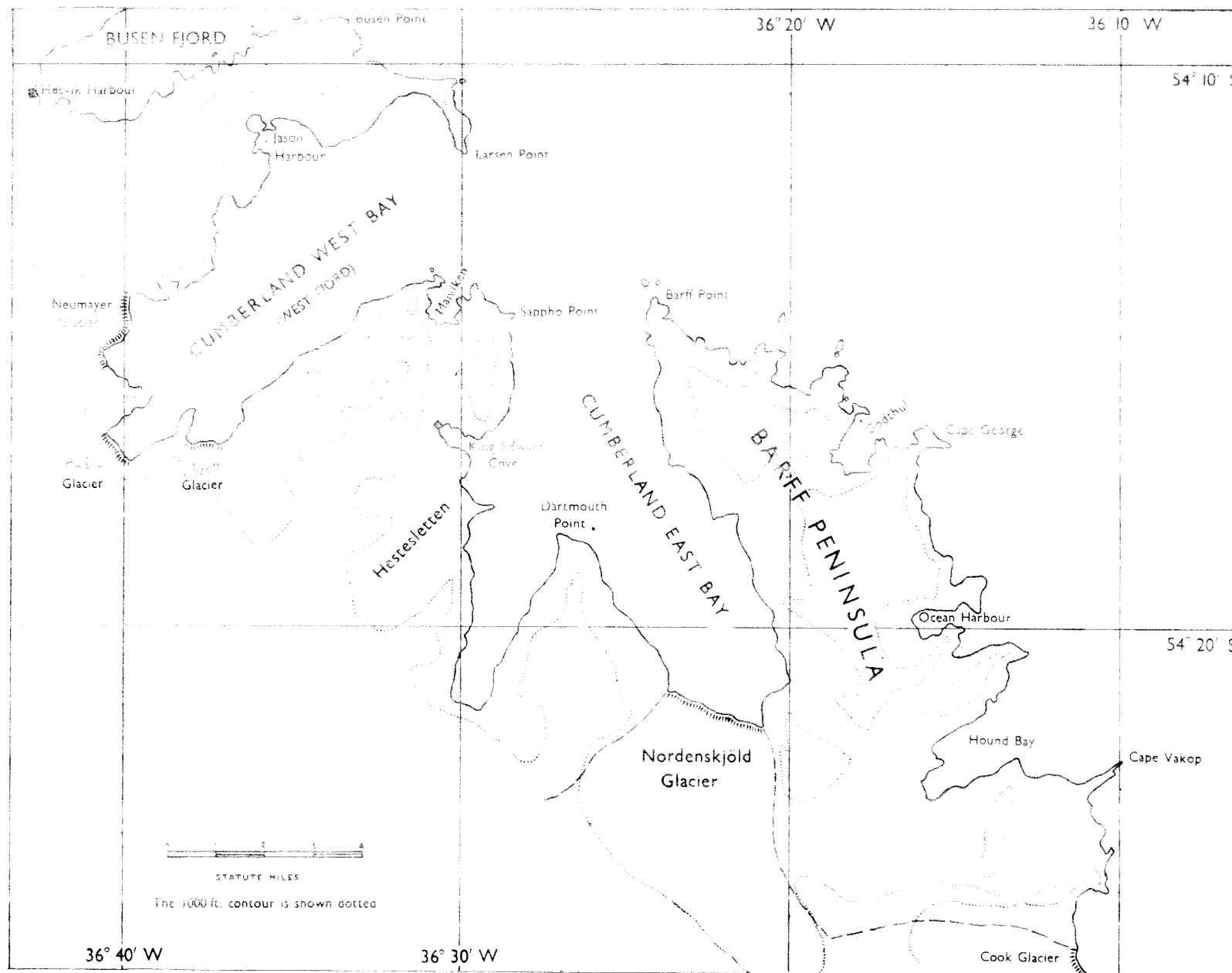
	PAGE
I. Introduction and History of the Deer ...	1
II. Material and Methods ... ..	3
III. Terrain ... ..	3
IV. General Behaviour ... ..	4
V. Feeding Habits ... ..	4
VI. Condition of the Deer ... ..	6
VII. Mortality ... ..	6
VIII. Hunting ... ..	7
IX. Future Prospects of the Herds ... ..	7
X. Acknowledgements ... ..	8
XI. Summary ... ..	8
XII. Literature Cited ... ..	8

## I. INTRODUCTION AND HISTORY OF THE DEER

SOUTH GEORGIA, in common with all other sub-antarctic islands, is devoid of a population of indigenous land mammals, but soon after the first whaling stations were established there, early in this century, reindeer were introduced. These animals have prospered exceedingly and the total population now numbers about 4000 divided between two herds (Plate I a & b).

The climate of South Georgia is more severe than its relatively low latitude (54° S.) would suggest, largely owing to the fact that it lies within the antarctic convergence at all seasons of the year. The mean annual temperature is only a couple of degrees above freezing point but temperatures below zero Fahrenheit are very rarely experienced. Strong winds, which may blow at gale force for days on end, and heavy precipitation, largely in the form of snow, make up the pattern of the island's climate. General snow cover is usual from the end of April till September. Much of the island is exceedingly mountainous with extensive glaciation and permanent snow-fields. Vegetation is generally confined to a coastal strip and a few low valleys extending into the hills.

The first introductions of reindeer were made by C. A. Larsen, the pioneer of antarctic whaling and the first coloniser of South Georgia, who released eleven deer at Ocean Harbour in 1909. These were nine females and two males, and by 1928 the herd numbered between four and five hundred and some 150–200 deer had been shot (Olstad, 1930). This herd now numbers about 4000 individuals and constitutes the main reindeer population of the island. Further introductions took place at Stromness Bay in 1911 when five deer were liberated at Leith Harbour. These were all killed in a snowslide, after having multiplied to about twenty individuals. In 1925 seven deer, four females and three males, were liberated at Husvik Harbour, also in Stromness Bay. The descendants of these deer still exist and number between 100 and 200.



## II. MATERIAL AND METHODS

FOR the purpose of observing the deer and collecting material, two visits were made to the main herd in January 1955 and March 1957 over a total period of fourteen days. It was not possible to keep the deer under continuous observation for these periods as only one observer was available for the work, but groups of deer were frequently watched for periods of up to three hours. A detailed study was made of the terrain with particular reference to any effect the herd may have had on the vegetation. Seven deer, all stags, were shot during the January visit. The carcasses of the deer were examined for parasites and notes taken of their general condition (see Section VI). Samples of the rumen contents were taken from each deer. These were treated with about one-tenth of their volume of 40% formaldehyde solution and afterwards examined and the identifiable plant fragments compared with the plants known to occur in that region.

Further information about the deer was obtained by taking part in two deer hunts organised by the Compañía Argentina de Pesca and by questioning several people on the whaling stations who had been visiting the deer for hunting purposes for periods of up to thirty years.

Two skulls and one complete skeleton of South Georgia reindeer have been deposited at the British Museum (Natural History).

## III. TERRAIN

THE larger herd, that whose progenitors were brought down by Larsen, inhabits the Barff Peninsula, the north-eastern boundary of Cumberland Bay. The deer are prevented from spreading to the rest of the island by the Nordenskjöld and Cook Glaciers, both heavily crevassed, and the ice-clad mountains between the two. The Barff Peninsula is about ten miles long from the Nordenskjöld Glacier to Barff Point on the south-west side, and fifteen miles from Barff Point to the snout of the Cook Glacier in St. Andrews Bay on the north-east side. The peninsula is seven miles across at its base. The country is generally mountainous, though nowhere much over 2500 feet. The greater part of the area is bare rock and loose scree, with glacier ice and névé on the higher peaks. The coastal strip and lower valleys support a relatively luxuriant vegetation (Plates II a and III a). The dominant species is the tussock grass, *Poa flabellata*, which forms a dense covering along the sea-board and ascends the hills to a height of 500 feet. Inland it is of scattered occurrence only, being replaced by an association of the grasses *Festuca erecta* and *Phleum alpinum* with minor amounts of *Acaena tenera* and mosses. On some of the valley floors and the coastal plain a dense peat-forming sward is found, consisting of the rush *Rostkovia magellanica* and the moss *Tortula robusta* (Plate II b). The valleys and the coastal plain are all very wet, streams or small rivers flowing down every gully.

Month	Temperature, °F				Precipitation millimetres	Mean Wind knots
	Mean Daily	Mean Max.	Mean Min.	Extreme Min.		
January	39	46	34	29	98.5	7.5
February	41	49	34	28	73.4	11.9
March	39	47	33	27	87.7	7.9
April	36	42	30	21	148.2	10.0
May	30	37	25	16	148.2	6.3
June	34	40	29	17	140.3	11.2
July	30	36	25	10	87.9	9.0
August	30	37	26	19	127.6	8.9
September	31	36	27	15	44.9	6.1
October	37	43	31	25	68.7	9.6
November	38	44	32	25	157.6	10.2
December	41	49	35	30	74.6	7.7
AVERAGE	35.6	42.1	30.2	21.8	104.8	8.9
TOTAL					1257.6	

TABLE I. Climatological Summary, Grytviken, South Georgia, 1953.

(Compiled from Annual Meteorological Tables of the Falkland Islands and Dependencies Meteorological Service.)

No meteorological data are available for the Barff Peninsula but an observing station is maintained at Grytviken about five miles to the east. There the yearly mean temperature in 1953 was 35.6° F. The climate is remarkably equable with the extremes of the mean daily temperatures (meant as averages for months) departing less than 6° F. from the yearly mean. Temperatures below 0° F. were not recorded at Grytviken but the prevailing high winds and low temperatures together make a climate of considerable rigor.

The smaller herd, generally known as the Busen Herd, is to be found on the peninsula separating Busen Fjord from Cumberland West Bay. This is about half the size of the Barff Peninsula but the Busen deer are not confined to their territory by physical barriers. The deer could walk round the whole of Stromness Bay and even cross a low pass to Fortuna Bay, but no record of their ever having done so exists. The deer are seen fairly frequently in the environs of the whaling station at Husvik Harbour, more so in the winter.

#### IV. GENERAL BEHAVIOUR

THE does drop their fawns in November when the sexes separate, the stags running apart from the does until the rut in mid-March. The stags are out of velvet by the beginning of March and the does a little later. The antlers are said to be shed in August (Olstad, *op. cit.*). After the calving season the deer are running in small groups of up to about fifty in the case of stags and 150 in the case of does with their fawns. Solitary deer are very rarely seen and deer that have become separated from one group will join another as soon as opportunity presents itself. In February the small groups begin to coalesce to form the large winter herds of about 500 deer. The sexes mingle soon before the rut; mixed herds and low-intensity sexual fighting between stags were seen in the first week of March. Odd stags are occasionally seen with groups of does earlier in the year. The summer groups have little individuality, the deer wandering from one to another quite freely.

The deer spend most of their time grazing; the herd as a whole moves in one direction, following a leader, but, as this deer frequently changes direction, it is not unusual for a group to remain in one valley for a whole day. Deer grazing on the cliffs move faster than those on the plains, no doubt because the food is sparser. While grazing the deer are well spread out, a group of twenty occupying perhaps as much as five acres. At the first hint of trouble the deer bunch together and move off, rarely going far unless scared for a second time. If deliberately scared, the deer will bolt but always follow the arc of a wide circle so as to bring the herd round by the side of the cause of alarm. After going a mile or so the deer will pause to examine the situation and if no further cause of alarm is observed will start feeding again; if however alarming stimuli are again perceived they move off to another feeding ground, frequently at the other side of the peninsula.

The Busen herd is very much tamer than the deer at the Barff Peninsula. It is said to be an easy matter to approach the former to within fifty yards though the latter will not tolerate approach closer than three times that distance.

The main routes the deer take over the passes are marked by well-defined tracks, the deer travelling in single file. On the feeding grounds these tracks are rarely seen, save where the nature of the country compels the deer to pass narrow defiles. The deer are very agile and can move along mountain sides and cliff faces that offer no foothold to a man.

#### V. FEEDING HABITS

THE deer feed principally on phanerogamous plants, chiefly tussac grass, and are thus peculiar in being probably the only stock of feral reindeer whose staple diet is not lichens. Lichens make up a very small part of the vegetation of South Georgia: numerous species are to be found but none occurs in sufficient quantity to be of any importance to the deer (Plate III b). When first introduced, the deer probably had the opportunity to make the change from lichens to grasses gradually, as with only eleven deer on the Barff Peninsula it would have been possible for lichens to play a significant part in their diet.

The deer are most frequently seen grazing in the tussac zone behind the beaches. They are wasteful feeders, pulling at the long pendulous leaves of the tussac and dropping quantities on the ground so that a

kind of straw of dried grass collects between the clumps. Tussacs may be killed completely by the deer pulling off all the leaves but the amount so damaged is small compared with the resources available. The other main feeding ground is the *Festuca-Phleum* association that covers the lower hills. This is apparently grazed non-selectively, though perhaps a smaller proportion of *Festuca* finds its way to the stomachs of the deer than might be expected.

The seven rumen samples examined do not truly represent the feeding habits of the deer as owing to the difficulties of approach only two of the samples came from animals feeding on the coastal tussac. The other animals had been feeding on the lower hills where tussac is of scattered occurrence only; despite this, however, tussac was identified in three of the five samples from this group.

Set out in Table II are the results of the examination of the samples. The first two specimens were those taken while feeding in the tussac zone, and as might be expected grasses form a large part of the rumen contents. A fragment of moulted elephant seal skin was found in the second sample. Unless this was deliberately included it would seem to indicate that the deer are less selective feeders than, for example, a cow. Fragments of the lesser burnet were found in all the samples as were those of the rush *Rostkovia*. No identifiable lichen remains were found though this does not, of course, mean that none were eaten.

Specimen Number	1	2	3	4	5	6	7
Grasses							
All species	+++	++	---	---	+	+	+++
<i>Poa flabellata</i>	+++	+	+	---	++	+	---
<i>Poa annua</i>	+++	---	---	+	---	---	+++
<i>Phleum alpinum</i>	---	---	+	+	---	---	---
<i>Deschampsia antarctica</i>	+	---	---	---	---	---	---
<i>Acaena tenera</i>	+	---	+	+++	---	+	++
<i>Rostkovia magellanica</i>	++	---	+++	+++	++	+++	+
Mosses	---	(-)	++	++	+	+++	+++
Degree of Division	0	0	1	3	2	1	2

TABLE II. Analysis of Rumen Contents of Seven South Georgia Reindeer.

The minus sign does not indicate that the species was absent, but that it was not identified.

The degree of division was reckoned in four classes varying from 0: majority of fragments more than 15 mm. long, to 3: majority of fragments less than 5 mm. long.

Johannes Lid examined the stomach contents of three South Georgian reindeer collected by Olstad (Olstad, *op. cit.*). Tussac, *Poa flabellata*, and *Festuca erecta* were identified and burnet, *Acaena adscendens*, occurred in all. *A. adscendens* is now very sparsely distributed on the Barff Peninsula, probably owing to its having been grazed off by the deer as it is very common elsewhere on the island. It is possible that in 1928, when Olstad's specimens were collected, its distribution over the Barff Peninsula was more plentiful. Besides the phanerogams identified in Olstad's samples a fragment of a lichen and two fragments of mosses were found. Olstad comments, "It is beyond doubt that these three fragments of lichen and mosses, which weigh less than one gram put together, have been included quite accidentally". The considerable quantities of mosses found in the last two samples taken in 1955 could hardly be said to have been included accidentally; they represent indiscriminate cropping of the *Rostkovia* association.

During the winter, the deer are mostly confined to the coast where they have little difficulty in scraping away the snow from the tops of the tussacs with their forefeet. They must be much more nearly dependent on the tussac at that time of the year as the other associations are usually under several feet of compact snow.

Deer are occasionally seen wandering over the foreshore, nosing at the heaps of sea-weed thrown up by storms. It seems likely that they are eating sea-weed for the sake of its salt-content, though it might be expected that the tussac would supply sufficient salt as its leaves are, at times, exposed to sea-spray.

## VI. CONDITION OF THE DEER

SEVEN deer, all stags, were shot in January 1955 from the Barff Peninsula herd, and the carcasses of another fourteen, also all stags, shot by a hunting party were examined. Owing to lack of equipment no weighings could be made, but three weights given by Olstad are included in the table. Norwegian mountain stags, of the same type as those in South Georgia, weigh 120–150 kilograms when full grown.

Specimen Number	Date	Sex	Antlers			Height at shoulder	Length nose to tail	Axilla to tip of hoof	Groin to tip of hoof	Maximum girth	Weight
			Brow to Tip		Span						
			Right	Left							
1	23.1.55	M	49	51	64	95	156	67	82	132	—
2	23.1.55	M	60	60	70	104	170	66	81	156	—
3	25.1.55	M	—	—	—	108	180	66	84	158	—
4	25.1.55	M	54	52	54	98	160	68	80	134	—
5	25.1.55	M	49	54	66	102	152	57	78	146	—
6	25.1.55	M	50	47	60	100	148	67	75	136	—
7	25.1.55	M	60	62	62	106	165	64	87	154	—
189*	13.2.28	M	—	—	—	—	169	—	—	132†	120
190*	13.2.28	F	—	—	—	—	154	—	—	97†	68
191*	13.2.28	F	—	—	—	—	154	—	—	97†	74

TABLE III. Measurements of South Georgia Reindeer. All lengths in centimetres, weights in kilograms. The antlers were still in velvet but appeared to be full grown.

\* Olstad's specimens (Olstad, *op. cit.*).

† These figures relate to the girth immediately behind the forelimbs and not to the maximum girth.

The deer appeared to be in excellent condition. No external parasites were seen. There are no indigenous blood-sucking flies in South Georgia and the reindeer warble fly, *Oedemagena tarandi*, has not been introduced. Apart from small abrasions on the legs of some of the deer, probably caused by striking against sharp rocks, the hides were entire. The teeth were in good condition and even in the largest (and presumably oldest) specimen did not show signs of excessive wear. The hooves of all the deer were in a healthy condition.

Internally no pathological conditions were found, though the examination was severely limited by the lack of facilities in the field. There were no macroscopic endoparasites in the viscera of any of the deer examined. Considerable deposits of fat had been laid down, both visceral and subcutaneous, the latter forming dense accumulations round the groin, over the rump and extending forward over the withers. These stores of fat are probably the best indication of the conditions of the animals.

Unfortunately, no carcasses from the Busen herd were available for examination.

## VII. MORTALITY

THERE are no predators, except man, on the adult reindeer in South Georgia. It is possible that the giant petrel, *Macronectes giganteus*, and the brown skua, *Catharacta skua*, may kill a certain number of the calves, but there is no direct evidence of this. The remains of nearly fifty deer, in various stages of decomposition, were found on the Barff Peninsula. In the great majority of cases it was impossible to determine the cause of death. One stag was found that had fallen into a sheer-sided peat pool and died of either

suffocation or exhaustion; another was found with its antlers entangled in a length of wire at the deserted whaling station at Ocean Harbour. Several skeletons were lying in places which seemed to indicate that the deer might have met their deaths by falling down cliffs. One skeleton showed injury to the pelvis, caused by a rifle bullet. Three deer were found that might be said to have died of natural causes; a doe was found that had died in labour, one skeleton was found with a bony tumour of the condyle of the left ramus of the mandible and another with the last lower right molar missing with consequent hypertrophy of the upper cheek teeth of the same side. Both the latter animals presumably had met their deaths by starvation.

In the absence of predators it is likely that many of the deer live so long that they become handicapped by senile changes and perish in the rigorous conditions of winter.

## VIII. HUNTING

REINDEER are scheduled as absolutely protected under the Wild Life Protection Ordinance of the Falkland Islands but permits to shoot deer can be obtained from the Administrative Officer. Owing to the small number of deer in the Busen herd shooting permits have not been issued for that herd since the last war, though as the deer can easily be reached on foot it is possible that a certain amount of poaching has taken place.

Most of the deer hunting is carried out by the *Compañía Argentina de Pesca* who have utilised the herd on the Barff Peninsula as a source of fresh meat for its employees for a number of years.

Hunting takes place mostly in December and January when the stags are running separately from the does. The technique used is to drive the deer rather than to stalk them. A disused whale catcher is used to transport the hunting party across the bay. It steams along the coast until a group of deer is sighted. Male herds can be easily identified by the lack of accompanying juveniles and if the herd proves to be composed of stags the catcher steams to the next convenient landing place and puts about half the hunters ashore; it then goes about and steams back along the coast in the opposite direction and puts the remainder of the hunters ashore on the other side of the deer. The two parties then converge on a prearranged killing ground, driving the deer before them. A considerable knowledge of the inland and coastal passes is required if the deer are not to be allowed to escape. At the killing ground, which is chosen as near the beach as possible, to avoid too much work in transporting the carcasses, the hunters open fire. Under these circumstances the deer are nearly always in rapid movement and a considerable amount of skill and ammunition are necessary to obtain a kill.

As many as twenty guns may be employed and an average kill would be thirty deer for a day's hunting. The herds of deer chosen for killing usually number from fifteen to twenty and every endeavour is made to kill out all the deer of a herd. The hunters are punctilious in searching for wounded animals and will spend several hours following animals thought to have been maimed. At the end of the shoot the throats of the killed animals are cut and they are paunched. Frequently the heads are removed to facilitate dragging the carcasses down to the beach where they are loaded into a pram and taken out to the catcher.

Occasionally, hunts are held in the winter when the much larger mixed herds occur. On these occasions the technique is similar except that small groups of deer are cut off by men on ski. Kills are light but usually include a proportion of females.

During the last two years only two deer hunts have been held with a total kill of twenty-nine deer. It is likely that deer hunting, with the intention of obtaining fresh carcasses for food, will cease entirely. The whaling companies are taking an increasing interest in the economic use of their labour and the employment of a whale catcher and twenty men to bring back thirty deer carcasses is scarcely rewarding. In a similar manner the collection of penguin and albatross eggs for local consumption has also been discontinued in the last few years. Reindeer hunts are, of course, very popular with the men as a recreation.

## IX. FUTURE PROSPECTS OF THE HERDS

THE Barff Peninsula herd is an excellent example of a successful introduction. It is difficult to arrive at a true estimate of the number of animals present but there are probably not less than 3000 nor more than 5000. A figure of 4000 has been suggested after my own observations and interviews with people familiar



with the herd. Overgrazing problems with their accompanying changes of flora do not seem to exist, save in the case of *Acaena adscendens* which, as mentioned above, has been almost eliminated from the territory occupied by the deer. Several people in South Georgia have pressed for the introduction of fresh blood from Scandinavia but this would serve no useful purpose and might lead to the introduction of disease into what is at present a healthy stock. The size of the herd makes it unlikely that any inbreeding, other than that due purely to chance, is taking place. The deer at present living in South Georgia are fully acclimatised to the conditions prevailing and weak specimens must be removed by the heavy selection pressure operating in the rigorous winters.

The reindeer hunting is well conducted and the stock appears to be in no danger of depletion. Should numbers reach a low level it would be a simple matter for the Administrative Officer to withhold permission to hunt for a few years till the situation righted itself. It is possible that if hunting ceases altogether, which is not unlikely for the reasons set out above, it may be necessary for a certain number of deer to be killed out from time to time to prevent the stock outgrowing its winter grazing resources. This is unlikely to happen in the near future, however.

Any attempt to start intensive farming of the deer would be unlikely to meet with success owing to the nature of the habitat. Herding the deer in the interior would scarcely be possible and on the coastal plains the broken ground and the bogs would make it a matter of great difficulty. On the other hand, the introduction of deer to other parts of the island would almost certainly prove rewarding. The country round the whaling station at Grytviken, particularly the Maiviken and West Fjord regions, would seem very suitable for deer and a total stock of at least a thousand (or 1500 if a programme of autumn killing to prevent overstocking in the winter were carried out) could be supported. It would be preferable to transfer existing stock rather than to import fresh deer.

The position of the Busen herd is uncertain and the reasons for the comparatively small numbers, estimated at one to two hundred, are not understood. It has been suggested that the small size of the herd is due to overkilling in recent years; figures for kills of these deer could not be obtained but it is possible that much poaching might have occurred. A detailed study, particularly during the winter months, might reveal that the food resources of the territory occupied by the Busen herd are less than they appear.

## X ACKNOWLEDGEMENTS

MY THANKS are due to the Administrative Officer, South Georgia, and to the Compañía Argentina de Pesca for providing facilities to visit the deer, and to many members of the Compañía Argentina de Pesca, in particular Chief Chemist Tormod Tröim, for information concerning the deer. Mr. Reidar T. Karlsen, of the Tonsbergs Hvalfangeri, very kindly provided the photograph for Plate I a. Dr. Lindgren and Mr. Utsi of the Reindeer Council of the United Kingdom very kindly read the proof.

## XI. SUMMARY

AN ACCOUNT is given of the introduced reindeer living in a feral state in South Georgia.

It is concluded that the diet of the deer consists largely of the tussac grass, *Poa flabellata*, with a large proportion of short herbs during the snow-free months. Lichens form only an insignificant part of the diet of the deer.

The hunting of the reindeer for food is described and it is suggested that systematic hunting by the whaling companies may cease altogether in the near future which may necessitate occasional reduction of the herd.

## XII. LITERATURE CITED

OLSTAD, O. 1930. "Rats and Reindeer in the Antarctic." Det Norske Videnskaps. Akademi i Oslo. Scientific Results of the Norwegian Antarctic Expedition 1927-1928. and 1928-1929. No. 4 Oslo.



a. Stag from the Busen Herd. (Photo: Reidar T. Karlsen.)



b. A group of deer from the Barff Peninsula stock, January 1955.



TERRAIN. a. The grass-covered lower slopes and coastal tussac strip, Barff Peninsula.



b. Foreground: *Rostkovia* association with scattered tussac.  
Background: *Festuca-Phleum* association tending to mosses on the hills.  
Barff Peninsula.





TERRAIN. a. The coastal tussac strip of Ocean Harbour.



b. The uplands of the Barff Peninsula. Scattered grasses with mosses and lichens.  
This form of plant cover provides little food for the deer.