III. *Notes on the Habits of the Gentoo and Ringed or Antarctic Penguins.*

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(Plates I.–VII. : Text-figures 1–3.)

INTRODUCTORY.

Between 1920 and 1922 I was a member of a small expedition to Graham Land in the Antarctic regions *. Through some unanticipated difficulties Mr. M. C. Lester, our navigator, and I remained at a spot on the Danco Coast of Graham Land, which we called Water-Boat Point, from January 12th, 1921, until January 13th, 1922. It was situated in lat. 64° 48′ S., long. 62° 43′ W., quite close to the west side of the entrance to Andvord Bay and facing Lemaire and Bryde Islands. Between March 4th, 1921, and January 13th, 1922, Lester and I were entirely alone on this small group of islands or divided island, which lies at the foot of a glacier descending from the mainland of Graham Land. The main island was about 200 yards long. We lived in a hut made from a water-boat, which formerly belonged to one of the whaling ships, and packing cases.

During the winter we had about twenty hours of darkness, and the remaining four, if the weather was bad, were little better than twilight.

As our base was no great distance from the operations of the two French expeditions led by Dr. J. Charcot in 1903–1905 † and 1908–1910 ‡, the observations contained in these notes may usefully be compared with those of his two expeditions. Where the French expeditions made observations of a deeper scientific nature, no attempt was made by us to verify or amplify them. We contented ourselves with noting down simple facts as they occurred, some of which supplement the studies of the two expeditions mentioned above.

* For a full account of the Expedition see 'Geographical Journal,' vol. lxii. p. 174 *et seq.*

† 'Expédition Antarctique Française (1903–1905).' Oiseaux, par A. Menegaux. Paris, 1907.

‡ 'Deuxième Expédition Antarctique Française (1908–1910).' Oiseaux Antarctiques, par L. Gain. Paris, 1914.

During the course of the expedition we came into contact with the following species of Penguins :—

Gentoo Penguin (*Pygoscelis papua*).
Ringed or Antarctic Penguin (*Pygoscelis antarctica*).
Adélie Penguin (*Pygoscelis adeliæ*).
Macaroni Penguin (*Eudyptes chrysolophus*).

As we lived for a considerable time in the midst of rookeries of the first two, it was possible to make fairly detailed observations of their habits, particularly during a period of thirty-eight days* when we were making tidal observations hourly, night and day.

Throughout the notes which follow it should be realized that neither of us was a trained naturalist, with the result, no doubt, that many important details may have been missed or wrong deductions made. Both of us had, however, accurate minds, and rather than bring an observation to a successful conclusion by the use of conjecture or imagination, we preferred to discount it altogether, and so avoid a possibly inaccurate inference. The work of observing detailed habits of a number of birds simultaneously was rendered a most difficult task by lack of proper means for marking them, particularly absence of rings. This necessitated our devising primitive methods such as marking birds with Indian ink applied by a brush, sometimes at close quarters, at others by a jab with a brush attached to a long bamboo. In desperation a fountain-pen filler was also used at times. These methods might have worked well in a mild climate, but with the temperatures we experienced, ink rapidly became frozen in the open air despite all sorts of elaborate precautions.

As additional help in identifying birds once they had settled on their nesting sites, we marked numbers in enamel on forty-six stones which we placed by various pairs or even single birds. As these soon, in most cases, became almost obliterated with guano, we were forced to locate them by additional means. Thus some were marked :—

No. 2. 4 ft. S.E. of 9. East side of gully.
No. 8. 5 ft. N.E. of 1 and 5 ft. N. of 16. West side of gully.
No. 18. 6 ft. N. of 10 and 5 ft. S.S.E. of 19.
No. 20. 3 ft. S.S.W. of 26 and N. side of △ rock exposure.

Birds grouped round the ash- and dirt-dumps, as well as the meteorological screen (called the " screen " in the notes which follow) were tolerably easy to recognize.

When making observations we carried a card, on each side of which was listed or sketched the positions of birds under observation. This, as protection against weather and dirt, was carried in an army pattern map-holder with celluloid front and back. This we slung round our necks.

* October 31st to November 6th and November 16th to December 16th, 1921.

A gap in the early part of our observations at a time when the young birds were growing up was accounted for by the fact that we were busy hut-building, making journeys in the life-boat and doing other jobs, so that only notes of a general character were made. In addition, neither of us was responsible for making bird observations, and it was only when we were left to our own devices that we were able to tackle such work, at which we were both novices. At the end of our stay we had hoped, before being relieved, to have overlapped into the next breeding season sufficiently far to complete observations missed during the first summer. Unfortunately, our relief was a little too early to do this.

All the observations as to habits etc., were made at our base at Water-Boat Point, unless stated to the contrary.

In conclusion, I should like to add a word in praise of my colleague's help in gathering notes. Without this help, which was unstintingly given, it would have been physically impossible for many of the facts to have been obtained, particularly those secured over continuous periods. It is almost superfluous to point out that bird-watching in the Antarctic regions is attended by no great comfort, and the mere writing of rough pencil notes in the open air was often an extremely painful procedure.

In many cases where the pronoun " I " is used it refers to Lester. It has been found difficult in some of the descriptions to keep them impersonal, as they involved personal deductions by the observer.

On completing these notes I am left with one great regret and that is that it will never be my good fortune to return to Water-Boat Point to settle some points which could only be cleared up by working two seasons on end with adequate appliances for observing these interesting creatures. I have given on pages 270–271 some suggested observations which could, with interest, be undertaken by any subsequent expeditions, and which would help to make these notes of greater value.

THE GENTOO PENGUIN
(*Pygoscelis papua*).

Rookeries and occasional Observations.

Deception Island.—This is not so common as the Ringed Penguin, and I did not observe a rookery when I was there in 1920. Charcot, however, records their nesting there in the accounts of his second expedition.

Water-Boat Point.—Lat. 64° 48′ S., long. 62° 43′ W. There was a large rookery at this locality, which was the headquarters of our expedition and where the

observations collected in this paper were obtained. We calculated that there were (excluding Ringed) upwards of 12,000 Gentoos on the rookery, which was divided into three parts (see Map, text-fig. 1) called by us The Island, South Island, and Coal Point (Pl. I. figs. 1–3).

Andvord Bay.—We found on 7. 2. 21 a rookery of Gentoo and Ringed on the south point of the entrance to this bay. This we called Shag Point.

Near the bottom of the bay on the same day we found a rookery of Gentoos only.

Bryde Island.—We found a rookery occupied by Gentoos only on the east coast of Bryde Island (9. 2. 21).

Nansen Island.—Between January 17th and March 23rd, 1922, we saw occasional birds on the rocks near the ships, but never more than three at a time. I do not think there was a rookery very close by.

Rocks off Cape Murray.—Two birds on rocks (4. 3. 22).

Between Cape Murray and Cape Kaiser.—One bird seen on an iceberg (9. 3. 22).

Off Brabant Island.—Several Gentoos seen swimming together towards Brabant Island (25. 3. 22).

Physical Characteristics.

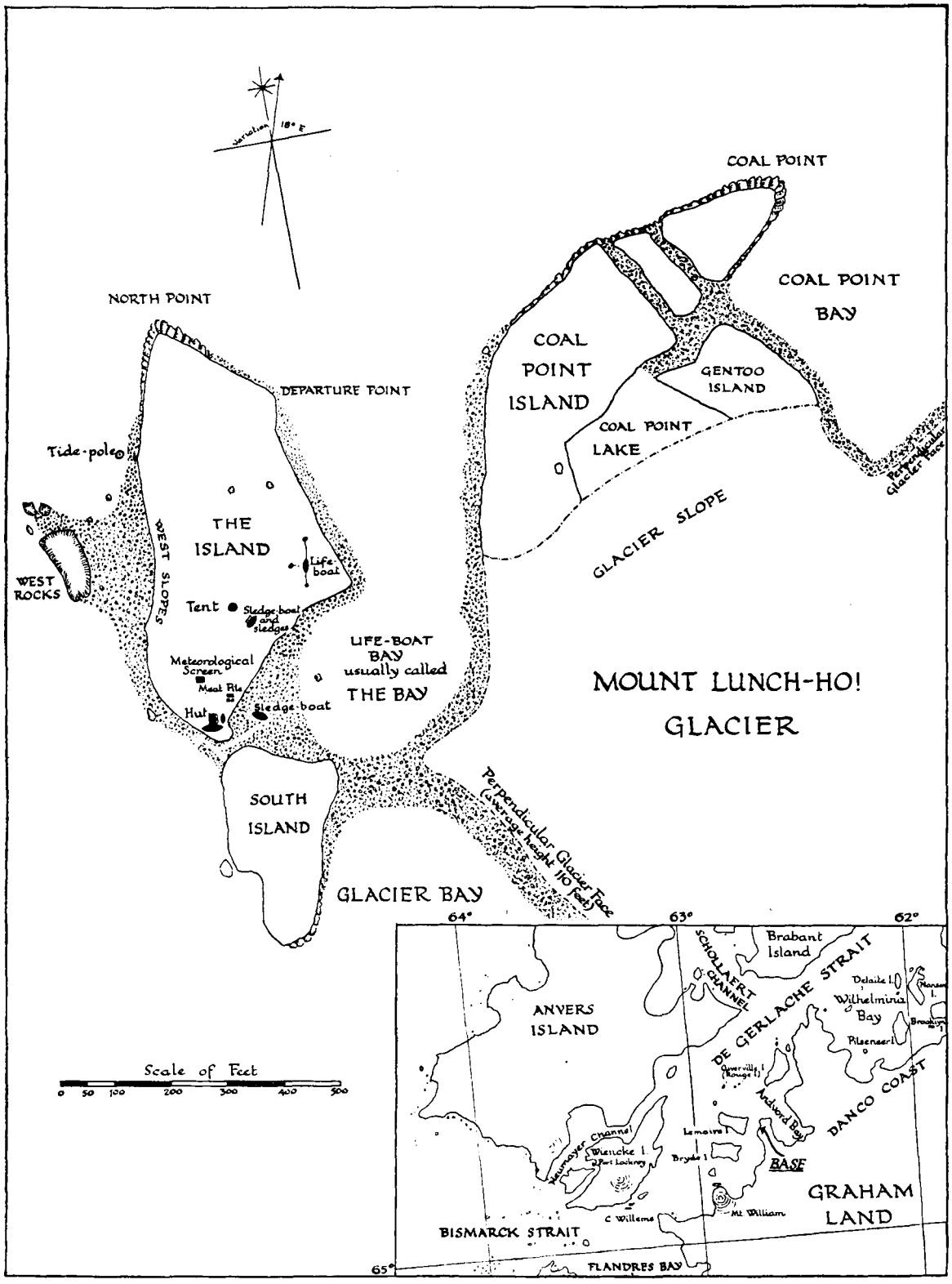
The Gentoo Penguin stands about 2 ft. high and is recognized by the white triangular patch which passes over the head and round each eye.

The colour of the dorsal regions is a dark bluish slate with occasionally a "shot" appearance. The ventral parts are pure white with a beautiful sheen. The line of separation between the two colourings is very clearly marked. The outsides of the flippers are the same colour as the back, with white undersides and dark tips. The beak is purplish-red and the feet are yellowish.

After the reoccupation of the rookery and the settling down for the season's breeding, the coat becomes duller and tends to change to a "heathery" colour. In some birds there is a distinct brownish tint.

During the first part of March, 1921, we were cutting up penguins for food, and measurements, weights, etc., were taken of the first fifty killed (see Table I.). They were all fully fledged or very nearly fully fledged young. When pebbles were found in the stomachs they were usually near the rectum, but could often be traced all along the stomach. The largest stones measured $1\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ in. Two of this size were found in the same bird. Pebbles were found alike in stomachs full of food and empty.

Text-figure 1.



Sketch-map of Water-Boat Point and its relationship to Graham Land.

TABLE 1.—*Measurements etc. of Gentoo Penguins.* Young birds.

Length=Tip of beak to tip of tail.
Spread= From tip to tip of outstretched flippers.
Girth = At widest portion.

No.	Date.	Age.	Weight (kilos.).	Length (mm.).	Spread (mm.).	Girth (mm.).	Length of flipper (mm.).	Stomach contents.
1..	7. 3. 21.	Fully fledged young bird.	4·5	..	..	..	..	.....
2..	,,	Nearly fully fledged.	3·9	..	..	..	..	.....
3..	,,	Fully fledged.	4·5	660	559	457	254	No food. 25 small pebbles.
4..	,,	Fully fledged.	5·4	762	610	508	241	Euphausiæ.
5..	,,	Fully fledged.	4·3	686	584	457	254	Mass of Euphausiæ and 27 pebbles.
6..	,,	Fully fledged.	4·1	686	610	483	254	No food. 53 pebbles.
7..	,,	Fully fledged.	5·0	737	610	508	254	No food. 27 stones.
8..	,,	Nearly fully fledged.	5·9	737	610	508	254	Small fish 4 to 5 in. long and Euphausiæ.
9..	8. 3. 21.	Fully fledged.	4·3	610	610	533	254	No food. 5 pebbles.
10..	,,	Nearly fully fledged.	4·4	686	559	457	241	Lot of fish and Euphausiæ. 14 pebbles.
11..	,,	Fully fledged.	4·5	686	584	508	254	Digested Euphausiæ. Stones.
12..	,,	Fully fledged.	5·4	711	610	533	254	Digested food. 27 stones.
13..	,,	Fully fledged.	5·4	749	648	508	267	Very little food. Stones.
14..	,,	Fully fledged.	4·3	711	610	495	254	Little food. Few stones.
15..	,,	Fully fledged.	4·3	749	622	508	254	No food. Stones.
16..	,,	Fully fledged.	4·8	762	648	572	254	No food. Stones.
17..	,,	Fully fledged.	4·5	762	610	521	279	Well digested Euphausiæ and a few small stones.
18..	,,	Fully fledged.	4·5	686	635	521	267	Euphausiæ. 15 stones.
19..	,,	Fully fledged.	3·6	686	584	521	254	18 pebbles. No food.
20..	,,	Fully fledged.	5·0	686	610	546	279	No food. 33 pebbles.
21..	,,	Fully fledged.	2·9	673	584	457	254	No food. 28 stones. Two measuring $1\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}$ in.
22..	,,	Fully fledged.	4·5	711	610	533	254	No food. 37 stones.

TABLE I. (*continued*).

No.	Date.	Age.	Weight (kilos.).	Length (mm.).	Spread (mm.).	Girth (mm.).	Length of flipper (mm.).	Stomach contents.
23..	8. 3. 21.	Fully fledged.	5·4	673	610	559	305	Little food. Stones. Maximum width of flipper=57 m/m.
24..	,,	Fully fledged.	4·1	711	610	533	254	No food. Stones.
25..	,,	Fully fledged.	5·4	711	610	584	254	Full stomach=¾ kilo. Euphausiæ. Stones near rectum.
26..	,,	Fully fledged.	4·5	762	610	508	254	Very little food. Stones.
27..	,,	Nearly fully fledged.	3·6	711	610	508	267	No food. 6 stones.
28..	,,	Fully fledged.	4·5	660	610	508	279	No food. 26 stones.
29..	,,	Fully fledged.	3·6	686	584	533	254	No food. Stones.
30..	9. 3. 21.	Fully fledged.	4·5	711	610	533	254	Euphausiæ and stones.
31..	10. 3. 21.	Fully fledged.	3·6	787	610	533	254	No food. 20–30 stones.
32..	,,	Fully fledged.	4·5	762	610	508	254	No food. Stones.
33..	11. 3. 21.	Fully fledged.	4·5	762	610	508	254	Full of Euphausiæ. Few stones near rectum.
34..	,,	Fully fledged.	5·0	711	610	508	254	Do. do.
35..	,,	Fully fledged.	4·1	737	584	483	254	No food. Stones.
36..	,,	Fully fledged.	5·0	711	610	533	241	Female. No food. Stones.
37..	14. 3. 21.	Fully fledged.	3·9	686	584	495	254	No food. Stones.
38..	,,	Fully fledged.	4·5	762	559	508	267	Do. do.
39..	18. 3. 21.	Old bird.	5·4	787	559	533	279	Full of Euphausiæ.

At various intervals, when birds were killed for food, measurements were taken. These are given in Table II.

Method of progressing on Land.

Normally birds walk, or rather waddle, standing upright on their webbed feet. They can, however, travel on land on their breasts, using their flippers and feet as aids to propulsion. In soft snow the usual method of getting along is this:—The bird will lie on its breast and propel itself along with its flippers and feet, using the former like rowing oars, leaving a long concave trough on the surface of the snow with the indentation of its flippers at intervals on either side. In the trough itself the marks of the feet may be seen.

TABLE II.

No.	Date.	Weight (kilos.).	Length (mm.).	Spread (mm.).	Girth (mm.).	Length of flipper (mm.).	Stomach contents.	Remarks.
40..	24. 9. 21.	5·4	838	610	559	254	Full of Euphausiæ.	Fat and healthy.
41..	1. 10. 21.	5·4	825	660	533	254	Do.	
42..	9. 10. 21.	5·9	787 *	673	572	254	Do. 1 small pebble.	Male.
43..	14. 10. 21.	5·2	857	610	546	254	⅓ full of Euphausiæ.	Do.
44..	23. 10. 21.	6·3	829	610	584	251	Moderately full of Euphausiæ.	Male. See note below.
45..	29. 10. 21.	5·0	813	616	533	251	Nearly empty. 3 small stones.	Female. Ovary not well developed. From markings apparently immature.
46..	,,	5·4	800	622	533	251	Nearly empty.	Female. Ovary contained one large and many small eggs.
47..	,,	5·9	813	622	559	251	Full.	Female. Ovary not well developed.
49..	16. 11. 21.	6·3	791	619	572	241	Full of Euphausiæ. No stones.	Male.
50..	22. 11. 21.	5·0	759	600	521	240	Several large cysts in intestines.	Female. Immature.

Note re no. 44.—On this bird the blubber was very thick round the neck and heart, being there ⅜ in. thick. Towards the stomach it thinned out and then became thicker round the legs.

Method of progressing in Water.

The usual method of getting on shore from shallow water is to scramble from its breast on to its feet. If an ice-foot has to be contended with, the bird will swim as hard as it can towards it and leap completely out of the water. Sometimes it will land on its feet, at others it will either topple over or land on its breast. It will then toboggan along a little before regaining a normal walking position (Pl. V. fig. 2).

Penguins will swim either in a sharp fish-like way or else simulate porpoises in a series of undulations alternately below and above the water.

* Tail incomplete.

Sexual Intercourse. (Pl. I. fig. 4.)

The following is a description of sexual intercourse between Gentoo Penguins as recorded in my diary. The male becomes excited. He bows his head and agitates his flippers. He approaches the female who is lying down, and while he mounts her back he keeps on coaxing her by rubbing his beak against hers. If she is standing he tries to pat her down. All the time he jerks his flippers. Once on her back he continues coaxing the female and they rub their beaks together. His flippers are now used partly to preserve equilibrium, but more especially to create sensation. This is fairly obvious from the fact that he starts to agitate his flippers directly he approaches the female and continues while he is mounting and on the back, only stopping when he jumps off. All the time he is mounted his feet beat an audible tattoo on the female's back. If the female is willing for intercourse she raises her tail and the male endeavours to cross his tail with hers. They have no preference as to which side the tails are crossed. When this has been done and he has got sufficiently excited, he brings his tail down into contact with the raised tail of the female. For a few seconds they remain in this position, the male still coaxing the female with his beak against her upturned beak. Directly ejaculation is accomplished the male jumps off the female's back and stands by her side, perhaps shaking his tail. The female either continues lying down, giving her tail a shake, or gets up and shakes it.

4. 10. 21 *. We noticed a male continually pecking at his mate who was lying on the ground. Whenever she tried to get up he pecked her down again. She seemed to take no notice of this ill-treatment, although several times he plucked out small tufts of feathers. This domestic trouble was terminated by the male being chased round the rookery by another whose wrath he had incurred. I assume that she was not responsive to his wish for intercourse.

25. 11. 21. During our observations of one pair (No. XIX) we noticed that on this day at 2 a.m. there were two attempts at intercourse and at 4 a.m. another attempt.

5. 12. 21. A male tried intercourse with his mate who was sitting on her single egg. The female got up, however, and the male took over the watch. This was the only time we saw attempted intercourse when the female had an egg laid.

See also under "Attitude towards Death " (p. 209).

See also under " Family Histories " (p. 249 *et seq.*).

* This date and others that follow represent the actual date of observation. The notes have been copied from the log-books.

Nest-making.

Normally the Gentoos have for their nests heaps of stones, but in the earlier parts of the nesting season it was impossible for them, owing to the snow covering, even to see the stone nests, much less use them. At this time it was quite a common occurrence for birds to make depressions in the snow to serve as makeshift nests. The construction of such a one is recorded below under 9. 10. 21.

A dozen normal-sized Gentoo nests were measured. They averaged 23 in. diameter at the base, 17 in. diameter at the top, and 3 in. deep in the hollowed-out part (Pl. II. figs. 1–3).

The nests are much larger and better built than those of the Ringed. Small stones (especially flattish pieces of slaty rock which are naturally easy to carry in the penguin's beak), bones, and tail-feathers are the normal constituents, but many contained, on account of our residence, pieces of wood, glass, tins, tin-openers, sennegrass, etc.

A medium-sized nest was chosen and the stones of which it was built were counted. There were 1,700 stones of various sizes, as well as 70 old tail-feathers * and a bone. There were many nests which contained twice or three times as many stones.

The majority of the nests are built up from existing supplies of stones on the rookeries, gradually accumulated throughout generations. Occasionally these were added to, as will be seen in certain of the observations which follow, by energetic birds which made journeys down to the beach for new material.

9. 10. 21. I watched a bird lying down and digging herself a nest in the snow. To do this she turned over a little on her side and scraped some snow out with the free leg, kicking it away from her. She then turned over on the other side and used the other leg. In order to get some sort of symmetry she got up and lay down in another position and scraped until she was satisfied. This eventually gave her a shallow saucer-shaped depression in the snow. The use of the feet as a help to form the shape of the nest is a regular habit.

17. 11. 21. When making a journey to the ash-dump in the early hours I saw the male of Pair XI still nest-building. I put down the box I was carrying and gently threw large cinders to him. He was not at all nervous and looked pleased. He made noises of satisfaction (" coo "). I went closer, giving him cinders all the time. They hit his feet, but he did not mind. As I threw them to him he arranged them.

* There are sixteen long feathers composing the tail of a Gentoo Penguin.

After doing a little more pilfering during the early part of the morning he had a rest. At noon he was collecting again and we took some photographs (Pl. II. fig. 3; Pl. IV. fig. 4).

20. 11. 21. Gave two birds complete nests of ashes. They soon took possession of them.

22. 11. 21. We gave Sarah, who has a nest by the meteorological screen, some cinders and she was very pleased. The next-door neighbours were obviously covetous.

23. 11. 21. I placed some cinders in Dolly's nest while she was out fishing. She was delighted when she returned home. I gave her and her mate two more, whereupon they crowed and cooed in evident satisfaction. Dolly was soon arranging them.

A heap of cinders and ashes was placed midway between two nests. The male of one pair was soon collecting them and later in the day this pair moved their nest to the centre of the pile.

26. 11. 21. It was noticed that the birds we gave cinders to remained behind after the others had gone fishing, usually one to each nest. This happened at the north end and in the centre of the Island where the rookery had been bare each morning previously. This shows that the birds which have partially built-up nests remain to look after them, while those which have no stones or cinders do not worry about theirs, and go off fishing in a care-free way.

27. 11. 21. One bird had a nest with two stones in it. He or she arranged one of them eleven times and even then was not satisfied with the position.

We gave one of the birds of Pair XVII a stone marked with three white stripes. She immediately arranged it in the nest. The male, who had been resting, seeing that his mate had found a stone, promptly started on a search to see if there were any more around. Later, when the female was on the nest, we put six small stones of various shades of light and dark slate-colour near her. The male immediately seized the one nearest him and gave it to his mate. The rest followed. He had no preference for shade. Two he knocked down the slope but retrieved them. One stone only was left, a white one, which he probably mistook for snow. He found this later.

Later on the female was given a stone which she took rather roughly from my hand and threw down beside her.

28. 11. 21. The male of Pair XVI endeavoured to force a stranger, apparently a female, from his nest. The stranger was for a long time quite indifferent. The owner's treatment was, curiously, not very harsh. Eventually the intruder got up and went away.

3. 12. 21. A nest was found containing eleven limpet shells and no stones. These had been brought up from the shore recently.

During a visit to the tide-pole some birds were disturbed. One was noticed to have a large piece of slaty rock in its beak and was walking round in a circle to evade my path. On my return, this operation was repeated, and, my curiosity being excited, I experimented two or three times with the following result:—each time this bird was disturbed on its nest, it felt the urgent necessity of quick retreat, but also realized that to leave the large stone—it was the only one it had in its nest—would be fatal and so picked it up first and then cleared off. When my presence was no longer a cause for anxiety it promptly returned and, after some difficulty, since there was nothing but guano everywhere, appeared to find its nest-site and deposited the stone. They are not very trustful of their neighbours!

One of the pair on the west side of the screen this afternoon accepted eight stones from my hands. In the evening we gave her some more. This is the second case so far in which we have managed to give a bird stones from our hands. (Later we were able to do so to some birds on the ash-dump.)

5. 12. 21. A nest was found containing a piece of bamboo and a piece of wood each about eight inches long.

Another nest was found containing eight limpet shells in the snow, but no stones. These again had recently been brought up from the shore.

Yet another contained only one stone, one piece of bamboo, and a piece of wood.

6. 12. 21. The first nest described on 5. 12. 21 contained at 8 a.m. to-day four stones, two pieces of bamboo, and a piece of wood. At 9 p.m. the nest had been robbed of one bamboo. Later all the contents had been pilfered.

9. 12. 21. One nest was surrounded with about two hundred small frozen balls of snow. They looked well, but were not lasting.

In the afternoon some birds were seen wading up to their middles along the shore picking up stones. They tried to carry these to the rookery, but were unable to get on the ice-foot with them in their beaks.

10. 12. 21. Saw a bird on the West Rocks with a stone in its beak. The bird dived into the water and rose once with the stone still in its beak. It lost it, however, before reaching the shore.

At 5 p.m. a nest was observed by the pathway to the tide-pole, composed of a dozen stones which, as they were very clean, looked as if they had been brought up from the shore 75 feet away. One of the pair was standing on the nest and the mate, presumably the male, came from the direction of the shore with a clean wet stone in his beak. He himself was wet. He had had to climb on to the ice-foot. When I returned a few minutes later he appeared again with another stone from the direction of the ice-foot. At 6 p.m. there was an addition of six

stones to the nest, representing six trips to the shore in an hour, and both birds were present. While watching I saw the bird come from the shore with a stone in his beak and take it to the nest. He then returned to the shore and was back again at the nest with another in a space of two or three minutes. He was very quick to have walked the 75 feet, jump into the water, get out again, climb on to the ice-foot and return to the nest. In a little over an hour he had made this journey eight times.

The four largest stones weighed 6, 5, 3, 3 oz., respectively. The sizes were :—

(1) $3 \times 2\frac{1}{4} \times 1\frac{1}{2}$ in.
(2) $2\frac{1}{4} \times 1 \times 1$ in.
(3) $3 \times 1\frac{1}{2} \times 1\frac{1}{2}$ in.
(4) $3 \times 1\frac{1}{2} \times 1\frac{1}{4}$ in.

Later in the evening two more nests near this one were observed to contain clean pebbles just brought up from the shore.

12. 12. 21. Saw a bird swimming with a stone in its beak. Later saw two birds come up on to the ice-foot from the shore and carry stones to their mates on the west slopes.

Several of the nests around the dirt-dump have old tins amongst other building materials and one nest has twenty-five pemmican tins, a sardine tin, and a few stones. The bird lies on one of the tins.

14. 12. 21. A female was lying on a nest and the male was trying to get her to accept a stone with good grace, which she refused to do for some reason or other. He pecked her and, bowing, offered her the stone. She would not return the bow so he pecked her again, and then picked up the stone and placed it in another part of the nest, bowed again, but was not accepted and so pecked the female once more. This was repeated about forty times. Each time the same stone was picked up and put in a different place. Eventually the female returned the bow while lying down and the male stopped worrying her.

A bird was seen to land on the ice-foot with a stone secured from deep water.

15. 12. 21. On the shore a bird was seen walking towards the sea with a stone in its beak. This it changed whenever it saw a larger one until in the end it had a very large one. Why it was walking towards the sea is not obvious. There were many birds on the shore carrying stones, but not taking them anywhere in particular.

In the afternoon a bird was seen carrying a stone from the beach to the rookery.

20. 12. 21. A bird on the rookery was seen on several occasions in the afternoon to bring stones from the shore to its nest.

See also " Family Histories," Pair No. VIII (p. 257).

Eggs.

Normally, the Gentoo lays two eggs, occasionally three, and rarely four. Details of the colouring and sizes of normal eggs are sufficiently well known not to necessitate my giving particulars. It is, however, of interest to record instances where nests were found containing more than the conventional clutch of two eggs. I quote from my log-books.

11. 12. 21. In a nest on the ash-dump were three eggs, two very dirty and one clean. The two dirty ones were of normal size, while the third was much smaller.

12. 12. 21. Found a nest near the screen with three eggs in it.

13. 12. 21. When I looked at a nest during an inspection there were only two eggs present. On returning to collect them I found another just laid, the shell being still soft in one place.

14. 12. 21. Nest near screen found containing three eggs.

15. 12. 21. Another nest found with three eggs, the third having only just been laid.

16. 12. 21. Two more nests near screen each having a clutch of three eggs.

23. 12. 21. Two nests containing clutches of three eggs found near the screen.

2. 1. 22. On South Island and near the screen two more nests have been found with clutches of three eggs, and at the north end of the Island a nest containing four very clean eggs. These four were undoubtedly all one bird's laying.

11. 1. 22. At Coal Point and South Island two more nests each containing three eggs found.

12. 1. 22. An observation nest on the ash-dump now contains a clutch of three eggs.

The eggs are covered by the bird in a peculiar way. The penguin has a kind of pouch at the lower part of its body which by muscular action can be opened to form a protection for the eggs. When the bird so desires, the slit opens out, parting the feathers and giving complete access to the bare skin. This naturally gives increased warmth to the eggs, and by releasing the muscles, the penguin partly enfolds them in this warm place.

Incubation Period.

A series of birds was watched to observe the incubation period. Naturally in many cases observations were spoiled by accidents happening to the eggs, losing track of birds, and so on. The list given opposite summarises successful results which may be regarded as absolutely reliable.

Adoption of Eggs.

So far as our observations went there is no doubt that Gentoos are perfectly indifferent to ownership of the eggs and are quite willing to take over one another's eggs and hatch them. We found we could change eggs about with impunity.

4. 12. 21. Probably owing to the depth to which the eggs had sunk in the snow and the consequent difficulty the birds would have had in sitting on them a pair neglected their eggs all the afternoon, so these were changed to the next-door neighbour's nest. These birds adopted them without hesitation.

8. 1. 22. No. PP. 19 have hatched one chick. On 29. 12. 21 both eggs from this nest had been taken for specimens and the birds were given an egg from another nest. It was this adopted one that was hatched.

TABLE III.

No.	Order of laying.	Date of laying.	Date of hatching.	Time of incubation.
1.....	1st.	Dec. 2, 1921.	Jan. 9, 1922.	38 days.
2.....	1st.	Dec. 2, 1921.	Jan. 9 or 10, 1922.	38 or 39 days.
3.....	1st.	Dec. 2, 1921.	Jan. 10, 1922.	39 days.
4.....	2nd.	Dec. 8, 1921.	Jan. 12, 1922.	35 days.
5.....	2nd.	Dec. 9, 1921.	Jan. 14, 1922.	36 days,
6.....	1st. } same	Dec. 4, 1921.	Jan. 8, 1922.	35 days.
6 *a* ...	2nd. } clutch.	Dec. 7, 1921.	Jan. 11, 1922.	35 days.
			Average ...	37 days.

Adoption of Young.

On our arrival at headquarters we had to remove a large number of young penguins from around the stranded boat, so we tried to get birds in other parts of the rookery to adopt them. Some with no young were delighted, but several, however, pecked at the eyes of the intruders and tried to kill them. I am afraid that the Skuas got many free meals.

One day a bird was seen with five young of various sizes attached to it.

Stages of Down.

For the reasons explained in the introductory notes we were unable to make minute observations on the young birds in their down stages. The chicks, as fully described by the naturalists on the second Charcot expedition, have two stages of down *.

* 'Deuxième Expédition Antarctique Française (1908–1910).' Oiseaux Antarctiques, par L. Gain, pp. 49, 50.

Method of feeding Young.

The way the old birds feed their young is as follows. If the young one is hungry it pecks at the beak of the old bird, which, if it is agreeable, vomits up food into its mouth, which it opens, and then the young one puts in his head and helps himself. The rate of growth of the young is very rapid, owing to their ravenous appetites.

Food.

The chief food of penguins is the Euphausiæ which swarm in the Antarctic seas. They also eat small fish. The distribution and movements of the Euphausiæ must have considerable bearing on the habits of the penguins. That they must have definite movements is more or less proved by the fact that during what I have called the Period of Massed Fishing Expeditions the penguins, particularly during the earlier excursions, must have gone very much farther away for their food-supply than later when I noted (4. 12. 21) that " they seem now to do their fishing in the shallow water round the shores whereas before they had to go further afield."

I opened up the stomach of one bird (no. 44 of Table II.). It was moderately full, but not so full as I have seen with other birds. In it I counted remains of 960 Euphausiæ. In the upper part of the stomach the Euphausiæ were mostly whole or nearly so, but in the lower part, where they had become partially digested, I had to count the eyes.

In Tables I. and II. the occurrence of stones in the stomachs of birds will be noted. The object of these stones is to grind up the food, particularly the rather hard shells or outer coverings of the Euphausiæ. On one occasion we saw a bird deliberately swallow a small pebble.

Drinking.

Often we saw birds which were lying down on the snow take up beakfuls of snow to drink or eat.

3. 12. 21. The female of Pair XVII left her nest and walked down to some clean snow and ate some, then took a rest for a few minutes and returned to the nest.

See also " Period of Moulting " (p. 224).

Disgorging.

At the time when the birds were departing for their early morning fishing one of them which was standing near the edge of the ice-foot suddenly went through the disgorging motion and spat out a quantity of undigested Euphausiæ.

It repeated the effort, but brought up only a little. Reluctant though I am to believe it, I am afraid that it was too full to undertake another fishing expedition, but, rather than miss it, preferred to make room for a further supply.

It was no difficult task for the bird to disgorge, for it is part of the normal method of feeding the young.

Excretion.

Usually the bird ejects its excreta with some force a distance to the rear, and seldom lets them drop straight down. This is done so that as much as possible may fall clear of the nest.

During the moulting period the excreta of the birds were nearly fluid and of a red, green, or green-yellow colour. When moulting was ending they became more solid and tended to be composed of small hard lumps of brown colour.

25. 6. 21. Some excrements on the snow were examined. These were chiefly light masses of solid dung which varied in colour from dark red to red-brown and chocolate. Noticed a small quartz pebble in one. Several also possessed a small soft patch of white. Some marks on the snow had a greenish colour.

Sleep.

When standing the penguins sleep with their beaks tucked in their flipper-joints. They may, of course, also sleep while lying on the ground.

Crowing.

The Gentoo makes two noises :—

(*a*) " Crowing " ; a grating raspy noise of lower note than the Ringed produced while extending the neck upright into the air and expanding and contracting the chest (Pl. II. fig. 4). This corresponds to the " ecstatic " attitude of the Adélies, which is described by Levick *.

(*b*) A wheezing sighing-like noise produced when pairs meet each other ; also when the male brings a stone to the female he lowers his head afterwards and wheezes (Pl. III. fig. 2).

When the young are about three-quarters grown they commence to wheeze and endeavour to crow.

14. 10. 21. Saw a bird " crow " while lying down—a rare happening.

15. 10. 21. Saw a bird crow on its nest, but before it had finished it got up.

18. 10. 21. Heard a bird crow while swimming—an exceptional occurrence.

* British Museum. ' Natural history of the Adélie Penguin.' By Staff-Surgeon G. Murray Levick, R.N. ' Antarctic Penguins,' by the same author.

21. 10. 21. From a series of observations it has been found that as a general rule when a penguin crows there are four long bars and a short one at the end when breath is taken.

āh, ăhă, ăhă, ăhă, ĕ
ĭ, and ĕ2, and ĕ3, and ĕ4, ĕ5.

27. 10. 21. On different occasions saw birds crow and the mates hurry from some little distance away to join them. Evidently when a bird crows it may, if alone, be calling for its mate.

28. 10. 21. I have been watching penguins for about 2½ hours to get some insight into the reason for crowing. The crowing indicates either a bird calling for its mate or, in the case of two birds crowing together, some sort of expression of satisfaction. During the time I was watching I saw thirteen birds crow and the mates hurry up to them, sometimes from a distance away, at other times from a few feet only. Sometimes the mate that arrived had difficulty in finding the other. On these occasions the other mate would perhaps walk up to it and put it right.

Sometimes birds appeared not to recognize each other until one of them crowed. I saw two birds standing quite close to each other. One crowed and the other immediately hurried to it and both bowed.

As an example of a bird recognizing another at a distance, I saw one bird crow and suddenly it spotted its mate about 25 feet away to whom it hastened with all speed.

Sometimes when a bird crowed the wrong mate would come up to it. I saw two examples of this. In one case a bird crowed and the wrong mate came up. When the mistake was realized it was chased away. The real mate hurried to join the crower from about 25 feet away. In the second case two birds which were standing near each other both crowed simultaneously, one then started to bow to the other, then realizing the mistake chased it away.

I saw six instances of two birds both crowing together as if in satisfaction. In all of these cases, after the birds had finished crowing they bowed to each other.

31. 10. 21. During the preliminaries to departing in the early morning for fishing it was noticed that immediately after several calls were given by birds on the rookery, their mates left the Bay ice and made towards them.

10. 11. 21. On three occasions birds which were alone were seen to crow and their mates came hurrying up.

22. 11. 21. A male bird called for his mate, who was only three or four feet away. She came up immediately. He desired intercourse, but she refused and went away.

See also " Family Histories," Pair No. VII (p. 255).

Preening and Cleaning.

A penguin is by nature a cleanly bird, though life on a rookery covered with guano makes it very difficult for cleanliness to be maintained. In the sea they would spend much time getting their feathers clean by scratching themselves with their feet and by shaking and twisting themselves. On land they would preen their feathers with their beaks.

6. 11. 21. Lester walked up to a penguin whose back was turned to him, and which was busily preening itself. He stroked the back of its head some thirty or forty times with his finger before the bird became aware of anything unusual. When they are preening themselves they seem to be utterly unconscious of what goes on around them. Frequently we have been up to a bird and toppled it on its back before it knew we were there.

22. 12. 21. Two birds were seen to come up from the sea before they had cleaned themselves properly. This is a thing we have never seen happen before.

Fighting.

Penguins are always fighting, but it principally consists in pecking at each other's beaks if they can reach so far when lying on their nests. Sometimes, however, one bird will chase another round the rookery and, catching it, will beat it with its flippers.

One day I saw the following comedy :—Two penguins on their nests were pecking at each other while the mate of one stood by the enemy. Suddenly while the enemy's back was turned it gave it a violent peck and then hurried off as fast as its feet and flippers would carry it, with the enraged enemy in pursuit.

22. 9. 21. I saw the pursued of one pair charge in between the legs of another, completely upsetting it and leaving it to get up and look around wondering what had happened.

For the first time I saw a real battle royal between two birds, lasting for about a couple of minutes' hard going. Usually it is a case of one bird merely pursuing another, but this time they stood up to each other and went at it flippers and beaks. The end was a draw, and both birds claimed the victory by crowing violently. Then they departed in different directions.

28. 9. 21. I saw one penguin chasing another across the rookery, both birds propelling themselves as hard as they could go on their breasts. The chase became lengthy and they ran out into the Bay where the culprit became absolutely "done-up" and gave up running away. The chaser, not much less fatigued, meanwhile pecked at the other's head. Getting tired of this the former got

up and a short flipper fight ensued and then off they went again towards the rookery. Eventually the culprit took the wisest course and made for a crowd, in which it was soon lost.

16. 10. 21. A fight took place between two male birds for the possession of a mate. The mate was with one male and then she went to the other.

10. 11. 21. We saw two birds having a stand-up fight. They left off once to crow and one returned to its nest. The other came up again and attacked it from the rear. A chase commenced and they ran into another bird. The chase contined until the leading bird could go on no longer, and the other pecked at its head and beat it with its flippers. We intervened and the chase continued, but was eventually given up. Both birds were blood-stained.

22. 11. 21. A bird which, with its mate, joined the ash-dump party yesterday afternoon caused a lot of trouble to-day when opposition to the tenancy was intensified and backed up by many fights. All, including Anne and Archie, vigorously objected. On two occasions in the course of a few minutes the intruder—it was actually the female—had in some way managed to get into Archie's nest, probably while he was cinder-searching. Needless to say, she was quickly ejected. The occupant of the next nest attempted intercourse with the new arrival. He beat her because she refused. After severe pecking from many quarters, the poor female eventually took up a position on her new nest and bowed to the nest amidst a great display of hostility from others around her.

See also " Family Histories," Pair No. VIII (p. 256).

Short-sightedness.

Time and again we saw instances of birds being either very short-sighted or else unusually dull of intellect. From the fact that when pecking at one another while lying on their nests they were nearly always short of the mark, I am inclined to think the former was the case.

The guy-wires of the meteorological screen caused many funny incidents. Sometimes we saw a penguin stopped by running into one of the wires, whereupon it charged it again and again until it either gave up or fell over. They often seemed incapable of appreciating that it was possible to get underneath. Once a fight was caused by a bird running into a wire and thinking the obstruction was caused by a near-by bird.

Later in the season we found that birds had learned to duck their heads when they passed under the guy-wires of the meteorological screen and did not walk into them and vainly try to push their way through as they did in the breeding season.

Illness.

Only on one occasion was an adult bird found dead on the rookery. It apparently died from natural causes. The weight was normal and neither the head nor the body showed signs of injuries.

One day a bird was observed to have a very lame leg due to a recent injury. It was obliged to stop and rest every few yards on its way to join the party that was collecting preparatory to departing for fishing. We saw two or three other lame birds about the rookeries.

On 16. 11. 21 I recorded a noticeable sneezing epidemic among the birds.

In many of the birds I skinned for food I noticed cysts in the intestines.

In an empty penguin nest part of a tape-worm measuring some 9 in. or more in length was found.

One bird was seen to have the left side of the beak prolonged towards the mouth more than usual. The right side was normal.

Mortality.

That the young of the penguins ever see the light of day is somewhat remarkable, for what with one adversity and another a good proportion of the eggs are never hatched. If neglect and bad management were not compensated for by an egg which can, with its fatty contents, withstand an enormous amount of misuse, the race of penguins would fast become extinct. If a young bird is tenacious enough to reach the adult stage it deserves to live. As an egg it may be trampled on, lost in mud and water, stolen by scavenging birds, or badly covered by its parents; as a chick it runs no risk of being lost in mud and water, but is in peril of all the rest.

The log entries which follow give some idea as the various causes of mortality:

4. 12. 21. A neglected egg was found, so some ashes were placed under it. Throughout the night no notice was taken of the egg, but all the cinders were pilfered from under it.

9. 12. 21. A nest had an egg in it which had been trampled on and broken.

10. 12. 21. A nest in the snow was full of water. The bird was unable to sit on the egg, but was alongside the nest at 9 p.m. and 10 p.m. The egg was lifted out on to the surface. After great deliberation and looking into the nest and at the egg alternately, the bird eventually covered the egg. At midnight the egg was covered, but at 1 a.m. it had completely vanished. The bird was looking round in a mystified way. Perhaps one of the scavenging birds had it.

Many eggs are being neglected through circumstances similar to this one.

12. 12. 21. Many eggs are lying about the rookery, deserted because it is impossible for the birds to sit on them. Sometimes they are in two or three inches of mud or else in nests half filled with water.

13. 12. 21. Pair XV. The last few days we have not seen the two birds together at this nest, and yesterday evening we noticed the nest was deserted. At 1 a.m., 2 a.m., and 4 a.m. to-day it was also deserted. At 1 p.m. one bird was there. It is probable that the mate had lost its life. This would account for the other having to leave the nest unprotected. One bird was seen alone at 1 a.m. on 14. 12. 21. From 10 a.m. to midnight the nest was again vacant. From 3 a.m. to 10 a.m. on 15. 12. 21 the bird was away, but was present alone from noon to midnight. Although observations were made hourly from 1 a.m. to 8 p.m. on 16. 12. 21 only one bird was present. At 10 p.m. the eggs were left unguarded.

It may be safely assumed that the young of this pair never saw the light of day.

22. 12. 21. A bird which had built its nest in the Bay deserted it with one egg in it.

Enemies and Scavengers.

The Gentoo has been provided by nature with sufficient enemies to prevent over-population. The principal of these are the

(1) Leopard Seal (*Stenorhynchus leptonyx*),
(2) Brown Skua (*Catharacta skua*),
(3) Dominican Gull (*Larus dominicanus*),
(4) Giant Petrel (*Macronectes giganteus*),
(5) Wattled Sheathbill (*Chionis alba*).

Of these I consider that the Leopard Seal only is the enemy of the adult and the gulls of the eggs and young. The Giant Petrel and Sheathbill are more in the nature of scavengers, picking up what is left behind by others.

In my log-book entry for 19. 9. 21 I noted that " With the reoccupation of the rookery by the penguins, there are more scavenging birds around. Gulls, Giant Petrels, and especially Sheathbills are always on the look-out for a meal. Other Petrels also hang around looking on the ground for food."

The following notes relating to the enemies of the Gentoo Penguin are taken from various entries in the log-books:—

Leopard Seal.

6. 3. 21. Saw one just off-shore killing penguins. It caught them, then raised its head and tossed them away, finally eating them whole. It killed about half-a-dozen while we were watching.

18. 3. 21. A Leopard Seal was lying behind a lump of ice in the small bay all the morning. It caught several penguins, and we could see it tearing them to pieces.

During March, April, June, August, September, and October I have records of Leopard Seals being observed looking for penguins.

26. 9. 21. Saw one eating a penguin carcass. The Leopard tore pieces off by shaking the body about and flinging it backwards and forwards. These it devoured as they came off, before tearing at the carcass again.

7. 11. 21. At 1 p.m. a party of about two hundred birds, just returned from a fishing expedition, were marooned on the middle of the Bay ice owing to the main mass of ice having severed from that around the edge, leaving a wide crack between them and the rookery. Their way home was barred by two Leopard Seals. Later the birds were seen rushing backwards and forwards towards the edge of the ice. One bird either fell in or dived in just in front of the Leopard's nose, but was not caught. At 2 p.m. they were still rushing about. At 4 p.m. they had left.

From now until the end of the month the Leopard Seals were continually round the Bay, causing a good deal of discomfort to the penguins (Pl. III. fig. 4).

10. 11. 21. A penguin was dragged off a piece of ice by a Leopard Seal.

24. 11. 21. At 1 a.m. a small party of birds waiting to go off fishing changed their minds on seeing a Leopard Seal devouring a bird just off shore. They turned back home.

At 4 p.m. a Leopard Seal was near shore with a penguin carcass and disappeared with it below water after taking a deep breath.

Brown Skua.

During the nesting season Brown Skuas were continually seen hovering round the rookeries on the look-out for an uncared-for egg or a young bird to be either carried away or feasted off on the spot.

On one occasion twelve of these birds were seen round the old carcass of a penguin.

See entry under 13. 12. 21 for Dominican Gull.

Dominican Gull.

As in the case of the Skuas, Dominican Gulls were a considerable source of danger to eggs and young birds.

26. 10. 21. We saw a penguin hurrying after a Gull which ran away. The penguin stopped and so did the Gull, so the penguin chased after it again until it was satisfied that the Gull was far enough away. It is peculiar that the Gull,

which would have great superiority over a penguin in fighting if it only exerted its powers, should be afraid of such a harmless bird which it could blind with a peck from its long beak.

This incident happened prior to the nesting time.

24. 11. 21. Ten seen hovering round a Leopard Seal which was devouring a penguin. They were hoping for any stray bits the Leopard might leave.

8. 12. 21. A dozen seen flying low over the penguins, evidently looking for eggs.

9. 12. 21. A Gull seen eating the contents of a penguin egg. On my approach it took the egg in its beak and flew off with it. This accounts for the disappearance of many of the eggs belonging to penguins under observation.

13. 12. 21. Saw a Gull on the West Rocks with a whole egg in its beak. It flew away, but after a little while dropped the egg into the sea. Later on saw another eating an egg. Still later a Gull landed with an egg in its beak which it was just about to eat when a Skua flew down on top of it, giving it a scare and making it flee a few feet away. The Skua then sharply but carefully broke the egg and ate it while the Dominican Gull looked on.

Giant Petrel.

I cannot recollect, nor have I any record of, any direct damage having been done to Gentoos or their eggs, or chicks, by these unwieldy birds, though I should not be surprised if they were capable of eating an egg or a chick when opportunity arose. Being much more wary than the Gulls places them somewhat at a disadvantage.

They would, however, eat any dead birds found in the sea or on the rocks.

Wattled Sheathbill.

Like the Giant Petrel, the Sheathbill is purely a scavenger, and I have no record of their having attacked eggs or young.

19. 8. 21. There were a dozen among the penguins. We noticed a curious fact, which explains why we have often noticed Sheathbills walking among the penguins. A penguin and a Sheathbill were standing together. The penguin excreted. Immediately the Sheathbill turned round and took up a beakful of the excretion.

29. 8. 21. Still about eighteen among the penguins.

20. 9. 21. About twenty around the penguins all day, as on previous days.

22. 10. 21. By this date their numbers had decreased somewhat, perhaps due to a return to their nesting-places to prepare for nesting.

1. 12. 21. Three seen to be eating penguin guano.

Attitude towards Death.

No repugnance was felt by adults or young for their own dead as the following diary entries confirm :—

11. 3. 21. The young penguins do not mind the dead bodies and blood of their kind. We have a pile of carcasses outside the hut and to-day a young penguin spent most of the time lying on the top and even pecking at the flipper of one of the dead birds. Others also took no notice.

29. 10. 21. One of the birds I had killed I left for a time and on coming back I saw a male trying to have intercourse with the dead bird. I also saw a male trying to have intercourse with a badly-wounded female.

Intelligence.

(*a*) We had to dig a trench in the snow round the bow of the boat to prevent two penguins from nesting on the deck or bedroom roof. There were two ways left to reach the deck, one by getting up on the stern and the other by mounting the coal heap, climbing on to the outer hut roof, then over a sack of sennegrass, and so down to the bow. From tracks one of the birds took this latter course and descended by jumping into the trench. This little incident demonstrates quite a reasonable amount of sense.

(*b*) When wishing to cross some broken-up ice in the Bay they would jump from one piece to another, always having a careful look at the distance between pieces before jumping. They were most careful and did not hurry.

(*c*) We placed a small shaving mirror in front of three different pairs. Although they seemed to look into it, they took no notice and did not try to fight their reflection as we had anticipated. Perhaps they thought the bird they saw in the glass was at the conventional distance away and need not be fought.

Lack of Intelligence.

17. 9. 21. While the birds were waiting for the nesting time we observed the great tendency they had to "follow the leader." On one occasion a bunch, at our approach, bustled to the edge of the ice-foot where they hesitated about going in, all waiting for one in the front rank to take the lead. Those in the rear looked indifferently about and simply waited to see what the others were going to do. Eventually one made the four-foot dive from the ice-foot to the shallow water. Immediately a few others followed. An independent-minded bird then decided that it was not worth it, so turned back and the rest followed suit.

On other occasions they would bustle on in front of us the whole way across the Island, never turning to the right or left. Some would even get upset when we had passed them and rush on past us and go ahead.

24. 10. 21. We watched a number of birds which were returning from fishing climb over the loose ice on the shore to get on to the rookery. It was very obvious that most of the birds just followed the leader. When the birds had approached near to the edge of the ice-foot there were two ways on to it. Although one party saw others go up the right way yet they endeavoured to find another way of their own. While they were searching for this, those which had arrived later than they and had taken the right road were on the rookery.

If one bird took the initiative and thought he knew a better way, the others followed like sheep, and if they could not get up to the rookery just waited for someone to lead them another way.

3. 12. 21. For six hours three pairs have been squabbling for the possession of a nest-site on the snow-drift outside the hut door. This drift is over the sea shore and no use at all for nesting, since when it clears away there will be water below.

15. 12. 21. On the shore at low tide a bird was found lying on what was obviously a constructed nest. An hour later the mate was bringing stones to her. The spot where the nest was situated was under several feet of water at high tide.

Affection.

There are two ways of showing affection, which is very liberally given between pairs:—

(1) By crowing. For full description of this see under " Crowing " (p. 201).

(2) By bowing to one another, perhaps the most charming penguin attitude. Two birds standing together will bow very frequently simply as a mark of affection. When a mate brings a stone to the nest it is nearly always accompanied by each bird bowing. With the bow there is a slight sigh or breath like a whispered low " hā " (Pl. III. fig. 2).

Occasionally there is even more ardent affection. We once saw two birds engaged in crooning to each other, the male rubbing his beak affectionately on the side of the female's face. They also rubbed beaks together (an equivalent of kissing ?), while one even took the other's beak in its own.

Bravery and Timidity.

They are not as a rule brave birds where a stranger is concerned and usually hurry away when a person approaches, bluntly disregarding such obstacles as other penguins' possessions, be they eggs or young birds.

So far as their own lives are concerned, they are not nearly so plucky as the Ringed, being, to use a colloquialism, too " gassy," making much noise without

a great deal of effect. The Gentoo's fighting display can be compared with the squabbling of two comic charwomen as against the Albert Hall fighting of the Ringed.

It was very noticeable that the marked birds became in time more timid than the rest when we approached them.

12. 10. 21. Alice of Pair VIII is very timid and artful and we have not been able to mark her yet. Directly we are anywhere near she makes off, although birds quite close to us make no movement. Horace does not run away like this, and none of the other birds we mark are so noticeably artful.

13. 10. 21. Since we have been marking him, Horace, of Pair VIII, is becoming obviously more timid on our approach.

23. 10. 21. It is noticeable that, whereas when the birds have eggs or young they will often stand up and " coooo " in protest when you pass by, we have only seen two do this during the pre-egg-laying period. Usually they hasten away at our approach.

1. 11. 21. As we pass through a part of the rookery on the way to the tide-pole every hour, the penguins have left us a pathway through their midst. They do not run away as much as formerly.

14. 11. 21. Whereas when we walk among the birds round the meteorological screen and meat-dump we do not cause much trouble, yet on the north end and at Coal Point where we rarely go the birds run away in a general rush at our approach.

Friendship.

One might safely say that very little friendship exists between penguins. Each pair for itself is their motto, though, as the two log-entries which follow show, friendship in not unknown.

6. 10. 21. At 4 p.m. I found two birds together and, assuming they were mates as they bowed to each other, I marked them. They then separated, which puzzled me, so I steered one back and it went to the other. A little later I was surprised to find one of the marked birds A bowing to an unmarked bird, while the second marked one B was a little way off. Evidently the two birds I had marked were not mates. At 6 p.m. I found the marked A and unmarked birds still together and the second marked bird B alone near-by.

7. 10. 21. On watching the marked bird of Pair V I saw that it bowed to a neighbour. It was certainly not its own mate. Later I saw it a little way off bowing to another bird, but it returned to its proper nesting-site.

See also under " Immature Birds " (p. 221).

See under also " Family Histories " (p. 251 *et seq.*), Pairs Nos. VI, VII, VIII.

Persistence.

11. 11. 21. As an example of penguin persistence, we saw a small party try over and over again to leap on the ice-foot when returning from fishing. Again and again they leapt out of the water and banged into the ice-foot, but, although they often jumped twice their own height from the water, they could not get on to it. Two just managed to get on, but slid back again into the water.

Inquisitiveness.

24. 11. 21. One of the birds of Pair XVII, probably owing to the fact that at 2 a.m. many of the occupants of the rookery had gone fishing and it considered its nest tolerably safe from robbery, was wandering round the meteorological screen. It tested with its beak the guy-wires, examined the ground temperature apparatus, had a general walk round, and after an hour's absence returned home.

See also under " Immature Birds " (p. 218 *et seq.*), also Pl. III. fig. 3.

Immorality.

30. 9. 21. A male was trying to seduce a female who was not willing. On the arrival of his mate he deserted the first female and attached himself to his mate.

5. 10. 21. A male started to mount on the back of a female, but she got up and pecked at him, as apparently he had mistaken her for his mate.

16. 11. 21. A approached B, who was lying near C. A bowed to one or both and then definitely bowed to C, who looked up and finally got up and went away, A and B being left alone. The former became amorously inclined. B at first reciprocated, but eventually decided that it was impossible. They stood together afterwards.

It was not quite clear whether this little episode should be classed under this heading. It is, none the less, suspicious !

24. 11. 21. A male attempted intercourse with a female in the Bay. Because she refused, he became very violent. I do not think she was his real mate.

The male of Pair XVI attempted intercourse with a female who was not his mate. His real mate was away fishing.

26. 11. 21. Pair XVI. The same male was having intercourse with a strange female on his own nest when his mate came up and a fearful row began. The lawful mate went for both and the strange female was very subdued. Eventually both husband and wife went for the strange female, who fled. To make amends, the male presented his spouse, who had now taken possession of her property, with a cinder, which was accepted with a bow.

27. 11. 21. The male of Pair XVII during the period just preceding egg-laying attempted intercourse at midnight with a stranger after having had a complete

intercourse at 8 a.m. in the morning and an attempted one at 8 p.m. with his own mate.

See also " Family Histories," Pairs Nos. I, VII, XVII (pp. 250, 254, 270).

See also " Fighting " (p. 204).

Thieving.

Every penguin is an accomplished thief by instinct, and at times shows considerable cunning with it. The thieving is all centred round one objective, the desire to build a nest. As explained under " Nest-making " the chief components of the nests are stones, and of these there are only a limited number on the rookeries, unless some enterprising birds add to the accumulation of ages by bringing up fresh stones from the shore. With the human weakness of desiring something better than one's neighbour coupled with slack habits of some birds, it is only to be expected that there will be robbers and robbed. However, the whole thing goes round more or less in a circle, so that while A is robbing B, C may be robbing A and B robbing C.

The episodes which follow give some idea of what takes place on a normal rookery.

8. 10. 21. We brought up from the shore a number of small stones about the size the penguins like for their nests, and put them in a heap near the meteorological screen. One bird had a look at them, but did not take any. Another bird, however, took one stone away just as two others arrived who claimed the " nest " as their own. The female even attempted to arrange one or two and lay down on the top of them. At 6 p.m. the two birds were still occupying the stone heap. As no other stones were yet visible, on account of the snow, the pile was of some importance.

9. 10. 21. No thieving has taken place from the heap of stones and the same pair still claim possession and stand by it.

6. 11. 21. A bird on the ash-dump was bringing numerous cinders to place round his mate, who seemed most pleased. These he was stealing from a bird which occupied the top of the ash-dump and who was not certain what to do while the thieving took place. She did not quite like the idea of leaving her nest and at the same time was aggrieved.

18. 11. 21. At midnight at the ash-dump, wholesale robbery was going on. Percy was busy pilfering cinders from Archie, who was sitting on his nest very perturbed (which was rather amusing, as at times he was the worst thief of all). Hector was walking up and down the dump pilfering cinders from Anne's nest, which was at the time vacant. All were busy nest-building and squabbling.

At 1 a.m. there were nine birds on the ash-dump, including one pair. On the

dirt-dump near by there were two pairs of birds. One pair was seen to walk over to the ash-dump, where the male attempted intercourse. The female left him, however, and joined a small fishing party. The male ascended Anne's nest, apparently looking for anything removable, and then returned home to the dirt-dump. At 2 a.m. Anne was home again. The occupants had decreased to six, as some of the birds had gone fishing. Archie and Hector were present all night and at 7 a.m. the former was alternately carrying cinders to his nest and assisting his mate, who had just returned spick and span from fishing, to fight neighbours. By 8 a.m. peace reigned once more.

23. 11. 21. Sarah and mate (Pair XVII) were busy stealing stones from the nest of Pair XVIII while they were away.

25. 11. 21. At 2 a.m., while the bulk of the occupants of the rookeries were away fishing, a bird was seen at the north end of the Island which, from the dirty condition of its breast, was obviously an inhabitant of the ash-dump. The rookery was almost bare. The bird was looking into nests, evidently searching for stones. At last in some poor unfortunate's nest he found a miserable collection of three or four small pebbles. The thief had a look at the stones, then glanced around him suspiciously, and finally decided that he had better try an experiment with the two or three birds which were a little way away, to see if the nest belonged to one of them. He therefore walked up and down past them two or three times. As they showed no signs of antagonism, he once more approached the nest. This he examined very carefully, as he knew that he had a long way to go and could only carry one stone away. He therefore sampled the stones until he lit on the best of the collection. This he took in his beak and hurried with it towards the meteorological screen, acting in a very guilty manner, looking to the right and left to see if his theft had been discovered. At the screen he placed the stone first in one nest and then in another, as if trying the final effect before taking it to his mate. He then picked it up, but, floundering into a guy-wire, lost it. After looking for it for a while he gave up the search and leisurely, now that he had no evidence of guilt on his person, made for the ash-dump, where he joined his mate and they bowed and crowed vigorously. To the observer's surprise he turned out to be Archie of Pair XI, a practised and confirmed thief, who, not content with possessing the finest nest on the rookery, must needs go out searching for stones from those who possess only two or three against his hundreds. He is a fearful stone-hoarder, and almost every time we see him he is either carrying a cinder to his mate or else having a heated argument with a stranger about the possession of one of the latter's collection.

By way of experiment, we placed at 6 a.m. a heap of cinders on a nesting-site at the north end of the rookery. At 7 a.m. these cinders had all been pilfered

by neighbours and lay in five nests within a radius of eight feet. At 8 a.m. the two birds who normally occupied the nest were present and we returned a few cinders to them, to their great pleasure.

27. 11. 21. On the ash-dump two birds were having intercourse. While they were doing so, a neighbour was pilfering the stones from their nest as fast as he could carry them away. He stole half-a-dozen before the owner of the nest went for him. A short fight ensued.

13. 12. 21. The following curious incident was seen by both of us:—Near the screen there were two nests close together, one containing many stones and the other only a few. Both occupants of the larger nest were present, but only the female of the smaller. By some subtle ruse the male belonging to the larger nest had apparently deluded the female of the smaller one into thinking that he was bringing her stones, whereas he was in reality stealing them as fast as he could. He made no secret about it, and when he saw a stone which suited him he would put his beak right under the female, who was half standing, and take a choice stone from near the egg. This female took absolutely no notice, so that he stole every stone he desired. Sometimes, when another bird tried to help himself, he would make some show of going for the robber and then, on the strength of it, himself relieve the female of another stone. Once he went so far as to push the bird with his beak to get at a special stone. Perhaps the most singular feature was the fact that if another bird came along with any robbing intentions the female was up in arms, yet in the case of the arch-thief she took no notice. He even took stones from close to the egg. He walked to and fro between her nest and his own to his heart's content.

The only explanation we could offer for the female tolerating his presence was that she thought that perhaps he was her mate and was bringing her stones instead of stealing them. When first seen, the female had quite a respectable little nest, but while we watched it gradually began to dwindle in size until only a few stones were left. An hour later the thieving was still going on. This time, however, it was noticed that when the thief put his head under the bird (standing in front of her) she raised a slight objection by half-heartedly pecking once or twice, but eventually left him to his evil work. This makes the explanation rather more obscure.

14. 12. 21. A bird which had been stone-collecting on the shore landed on the ice-foot with one in its beak, but dropped it. A moment after, one of the ash-dump inhabitants, who was standing near, picked it up and cleared off with it.

See also under " Nest-making " (pp. 195, 196).

See also under " Family Histories " (p. 270), Pair No. XVII.

Recognition.

The question of how easily the penguins could recognize one another away from the proximity of their nesting-sites requires more observation. I am inclined to think, from what we saw, that once away from the nesting-site they do not worry very much about one another, and even if they are able to recognise one another easily do not trouble to do so.

We did, however, notice on one occasion that two birds, who were apparently mates, arrived at the same time on the West Rocks from fishing. They met and bowed. They went through the usual series of moves, changing position and bowing each time (four bows were seen). When left they were among the boulders near the water. The observation would lead to the conclusion that birds are able to recognize each other, even when away from their nesting-sites.

See also " Family Histories " (p. 255), Pair No. VII.

Errors of Identity.

27. 9. 21. While at the meteorological screen I saw rather an amusing incident. One bird was standing guard over a nest when it was joined by another, who seemed to be its mate. They bowed and cooed twice, then suddenly the proprietor of the nest realized that it was not its mate and forthwith went for the intruder, who sheepishly made off and running into another nest was chased away by the occupant. Eventually it went away to a quiet spot and looked most melancholy until the real mate turned up and then there was much bowing and cooing.

2. 10. 21. One penguin started bowing to another who was not its mate. The intruder was chased away ; it had evidently mistaken the nest.

27. 10. 21. When a bird crowed I saw another bird close by hurry to it and at first the latter was mistaken by the former for its mate. When the mistake was realized the intruder was chased away. Shortly after the real mate arrived.

28. 10. 21. I saw two examples of mistaken identity connected with crowing. In one case a bird crowed and the wrong mate came up. When the mistake was found it was chased away. The real mate hurried to join the crower from about twenty-five feet away. In the second case two birds which were standing near each other both crowed simultaneously. One started to bow to the other, then discovering the mistake chased it away.

8. 11. 21. We saw a bird come up to another, start to bow, and suddenly realizing a mistake peck at the other and chase it away.

10. 12. 21. A was on nest, B arrived wet from fishing. They crowed and then bowed to each other about a dozen times. When approached, A became afraid and left the nest. B stood over the egg and, while it was busily looking at it

A returned. B, not noticing who it was, started to swear and was about to peck out when, on looking up, it recognized its mate, after which the officious one was at once pacified.

Prior to the nesting the following curious behaviour was noticed. Penguin A was on a nest, B came up and bowed. The bow was returned. C came up and bowed to A. A and C moved off and left B. B revisited A and they bowed. C then wandered off.

See also " Period of Massed Fishing Expeditions " (p. 234), 1. 11. 21.

Play and Amusement.

12. 10. 21. I watched a penguin toboggan on its breast halfway down the slope from the screen. On being disturbed, it walked a little way back, then tobogganed to the bottom, arriving quite close to me. When it arrived at the bottom it had a very amusing look of pleasure. I saw another toboggan-track evidently belonging to it. Its method was to start off by paddling along with its feet, and then slide the rest with flippers close at its sides.

24. 10. 21. We found a long toboggan-track belonging to a penguin which extended from near the screen into the Bay. This was thirty-six feet long, so that the bird had a pleasant run. Down one side of the concave trough produced by the body could be seen a small track caused by the foot trailing along, and down the other two small furrows made by the toes.

Cases of immature birds obviously playing about are recorded under " Immature Birds " (p. 218 *et seq.*).

Relationship with Ringed Penguins.

In two parts of the rookeries the Gentoo and Ringed had their nests next to each other and mixed up on the fringes.

It was noticeable here and elsewhere where we saw Gentoos and Ringed in contact with each other how aloof from one another they kept. I cannot help thinking that the Ringed had a sort of superiority over the Gentoos. Although they were in lesser numbers, they were respected by them and consequently left alone. Very rarely was there any friction seen between the two.

Whilst I see no reason to suppose that the Gentoos would not take quite complacently to the eggs of the Ringed it would be an interesting experiment to ascertain if a Gentoo would rear a Ringed chick.

18. 9. 21. During the reoccupation of the rookeries it was noticeable that where the Ringed Penguins, which had not yet returned from migration, normally nest, clear patches were left by the Gentoos. These patches seemed to be carefully reserved for them. One site is at Coal Point, the other on South Island. They

are, however, on the highest parts of the islands where only a few Gentoos have their nests.

15. 11. 21. We saw on South Island, where there is a Ringed Penguin rookery, a little pecking or beak-fight between a Gentoo and Ringed. This is the first time we have seen any animosity between the two species.

18. 11. 21. A Ringed Penguin was seen to steal two small cinders from Archie's nest on the ash-dump, but was soon warned off.

Immature Birds. (Pl. IV, figs, 1, 2.)

The most puzzling of our observations was the occurrence of birds which did not conform either in their markings or habits with the normal Gentoo. It did not dawn on us for quite a time that they were immature birds, or in other words last season's youngsters. Some of these had evidently not adhered to the normal procedure of keeping away from the rookeries where they were born for the season after their birth, and not returning to them until the following season to breed. These abnormal birds should, therefore, have really been absent, but had returned to lead an unmated existence, which accounts for their free-and-easy habits and unpopularity with the breeding birds.

The whole question of the life of the immature bird from the time of its quitting the rookery where it was born until it reaches the adult stage, and starts breeding on its own account, needs careful investigation and study.

It was on 23. 10. 21 that we noticed a bird which was carefully looking around and inspecting objects. On close observation we noticed that it differed from the normal penguin in the following points :—

(1) Round the eyes there was only an indistinct white ring. The eyes consequently had a peculiar " far-away " expression.

(2) The white marking from eye to eye was smaller than normal size and at the top of the head it lacked distinctness.

(3) Under the throat was a whitish patch from the beak downwards.

The history of the bird is a little amusing. It began in the morning when at 11 a.m. it walked up to the tent and pecked several times at the canvas as if trying to find out what it was. Having satisfied its curiosity, it then walked round to the front of the tent and several times caught the guy-rope gently in its beak. It next inspected the hollow in the snow in front of the tent, and then walked straight towards me, stopping a few feet away. After a look at me it walked past quite close to me. Just before noon the bird came and had a look at Lester, who was digging a hole. It then walked up to the meteorological screen. After a few pecks at the wood and a look around, it waddled away. At 4 p.m. Lester noticed it playing about with a milk-tin in the Bay. After stretching itself it returned to the tin, pecked at it several times, rolled it along, and finally

turned it on end. Its next perfomance was to sit on a nest and be chased away by the rightful occupant as if it were a leper. It now returned to the milk-tin. Tiring of this, it came up from the Bay to the meat-dump where it inspected and and pecked at a bamboo post. Its next journey was to the dog-kennels where becoming scared it returned to the Bay and to the milk-can, which it rolled about. This palled so it came back to the meat-dump and climbed on to the sledge-boat and *en route* caught the handle of the barrow between its beak. Then it walked along to the bow of the boat and had a peck at the canvas. Another inspection of the dog-kennels followed and again being frightened it retreated. On being marked it went back to the milk-tin. While here another bird standing about

TABLE IV.—*Markings of immature Birds.*

Grade.	Markings.	Number observed.
A	Normal neck-markings and indistinct or bad eye-rings.	7
B	Indistinct whitish necks and normal eye-rings.	1
C	,, ,, indistinct or poor eye-rings.	29
D	,, ,, bad eye-rings.	1
E	,, ,, no eye-rings.	3
F	Distinct whitish necks and normal eye-rings.	2
G	,, ,, indistinct, poor, or bad eye-rings.	11
H	,, ,, no eye-rings.	1
I	Very distinct whitish necks and normal eye-rings.	1
J	,, ,, indistinct or poor eye-rings.	3
K	Exceptionally whitish necks and indistinct or poor eye-rings.	4
L	,, ,, very bad or no eye-rings.	2
M	Neck-markings not observed, but bad eye-rings.	4
	Total	69

six feet away suddenly went for it and drove it away. It seemed particularly unpopular. Later it came to within three feet of Lester to inspect him.

We had noticed birds curious over a single object, but never before such a wholesale curiosity.

There can be no doubt that it was an immature bird we had been watching. A certain amount of parental feeling and nest-making instinct was present, since while it was in the Bay we noticed it several times picking up cinders and bits of rubbish. It even carried a piece of sennegrass along a few feet. While in the Bay we heard it crow once.

Between 23. 10. 21 and 29. 11. 21 we kept careful notes of the markings of the immature birds we saw. In all sixty-nine were examined, in addition to the one

just mentioned. It is, of course, impossible to guarantee that some may not have been seen twice. On one day, however, thirteen birds were examined at the same time of the day, and I was careful that there was no duplication. Similarly on other days, five, six, seven, and eight were examined at the same time.

The variations from the normal markings of the adult birds may be classified as in Table IV. The whitish neck or throat markings are divided into indistinct whitish, distinct whitish, and very distinct whitish. In all three white spots are mingled with dark feathers. In the exceptionally whitish necks there is an almost pure white area.

In normal birds there is a white ring round the eye, in immature birds there is usually an indistinct ring.

Of the sixty-nine there were thirty-two which had otherwise normal or very nearly normal head-band markings. They were divided among the above grades as follow :—

Grade.	Number observed.
A	3
B	1
C	12
F	2
G	8
I	1
J	1
K	4

Thirty-three had poor head-band markings, in some cases so badly developed that they were divided at the top of the head by a strip of dark feathers. They were distributed among the grades as follow :—

Grade.	Number observed.
A	4
C	17
D	1
E	3
G	2
H	1
J	1
L	2
M	2

We were unable to examine the head-markings of the remaining four. There were one each of grades G and J and two of Grade M.

A few entries from the log-books will serve to show some of the queer habits of the immature birds.

30. 10. 21. On the east side of the Bay we found about a dozen penguins close together having either whitish necks, indistinct eye-rings, or incomplete white head-bands. We took particulars of eleven. They appear to live quite an independent existence and seem as a rule to keep to the Bay. We saw none mated, and although we have searched the rookery we have not found a pair together occupying a nest. They are much less shy than the adult birds and not as pugilistic.

We saw another later on. It was picking up bits of cinders in the Bay and came up to the meat-dump and caught hold of a bamboo pole in its beak. It then inspected the barrow and climbed on to the sledge-boat. Finally, it was chased away by a bird owing to its standing too near the nest.

21. 11. 21. One of the immature birds was noticed to be continually annoying " Dirty " on the ash-dump. It persisted for a long time in walking round the nest and looking at it and the occupant. " Dirty " sallied forth many times and pecked at the intruder, who simply moved a few inches along its small circle of inspection. It eventually settled down on a borrowed nest just to the west. Later on it was seen to bow to another bird which returned the compliment. When the rightful occupant of the nest returned and found the other bird on the nest it chased it away.

22. 11. 21. During the early morning fishing expedition about eighty were left after the main mass had gone. Among them were six immature birds.

26. 11. 21. One young bird on outer hut roof and one on roof of coal-hole.

Later we noticed about twenty-five together on the outskirts of the rookery. No two were mated.

27. 11. 21. One of these birds got very annoyed with a guy-wire which would not permit it to walk through it. When it did pass it fell amongst the inhabitants of the ash-dump who soon chased it away with pecks from all sides.

5. 12. 21. Practically every night immature birds haunt the premises carrying out detailed examinations. Whenever we go out one of these birds is surprised in some corner or another of the hut vicinity.

In the afternoon one of them came and looked into the hut door.

20. 12. 21. Two of these birds were seen to bow to each other outside the rookery, but, as they left each other to go different ways, the bowing, which occurred three times, was probably merely a friendly affair and no connection with mating. One had only poor eye-rings, but the other had practically no eye-rings and a divided head-band.

22. 12. 21. A bird which had its nest in the Bay has deserted it. It was made by us of sennegrass and for several days the bird occupied the nest. To-day we noticed on two occasions single immature birds on the nest, but neither sat on the egg which was lying a little to one side of it.

Later three of these birds were watching the nest, while a fourth occupied it.

Another case was observed of immature birds bowing to each other—just for friendship's sake !

Yearly Life-cycle of the Gentoo Penguin.

The yearly life of the Gentoo may conveniently be divided into various periods characterized by the changes in its habits. These are, in the order in which we observed them :—

I. Period of Rearing of Young.
II. ,, Moulting.
III. ,, partial Migration.
IV. ,, Visiting Parties.
V. ,, partial Reoccupation of Rookeries.
VI. ,, complete Occupation of Rookeries.
VII. Preliminaries to Egg-laying.
VIII. Period of Massed Fishing Expeditions.
IX. ,, Egg-laying.
X. ,, Hatching.

As has already been mentioned in the Introductory Notes, there are gaps in our observations during the earlier part of the time when we were at Water-Boat Point, particularly during the two stages of down of the chick. During the remainder of the time, however, we were able to make the very detailed observations which follow.

I. *Period of Rearing of Young.*

We found on our arrival at Water-Boat Point (14. 1. 21) that the eggs were already hatched and the young very small.

3. 2. 21. The young are now for the most part about three-quarters the size of the adults. They have not yet got feathers. The back is of slate-grey down, and the front white down. With the exception of the white marking from eye to eye, the markings of the old and young are the same, the down of the young being replaced by the feathers of the adult. Across the head of the young can be seen a slight indentation in the down from eye to eye where, in the adult, the white marking is situated.

When the young are fairly small they nestle into the pouch of the old bird head-first and only expose their rear portions.

10. 2. 21. The young are now beginning to take on the white patch from eye to eye. The whiteness is at first only visible round the eyes.

14. 2. 21. The young are now collecting together in bands. Many are developing tail-feathers.

15. 2. 21. The young can now be seen to be assuming feathers in place of their down. The first places to change are the flippers and the back near the tail.

Most of the penguins are keeping near to the beach, and round our hut the nests are deserted. On fine days they leave their nests during the daytime, returning at night. The young remain near the beach and are fed by the old birds.

19. 2. 21. Some of the young have lost most of their down. None go right into the water up to their middles, but many paddle about along the edge.

The old birds frequently run about around the rookery, the youngsters following close on their heels. Sometimes as many as three will rush about bundled together. The end of the chase is usually feeding-time.

24. 2. 21. Some of the young are now fully fledged. They are still fed by the old birds.

26. 2. 21. To-day I saw a young Gentoo, not quite fully fledged, endeavouring to swim in the shallow water, and cleaning itself.

The young are still fed by the old birds, though many are to be seen paddling about in the water evidently catching Euphausiæ for themselves. There are millions of small Euphausiæ in the shallow water—probably young ones.

When the old birds disgorge the contents of their stomachs for the benefit of their offspring large masses of Euphausiæ pass from one to the other. One mass I noticed to be composed of very large Euphausiæ, no doubt obtained from deeper water.

27. 2. 21. The last piece of down to come off the young seems to be a small patch at the back of the neck.

3. 3. 21. Many of the young birds are learning to swim on their own initiative along the shore.

8. 3. 21. The rookeries are nearly deserted and most of the young birds are down on the beach or swimming around in the shallow water.

15. 3. 21. We often see young birds which are obviously half starving, and I have seen one or two birds which have died of starvation. Perhaps the parents may be dead or they may neglect the young if of a late brood.

20. 3. 21. The young ones are becoming very precocious and frequently receive chastisement from their elders.

14. 4. 21. The young birds have migrated.

II. *Period of Moulting.*

At the beginning of February 1921 we noticed that the old birds were beginning to moult. They looked very dismal with their heads puffed up, their whole bodies drooping and forlorn.

21. 2. 21. I saw two old parent birds in a moulting state, sitting beside their offspring; the young bird still retained about half its down, but I did not see the old ones feeding it.

26. 2. 21. A large number of both Gentoo and Ringed Penguins climb up on to the glacier where they stand gloomily and moult.

1. 3. 21. Saw an old Gentoo in an advanced state of moult swimming in shallow water by the shore. I also saw two yesterday doing the same thing.

3. 3. 21. Several hundreds of Ringed and Gentoo on the glacier slope. One patch is about 150 yards up the slope. Early in the morning they had all congregated together, but later they separated and stragglers gradually joined the unhappy throng. They prefer to moult up on the glacier slope rather than anywhere else. Peace!

7. 3. 21. During the period of moulting the excretion of the old bird changes from a brick-red colour to a yellow or greenish-yellow.

8. 3. 21. The chief occupants of the rookeries are the old moulting birds. The young are mostly down on the beach. There are still several hundreds of moulting birds on the glacier slope.

10. 3. 21. Not so many moulting birds on the glacier slope.

11. 3. 21. While the old birds are moulting the male will still sometimes bring stones to his mate for their nest.

In the morning there were only about two hundred birds on the glacier slope, but many more went up towards evening when the tide came in.

13. 3. 21. Larger number of penguins on glacier in evening than in morning. Snow fell and the penguins opened their beaks to catch the flakes.

20. 3. 21. For the last few days there have been only fifteen to twenty penguins on the glacier. At low tide and during the day the rookery is nearly deserted except for old birds in the state of moulting, but at night time (about 6 p.m.) the rookery again becomes populated. Many of the old birds have, I think, finished moulting. Many are building nests for their spouses, and much more fighting is taking place.

21. 3. 21. About two hundred penguins on the glacier this morning.

23. 3. 21. Four or five penguins on glacier.

25. 3. 21. There are several inches of snow all over the rookery, and the moulting birds seem to like this.

Numbers of the old birds have now finished or nearly finished moulting, but have not yet grown their new tails. All the birds seem to enjoy the snow and the rookery is thickly populated.

27. 3. 21. A strong S.E. wind kept the greater part of the inhabitants away from the rookery most of the day, and the occupants were almost exclusively old birds who were either moulting or had just finished, sheltering on the lee sides of mounds and rocks. Later when the wind died down and the sun rose, the rookery was again completely occupied.

28. 3. 21. In the morning there were only a few birds about, but in the evening the rookery was full.

Moulting over and family responsibilities ended, much more time is devoted to fighting, and we have also noticed two cases of attempted sexual intercourse.

1. 4. 21. I noticed a large number of Gentoos which had gathered close together on the beach.

2. 4. 21. A repetition of the previous day's gathering. I think this collecting together must have some direct connection with migration.

14. 4. 21. The moulting of the old birds has for the greater part finished.

28. 4. 21. I cannot see any Gentoos moulting. The excreta of the birds have become more solid and tend to be composed of small hard lumps of brown colour, instead of nearly fluid red, green, or green-yellow.

Effects of Ice Conditions.

Although throughout the winter our temperature was, with few exceptions, very much below freezing-point, yet the channel to the north of our base was, except for drift- and brash-ice which occasionally filled the area, in a continual state of open water, and everywhere to the north, as far as we could see, which was to the main De Gerlache Strait, appeared to be the same. It was only to the south that a permanent freezing over was evident. Unfortunately we were not in a good position to study ice conditions in the main De Gerlache Strait, so our knowledge was somewhat local.

These ice conditions naturally have considerable bearing on the life habits of the penguins. It affected in particular the Gentoos, especially their migration, which was not absolutely complete.

III. *Period of partial Migration.*

14. 4. 21. The rookeries (*i. e.*, the Island, South Island, and Coal Point) have still a large number of birds on them.

28. 4. 21. During the day the rookeries are almost deserted, but by evening there are a large number of birds on them.

4. 5. 21. Only about seventy-five birds on the rookeries this evening. Day by day the birds become fewer.

11. 5. 21. Yesterday and to-day the number of penguins has increased to a thousand or more.

19. 5. 21. No penguins on rookeries to-day.

20. 5. 21. About one hundred birds on the rookeries this evening.

Sexual intercourse does not occur during this period.

IV. *Period of Visiting Parties.*

31. 5. 21. To-day we saw the following occurrence for the first time: in the Channel a large number of Gentoos were swimming about. About a hundred birds were on the rookery at the time, and a few of these swam off to join the main body which began to make for the shore. They made their way through the water towards the rookery, alternately swimming along quietly then making a great deal of noise. Then quiet again, then more noise, their weird "caws" being answered by one or two birds on the shore. Arriving, they leapt on to the ice-foot, then made their way to the rookery, so that in a few minutes there must have been quite 5,000 birds there. In some cases they seemed to be mated, but the majority appeared to keep separate.

1. 6. 21. This morning all these penguins had disappeared and only an odd one or two remained. They have not returned to-night. Could this incident be attributed to a migration from another rookery, and was this a stopping-place on their way to somewhere else ?

8. 6. 21. To-day about two to three hundred birds have arrived on the rookery.

9. 6. 21. All but three had gone in the morning, but in the afternoon there arrived about two to three hundred.

10. 6. 21. This band has gone and in the afternoon there were only thirty birds on the rookery.

16. 6. 21. No penguins on rookery to-day or for last few days.

18. 6. 21.
19. 6. 21. } Penguin voices heard near the Island.

Between now and September 16th, 1921, was a period during which odd birds were seen and visiting parties came to Water-Boat Point. Table V. gives an idea of their numbers.

TABLE V.—*Period of Visiting Parties. (The numbers of fishing parties are approximate.)*

Date.	Number seen on rookeries.	Remarks.	Date.	Number seen on rookeries.	Remarks.
20. 6. 21.	1		19. 7. 21.	None.	One band seen.
21. 6. 21.	2	Calls heard in Channel.	20. 7. 21.	2	Band of 50 swimming N., another of 100 swimming S.
22. 6. 21.	8				
23. 6. 21.	17	Calls heard in Channel.			
24. 6. 21.	24	Seemed to be mated. Calls heard in Channel.	21. 7. 21.	None.	About 100 seen swimming N.
25. 6. 21.	43		22. 7. 21.	,,	Calls heard.
26. 6. 21.	55	19 at 2 p.m., 55 at 4 p.m.	23. 7. 21.	,,	Party of 20 swimming N.
27. 6. 21.	1	Above party left by 9 a.m.	27. 7. 21.	,,	Calls heard.
29. 6. 21.	44		28. 7. 21.	,,	Large party swimming N.
30. 6. 21.	None.	Above party left at 9 a.m.	30. 7. 21.	2	Calls to N.
1. 7. 21.	,,		31. 7. 21	None.	Large party swimming N.
2. 7. 21.	2				
3. 7. 21.	None.		2. 8. 21.	2	Bands of 20, 50, and 100 seen fishing round about.
4. 7. 21.	12				
5 & 7. 7. 21.	..	Calls heard in Channel.			
13. 7. 21.	1	Fishing party of 50 and 2 smaller parties in Channel making S.W.	3. 8. 21.	None.	Band of 100 fishing to N.
			4. 8. 21.	,,	Calls heard.
14. 7. 21.	1	Small party in Channel.	5. 8. 21.	2	
15. 7. 21.	None.	Odd birds fishing in Channel.	7. 8. 21.	None.	Band of 50 fishing in Channel.
16. 7. 21.	None.	Single call heard.	8. 8. 21.	1	
17. 7. 21.	1				
18. 7. 21.	9	Band swam N. up Channel.			

There was no actual or attempted intercourse during the period of the visiting parties.

V. *Period of partial Reoccupation of Rookeries.*

Between 9. 8. 21 and 12. 9. 21 the reoccupation of the rookeries took place. The gradual repopulation can be seen from Table VI. The numbers are approximate.

As in the case of Periods III. and IV., no attempts at sexual intercourse were seen during this period.

TABLE VI.

Date.	Number seen on rookeries.		Remarks.
	Island.	Coal Point.	
9. 8. 21.	2	200	Greater part departed by 2 p.m.
10. 8. 21.	Odd birds.	100	
11. 8. 21	..	400	Arrived in parties of 30–50.
12. 8. 21.	..	200	See note at foot of Table.
13. 8. 21.	1	150	
14. 8. 21.	..	200	Four separate bands of about 100 in each fishing in the Channel. Heard a bird crow for first time this season.
15. 8. 21.	..	100	Two bands, one of 100, the other of 50, near edge of ice-sheet towards Lemaire Island.
16. 8. 21.	60	150	Some heard crowing.
17. 8. 21.	125	200	
18. 8. 21.	7	150	
19. 8. 21.	3	150	Band of 50 fishing near edge of ice-sheet.
20. 8. 21.	..	200	
21. 8. 21. 22. 8. 21.	..	300–400	Parties arriving all day.
23. 8. 21.	45	2000–3000	50 at 8 a.m.; remainder arrived by 5 p.m.
24. 8. 21.	..	2000	Large bands in Channel in early morning.
25. 8. 21.	..	4000–5000	
26. 8. 21.	..	500	By 4 p.m.
27. 8. 21.	..	300	By 4 p.m.
28. 8. 21.	1	500	Two large bands seen round shore.
29. 8. 21.	..	300–400	
30. 8. 21.	..	500	Started arriving in numbers by 11 a.m.
31. 8. 21.	..	1000	By 2 p.m.
1. 9. 21.	..	1000	By noon.
2. 9. 21.	100	1000	
3. 9. 21.	2	1000	By 4 p.m.
4. 9. 21.	2	1000	By 4 p.m.
5. 9. 21.	1	500	By 4 p.m.
6. 9. 21.	..	200–300	By 6 p.m.
7. 9. 21.	..	300–400	By 2 p.m.
8. 9. 21.	..	500	By 6 p.m.
9. 9. 21.	..	300	
10. 9. 21.	..	500	3 bands in Channel at 2 p.m.
11. 9. 21.	..	30	
12. 9. 21.	..	50	

Note.—12. 8. 21. By 4 p.m. about two hundred birds had arrived at Coal Point. They jumped up on to the new ice of the Bay and so on to the land. We judged that most of the leaps were four to five feet high. The majority landed gracefully on two feet, one or two fell over. Some rested before walking on, lying down where they had landed. The birds are much quieter than during the breeding season, only occasionally a call is heard but never a full " crow."

VI. *Complete Occupation of Rookeries.*

13. 9. 21. By 4 p.m. there were about a thousand birds on the Island and about two thousand at Coal Point. Many on the Island are grouped round the meteorological screen. Noticed that most were in pairs, and, from the fact that they are frequently bowing to one another and making love signs, it seems that they are still mated. Many are in pairs with one bird lying on the ground (probably the female) and the second standing by its side. Much crowing is going on and a small fight took place.

14. 9. 21. Bad weather. At 8 a.m. there were only a score on the north end of the Island and the same number at Coal Point. By 4 p.m. about three hundred on Island and South Island and three to four hundred at Coal Point.

15. 9. 21. No birds at 8 a.m. By 4 p.m. three to four hundred on Island, ninety on South Island, and two thousand or so at Coal Point.

16. 9. 21. Strong wind and snow from S.W. At 8 a.m. no signs of birds on rookeries or in Channel. At 6 p.m. about sixty at Coal Point, none on Island or South Island.

17. 9. 21. No birds visible at 8 a.m., but large band swimming off north shore. By 4 p.m. about one thousand five hundred on Island and three thousand at Coal Point. Several small fights took place. Most of the birds are in pairs, and we continually saw them bow and heard them coo to each other. Many have taken up nesting positions where the rocks are exposed, and one bird of the two is often lying on the nest-site carrying on a pecking competition with a neighbour on an adjoining nest. Much crowing goes on. One bird selected a site on the snow, then repeatedly bowed to the spot, cooing as if to say " This is *my* nest."

I should think that the birds return to the nesting-sites already mated—possibly with the same mates as last season.

18. 9. 21. At 8 a.m. there were three to four hundred birds at Coal Point and about two hundred on the Island. At 10 a.m. many birds were arriving on the ice in the Bay. This continued through the day. By 6 p.m. there were about one thousand five hundred to two thousand on Island and four thousand at Coal Point.

The birds have now taken up the positions which they had occupied in the summer. It is noticeable that birds seem to come together in a bunch to occupy a site. For instance, until recently they never came near the meteorological screen, but now a party occupies the position every day. The same thing has happened at South Island, which was never visited at all this season until quite recently. To-day a party took up occupation round the bow of the boat and near the rubbish-heap ; this spot was never occupied before this season.

Although most of the birds occupy positions on land, some lie on the glacier

or on the ice near the edge of the Bay and in the small channel between the hut and South Island. On these sites they will have no chance of raising families, because when the thaw sets in there will be water beneath them.

Two birds occupy a position on the top of a very large boulder (Pl. V. fig. 1). During last breeding season I remember two birds on this unsafe place, but as far as I recollect they lost their eggs, which rolled off. Perhaps these are the same two birds.

So far we have not seen any birds carrying about stones for nests.

The birds seem to have a remarkable sense of location. They will visit their nesting-site, a patch of flat ground, perhaps, closely covered with nests, practically touching, and so completely covered with snow that no depressions or marks can be seen. There, over some quite indistinguishable patch of snow, they will bow and coo, as though certain that their nest is immediately below. If it really is, they must possess some extraordinary power of identification.

19. 9. 21. At 10 a.m. there were about three hundred at Coal Point, about sixty on the Island, and none on South Island. Large bands were in the Channel. From noon onwards birds returned to the rookery. At 2 p.m. two bands of about three hundred arrived from the south. More penguins to-day than ever before during this season. At 5 p.m. there were two thousand or so on the Island and South Island, with about four thousand at Coal Point.

In the afternoon a pair were seen to be going through the preliminaries of sexual intercourse, but they did not finish. This is the first attempt seen this season.

When we arrived in January we noticed that the middle of the Island and the part where we pitched the tent were bare of nests. For some unaccountable reason these spaces are left clear. The birds do not even walk over them, for we never saw traces in the snow. There is no question of inaccessibility, so it is difficult to guess the reason. Brown Skuas used to rest on these bare patches.

Birds are now doing their fishing in the early hours of the morning, for each morning there are only a few left behind. It is not until later in the day that the inhabitants return.

20. 9. 21. By 4 p.m. about the same number of birds as yesterday. Brash-ice made access to the rookeries awkward.

21. 9. 21. Snowing hard all day. By 4 p.m. about same number as previous two days on Coal Point, but fewer on Island and South Island. The weather has evidently kept them away.

VII. *Preliminaries to Egg-laying.*

22. 9. 21. There were only twenty birds on the Island and none at Coal Point at 8 a.m., but numbers increased by 2 p.m. to about two thousand on the Island and five thousand at Coal Point.

A complete coition was observed. I also noticed that in many cases either the male or female had a desire for intercourse, but it was not mutual. Two or three times I saw a male try to coax a female to lie down by exciting her with his beak.

There is more fighting than usual.

23. 9. 21. The rookeries were vacant at 8 a.m. At noon the birds began to return in their numbers. At 2 p.m. a band of about one thousand five hundred arrived on the edge of the ice in the Bay. Some went without hesitation to Coal Point, others crossed the Bay to the Island. A minute or two afterwards another thousand arrived and the majority went to the Island. One or two birds seemed undecided which way to go, so they joined the crowd. The others either turned to the right or left and made for their homes without hesitation.

24. 9. 21.
25. 9. 21. } More or less a repetition of yesterday.

26. 9. 21. A gusty breeze kept the birds away, so that there were only about five hundred on the Island, none on South Island, and about five hundred at Coal Point.

27. 9. 21. Birds began to return about noon from fishing, and by 4 p.m. there were about two thousand on the Island and South Island and about five thousand at Coal Point.

One band of about fifty were evidently playing "follow the leader," because after landing on the ice they made for Coal Point, until, suddenly realizing they were going to the wrong place, they turned about and hustled across to the Island.

Some of the pairs seemed to have no fixed abode, for I watched them being chased away by the lawful occupants of the nests when they arrived. They established themselves elsewhere, so were probably birds newly mated this season.

28. 9. 21. Small numbers in morning, but by the end of the day penguins in large numbers as usual.

29. 9. 21. Usual number of birds on shore by 4 p.m.

30. 9. 21. Large quantity of brash-ice coming up from the south caused fishing parties to return earlier.

1. 10. 21.
2. 10. 21. } Birds in usual numbers in evening. They now return from fishing in numbers from 10 a.m. onwards.

3. 10. 21. Band of about a thousand arrived at noon. Usual population in the evening. Fights taking place in all parts of the rookeries.

4. 10. 21. As usual just a few on the rookeries at 8 a.m. At about 2 p.m. birds started returning and by 6 p.m. were in their thousands.

5. 10. 21. By 11 a.m. birds were returning in large numbers from fishing. By experiment we have found that pairs do not necessarily fish together. (See history of Pair No. I.)

The snow on the rookeries is becoming covered with the reddish-brown excreta of the penguins.

6. 10. 21. By 10 a.m. birds were arriving in large numbers.

The rookeries must now have nearly their full complements of Gentoos.

11. 10. 21. The ice in the Bay being rather weak, the penguins had some difficulty in getting ashore. In order to keep afloat until solid ice was reached, they used their flippers with incredible speed, making quite a noise.

13. 10. 21. Rather more birds remained on the rookeries first thing in the morning and they began to arrive later than usual on account of bad weather. It was not until about 2 p.m. that the masses began to arrive.

14. 10. 21. Owing to the large amount of close heavy brash-ice around, there were not so many penguins as usual on the rookery. All but one of our marked birds were absent.

15. 10. 21. Rather more birds than usual on rookery at 8 a.m. They had probably not gone out fishing. Not so many birds on rookery at end of day. Much brash-ice around.

16. 10. 21. There were only a dozen or so birds on the rookery at 8 a.m. They began to return in numbers at 11.30 a.m. They were not able to land in the Bay, so had, as on other occasions, to find a new spot on the Island.

17. 10. 21. The first large band returned as early as 9.15 a.m.

18. 10. 21. Return of birds delayed by ice conditions. At 3 p.m. saw a large number looking for a place where they could get on to the rookery. They jumped on to a large floe, but not thinking much of the prospects jumped back into the sea again. They eventually reached shore by jumping over and between the ice. Matters were rather complicated by the arrival of a Leopard Seal.

19. 10. 21. Just a few birds on rookeries first thing in morning. At noon thousands of penguins on West Rocks coming on to Island.

20. 10. 21.
21. 10. 21. } Main arrivals from 10 a.m. onwards.

22. 10. 21. By noon half the population of the rookeries had arrived. The usual number was present by 8 p.m.

23. 10. 21. The penguins have been arriving earlier to-day. At 8 a.m. about a thousand had already arrived on the Island and South Island, and about one thousand five hundred at Coal Point.

It is strange that most of the birds had sense enough to arrive in the earlier part of the day when Life-Boat Bay was clear of ice. Those which were late found that the Bay was blocked with ice, so had to scramble over the ice off the west shore or over the ice in Glacier Bay.

24. 10. 21. By 9 a.m. about a fifth of the penguin population were on the Island and at Coal Point.

25. 10. 21. By 8.30 a.m. birds arriving in large numbers.

26. 10. 21. At 8 a.m. we found about sixty birds on the Island and about two thousand had arrived in Glacier Bay. There were two to three hundred at Coal Point. At 8.30 a.m. a procession started from Glacier Bay to the Island.

28. 10.21. About two thousand birds already at Coal Point by 8 a.m. Only a few on the Island.

TABLE VII.—*Sexual Intercourse during Preliminaries to Egg-laying.*

Date.	Number seen.		Remarks.	Date.	Number seen.		Remarks.
	Complete.	Attempted or incomplete.			Complete.	Attempted or incomplete.	
22. 9. 21.	1	..	Many desires.	15. 10. 21.	2	5	We have not been out much.
24. 9. 21.	..	2					
25. 9. 21.	..	2		16. 10. 21.	5	12	We have not been out much.
27. 9. 21.	1	..					
28. 9. 21.	1	..		17. 10. 21.	2	1	We have not been out much.
30. 9. 21.	1	1					
2. 10. 21.	3	1		18. 10. 21.	2	3	
3. 10. 21.	8	9	Becoming general.	19. 10. 21.	3	5	
				20. 10. 21.	..	2	
4. 10. 21.	1	4		21. 10. 21.	..	1	
5. 10. 21.	4	3		22. 10. 21.	3	4	
6. 10. 21.	9	3		23. 10. 21.	3	5	
7. 10. 21.	8	4		24. 10. 21.	4	5	
8. 10. 21.	11	6		25. 10. 21.	2	5	
9. 10. 21.	4	8		26. 10. 21.	6	5	
10. 10. 21.	2	8		27. 10. 21.	16	..	
11. 10. 21.	1	1		28. 10. 21.	11	9	
12. 10. 21.	2	6		29. 10. 21.	A few.	Several.	
13. 10. 21.	1	2		30. 10. 21.	5	3	
14. 10. 21.	1	8					

The cause of incomplete intercourse was usually unwillingness on the part of the female.

29. 10. 21. The birds seem generally to be returning to the rookeries earlier. To-day there were about six hundred on the Island by 9 a.m. and about one thousand five hundred at Coal Point.

30. 10. 21. At 9 a.m. there were about two thousand birds already on the Bay ice and about two thousand five hundred at Coal Point.

In this period (VII.) coition commenced. The frequency is demonstrated in Table VII.

VIII. *Period of Massed Fishing Expeditions.*

Between October 31st, 1921, and November 29th, 1921, we watched, while making some tidal observations, what is perhaps the most interesting feature in a penguin's life—the massed departure for fishing. It is probable that the time when we began the observations roughly coincided with the beginning of this concerted habit on a large scale after the re-settlement of the rookeries, and, roughly speaking, the second date, which corresponds with the first egg-laying, is its termination.

Massed fishing then changed to individual fishing excursions at irregular times.

The question of daylight, no doubt, also had some bearing on the change in habits. In a note made 4. 12. 21 I observed " When the nights were dark, the penguins departed *en masse* for fishing; now that the nights are light they go and return at any time during day or night, though mostly after about 9 or 10 p.m. They seem to do their fishing in the shallow water round the shores, whereas before they evidently had to go further afield."

Some of the more interesting of the massed fishing expeditions are given in detail in the notes which follow:—

31. 10. 21. The penguins were lying asleep, but at 1 a.m. there was a sudden awakening and most of them got to their feet. There was a general movement of birds towards the north end of the Island, where a large body had already collected near the edge of the ice-foot. Those from South Island marched across the Bay in a line. In about twenty minutes they had for the most part congregated at the north end.

At Coal Point a similar movement took place and the birds congregated on the N.W. side, those from Coal Point Bay coming over the rise in a line of column (text-fig. 2, Map 6). There was very violent crowing from some birds, who behaved as if they were leaders and were issuing orders. These were the preparations for leaving the rookery.

At midnight all had been quiet and peaceful. At 2 a.m. all the penguins had gone except one at Coal Point, about thirty on the edge of the Bay, and about fifty on the north end of the Island. Numbers decreased later, and until 7 a.m., when the first party of a hundred and nine had just arrived at Coal Point on their return from fishing, there were only just a few birds left.

1. 11. 21. At 11.50 p.m. on the day before, one penguin crow was heard. Then followed many more at short intervals. Soon after this several calls were heard, and birds proceeded from the Bay to the rookery. Observed three birds make for their mates near the meteorological screen and bow to them. Another bird was seen to come up and bow to one which was lying down. It was not its mate and so was chased away. At a nest near the screen two birds met, bowed, and after a minute or so left and remained separated for a considerable

time before losing each other in the crowd. These observations tend to show that birds may be scattered about at night and meet at the nest-site before departing for fishing on their own. Between 11.50 p.m. on 31. 10. 21 and 12.45 a.m. on 1. 11. 21 there was a general movement everywhere, but still many birds were undisturbed.

Gradually, with the exceptions of perhaps one in five hundred, all were standing and a general move took place towards the N.E. corner of the Island.

At 1 a.m. observed mass formation at Coal Point and birds diving off.

At 1.30 a.m. the penguins on the Island were packed tightly on the edge of the ice-foot, remaining in this formation for perhaps half-an-hour. They were so close that they could not raise their flippers. Suddenly, they dived in all along the line. Just before diving, complete silence prevailed, then a few crows were heard and departure took place. It took seven to eight minutes for all the birds to dive in. No noise was heard during the actual departure ; all was very orderly, no pushing or bickering. They went off in a thin stream on a due north course, swimming at first under water.

Two points of interest were observed: (1) During the muster only one or two minor squabbles and one chase were seen. (2) While the " calls " were taking place, penguins could be seen everywhere getting up, stretching themselves, and looking around.

From 3 a.m. to 7 a.m. when the first small party returned from fishing there were only a dozen or so birds on the rookeries. The first large party returned at 8 a.m.

2. 11. 21. At 11.55 p.m. on 1. 11. 21 several crows were heard at intervals. At 12.10 a.m. a few birds from the west slope were making towards the north end of the Island. At this time more birds were standing, although before most of them had been lying down. Ten minutes later I saw half-a-dozen birds from the Bay walk up to the rookery and join the mates on the Island. There was much crowing at Coal Point.

At 12.25 a.m. birds from South Island were moving across the Bay and there was a general northward movement of birds from the Bay, South Island, and the west slope of the Island (text-fig. 3). At 12.30 a.m. a compact mass was visible at Coal Point. The place of congregation was the same as yesterday (text-fig. 2, Map 6). On the Island more birds were getting up and stretching themselves. There was now a temporary cessation in the northwards movement of birds from the Bay and South Island. Over half the birds were by this time standing. Saw two come from the west slope, meet at a nest just north of the screen, bow, and then return separately to the west slope.

At 12.40 a.m. more birds were moving from the Bay, west slope, and South Island. At this time saw two more birds from the west slope come up to a nest

near the screen, one about a minute after the other, and bow. The male tried intercourse and had mounted the female's back when she got up and they returned to the slope. Saw a complete intercourse take place.

At 12.45 a.m. the birds north of the screen, in the Bay, and on South Island started to hurry to the north end of the Island.

At 12.55 a.m. there was a very dense mass at Coal Point and another on the N.W. corner of the Island with a column of birds moving towards it from the west side and another from the east side of the Island. By this time only about a hundred birds were left on South Island. A complete intercourse took place on the outskirts of the mass.

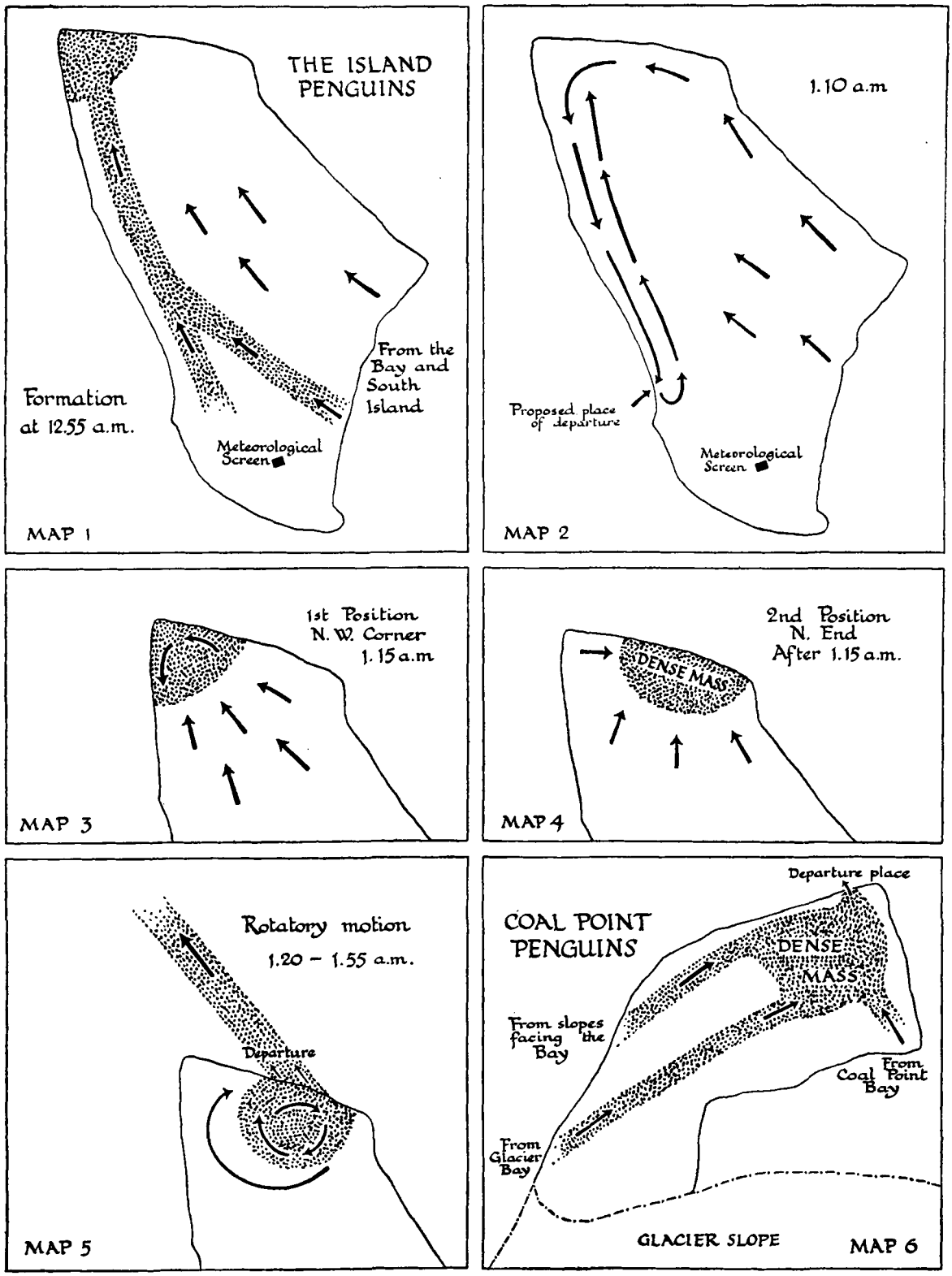
At 1.5 a.m. there was a dense mass at the N.W. corner of the Island. Crowing was going on occasionally, then there was quiet, then much cawing. Next there were three crows one after another from birds down the column. Then followed immediately a general movement south and birds began to depart from the ice-foot opposite the tide-pole (they had been unable to leave from the north end owing to the low tide and deep drop to the rocks below). After the birds had been going for about two minutes there was a sudden stop as if they had decided that this was not a good place, and some strange cawing was heard, as if a consultation were going on. Suddenly the birds wheeled back in column to the north-west point. Here more cawing took place. About this time some birds in the rear of the column had evidently discovered a good place south of the last one, and there was a general movement in column to this place. Birds first began to leave by this new route at 1.20 a.m. and in thirteen minutes all had gone except a party of about seven hundred and fifty, who, suddenly, for some unknown reason, turned back and returned to the N.W. corner, where they seemed undecided what to do. At 2 a.m. they were still there, but at 4 a.m. only nineteen were left.

At Coal Point there was a better organized affair, though the place of departure was rather small. At 1.5 a.m. (at the same time as the departure of the first bunch from the Island) birds began to leave and in twenty minutes all had gone except about seven hundred and fifty, which were still there at 2 a.m., but which had gone, for the most part, by 4 a.m.

Between the time of departure and 7 a.m. all parts of the rookeries were deserted, except for a dozen or two birds. From 7 a.m. onwards birds returned from fishing.

3. 11. 21. At 1.5 a.m. the Island party started to leave. They all left from one place. At 1.10 a.m. there was a sudden hold-up at Coal Point, because the foremost " had the wind up." At 1.25 a.m. they started off again but three minutes later there was another hold-up. At 1.20 a.m. there was a hold-up on the Island. The reason was observed—a penguin became nervous about

Text-fig. 2.



Departure of penguins from the Island and Coal Point.
Period of Massed Fishing Expeditions.

jumping down. It went near the edge of the ice-foot, looked, retreated, repeated the operation, and finally went in. During this block the previous intense silence was broken by cawing, the penguins apparently wanting to know what was wrong. After this, hold-ups continually took place. The birds obviously did not like the jump off. From 2 a.m. to 7 a.m. the rookeries had only a few birds on them. After 7 a.m. the birds began to return in parties.

4. 11. 21. From about 11.30 p.m. on 3. 11. 21 crows were heard at intervals, increasing in number until by 12.15 a.m. there were many going on. These probably came from birds calling for their mates before leaving for fishing. They often seem to meet at the nesting-site before departing. A dozen or so birds came up from the south side of the Bay to the bay slopes and either joined their mates or waited for them. A bird came to the Island near the screen and was shortly joined by its mate. At 12.45 a.m. several birds from the Bay were seen coming on to the Island. Saw a bird from the Bay join its mate just north of the screen. Three complete and one attempted intercourses were seen. Two more birds came up from the Bay and met north of the screen. Later they separated.

At 12.50 a.m. a bird came up in a great hurry from the Bay, closely followed by its mate. They met and bowed near the screen. This was repeated twice more later on.

Two or three birds near the screen were inspecting each other to see if they were mates. They appeared to have some difficulty in recognizing each other owing to the darkness. Saw a bird come up to a spot near the screen, look for its mate and go away. Later the mate came up to the same place, looked around, and went away.

At 12.55 a.m. (text-fig. 2, Map 1) a small body was already at the starting-place at Coal Point. There were two streams of birds as before.

By this time a column had formed on the west slope of the Island and was moving north. It was met by another from across the Island, north of the screen. Birds were hurrying to the north end. In a few minutes this column was broken up and birds hurried north from all over the Island.

At 1 a.m. a movement took place along the west slope from the north to a spot on the edge of the ice-foot W.N.W. from the screen. At 1.10 a.m. (text-fig. 2, Map 2), when the van of the birds had arrived at the chosen place (marked with →), they decided that it was unsuitable and wheeled round and turned back in column. Still the column from the north continued, almost rubbing shoulders with those moving north, inspected the spot, and returned. It was some time before they realized that they could make a short cut. Birds were coming up from the Bay and many were going right round the Island to get to the spot instead of cutting across.

There was a sudden halt and silence, and then the movement back to the N.W.

end was continued. Crowing was going on both on the Island and at Coal Point. Noticed a few birds lying about quite unconcernedly while the crowd passed by. At 1.15 a.m. they were massing rapidly towards the N.W. end (text-fig. 2, Map 3). Commotion at N.W. end and much cawing. Found the " take-off " was no good here, so moved towards the centre of the north shore (text-fig. 2, Map 4). At 1.20 a.m. much cawing, after silence, at Coal Point and on Island. Birds now left Coal Point and there was much cawing on the Island. The Coal Point main mass had gone in five minutes (text-fig. 2, Map 6). A little bickering was going on amongst the crowd on the Island. At 1.30 a.m. there was a stoppage at Coal Point and some seven hundred and fifty birds were left behind. The birds on the Island became impatient. Fighting took place in the middle of the crowd and much crowing. At 1.35 a.m. there was a dead silence on the Island, followed by cawing and then vigorous crowing. At 1.50 a.m. the rest of Coal Point party departed.

It was noticeable that during the whole time the birds were congregated at the north end of the Island, preparatory to departure, there was a rotatory motion going on (text-fig. 2, Map 5), giving the impression that the birds all wanted to be in the rear ranks. When these birds behind tried to push on those in front of them, the others swerved to one side and the hustlers found themselves in the front ranks, only to be hustled forward by the new rearguard, until swerving aside they again turned the tables. Some made the trip longer by going round the north-west part as well.

It was observed that a few birds in the front rank kept to their posts, and it was these who inspected the likely places to take off, although, whenever they had an inspection, they got afraid and hustled back.

Between 1.55 a.m. and 2 a.m. the birds from the Island went off. At 2.4 a.m. they had all gone except seventeen, and were making N.W. in the Channel. The Coal Point penguins went due north in a thin stream.

From the time of departure to about 9 a.m., when birds were arriving on the Bay in large numbers, the rookeries were practically empty.

The low tide was the cause of the lateness of departure and the muddling of plans.

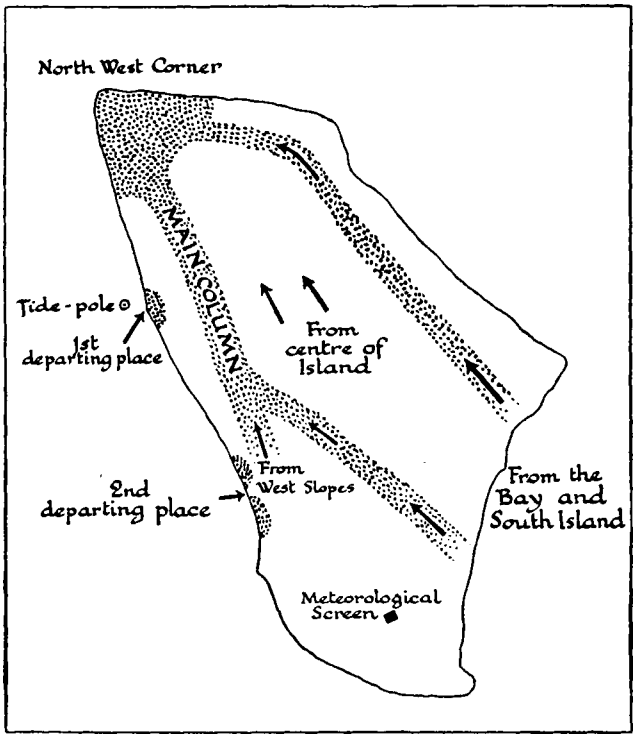
5. 11. 21. Normal departure for fishing about 1 a.m. at Coal Point and 1.30 a.m. on the Island. Return from fishing commenced at 7 a.m.

6. 11. 21. At midnight crowing began, and from 12.15 a.m. onwards the crowings increased in number. At the latter time there were a few birds congregated at the starting-place at Coal Point. At 12.30 a.m. two or three birds moved from the Bay to the Island, and birds began to move to the starting-place at Coal Point. Saw three or four birds come up and join their mates round the screen.

At 12.40 a.m. there was no movement on the Island. At 1 a.m. the Coal Point birds were forming rapidly into a mass at the starting-place and those on the Island were making a general move down the middle of it, in column towards the north-east corner.

At 1.10 a.m. the Coal Point birds began to leave. Those at the N.E. corner of the Island were performing the same rotatory movement as seen before, and only a few in the front rank kept still. A few birds inspected in turn a place from which to take off, but soon retreated. A little bickering was going on, otherwise all was quiet at the congregating place. Crowing was heard in other parts.

Text-fig. 3.



Disposition of penguins on the Island preparatory to leaving rookery, November 2nd, 1921.

At 1.13 a.m. there was a sudden halt in the rotating movement—silence,—then it continued again. There was a halt at Coal Point and about three to four hundred birds were left at the starting-place. Stragglers were coming in two streams. At 1.17 a.m. the batch from Coal Point left.

At the same time there were three or four birds on the Island on a projecting piece of the ice-foot who were inspecting a likely place from which to take off. Two minutes later one of them suddenly tobogganed down the slope into the sea and after a few seconds' interval, the rest of the crowd followed. A few of the

first batch followed the example of the leader and tobogganed in, but the mob just flopped in on their bellies and made off north in a thin line.

At 1.21 a.m. there was another hold-up at Coal Point. Stragglers joined a few left at the starting-place. Two minutes later the main mass from the Island had left and about three to four hundred waited at the starting-place, where a number of stragglers joined them. At 1.25 a.m. another batch departed from Coal Point. A minute later there was another stoppage there until some more stragglers came up. At 1.29 a.m. a party of about thirty left Coal Point together.

At 1.40 a.m. there was still a large batch of three to four hundred birds left on the Island. The rotatory movement went on and birds were hesitating to go in. A fight took place in the front rank. The attacked bird backed into one at the edge of the ice-foot which lost its balance and had no alternative but to go in. The rest followed. About thirty remained after a hold-up, and a few stragglers were coming in. There were two Adélies left with them. One of them was heard in the main mass before it had started, squawking and kicking up a fuss because it was being hustled. The other was on the outskirts.

At 1.42 a.m. the last batch of about thirty birds left Coal Point. At 2 a.m. there were still about fifty birds on the N.E. corner of the Island and two birds on the Bay slope moving towards the N.E. corner. About a dozen birds at Coal Point.

Two special observations were made during the watching of this departure:—

(1) At the head of each batch of birds which formed at Coal Point there was a single penguin standing near the ice-foot with its back to it. It was this penguin that seemed to decide when the party should leave. There was a single bird at the head of the second batch leaving the Island who would normally have led them off.

(2) The reason for the departure in batches was apparently due to the desire to leave in parties rather than alone. With each departure a number would be left behind, until, being joined by sufficient stragglers, they decided they were sufficient in number to depart.

At 6 a m. a dozen birds arrived at Coal Point. At 7 a.m. about a hundred and fifty had arrived on the north end of the Island. At 8 a.m. over a thousand birds arrived at Coal Point, jumping on to the ice-foot on the east side of the Bay. At 10 a.m. large numbers had already arrived and were arriving on both rookeries.

8. 11. 21. The penguins were late in arriving back from fishing to-day. They had difficulty in getting on to the rookeries owing to the portion of the Bay ice which had severed from the firm ice being now separated from the latter by a wide lead filled with broken-up ice (Pl. V. fig. 3).

All through the morning they were trying to find a way ashore and at 11 a.m. there were about five thousand birds on the severed sheet. One bird would lead them to a spot at the edge, but directly it reached there it always seemed afraid (perhaps of the possible appearance of a Leopard Seal) and they would all flee away to follow another penguin to some other spot. A few managed to get home by way of the glacier where there were only a few holes between the main sheet and the ice-foot. Meanwhile, parties would leave the ice to try elsewhere, but more arrived all the time. Eventually at about 12.30 a.m. some suddenly jumped on the firm ice by swimming under the broken ice between. When a number had gone this way, most of the others struggled across through the broken-up ice, clambering from one firm bit to another and reaching the shore. At one time, as a few were struggling in the slush ice, a Leopard Seal suddenly shot its head out of the water, but failed to get a catch (Pl. V. fig. 4).

Throughout the afternoon there were birds on the sheet and at 6 p.m. there were still about a hundred running backwards and forwards. At 8 p.m. there were still about the same number.

9. 11. 21. Same sort of complications as yesterday. Between 11 a.m. and noon about five thousand on the floe. They managed to get ashore from the west edge of the floe by scrambling through the slush ice.

11. 11. 21. By 8 a.m. there was a fair population at Coal Point and a great many on the Island. Some three hundred were on the floe with the Leopard Seal worrying them.

12. 11. 21. Return from fishing commenced from 8 a.m. onwards.

13. 11. 21. Owing to the bays being full of ice those birds that live on the Island had to land at Coal Point and walk over the glacier slope home.

14. 11. 21. Owing to the large quantity of close brash-ice around only about half the Island population was present at 6 p.m.

15. 11. 21. At 9 a.m. there were very few birds present. Up to noon there was a dearth of birds and not until 3 p.m. did the rookeries begin to be filled. Irregular habits due to ice conditions.

16. 11. 21. Although the birds from Coal Point started leaving by 12.15 a.m., those from the Island had not gone by 1.20 a.m. Most had, however, departed by 2 a.m. At this time a few were returning to various parts of the rookery, apparently having given up the idea of fishing. At 8 a.m. birds started returning in numbers.

17. 11. 21. At midnight the Coal Point penguins were forming. A quarter of an hour later the Island birds began to form on the west slope. A panic then followed, and they rushed to the north end of the Island. At 12.20 a.m. the Island birds were re-forming on the west slope near the meteorological screen, and there was no sign of formation at the usual place. This was no doubt due

to the presence of a Leopard Seal on an ice floe only a hundred feet from the north shore.

At 12.30 a.m. the Coal Point birds were making off in a ragged course to the north. A quarter of an hour later the crowd from the Island started leaving from the west slope. They were practically all in in about three minutes. At 12.50 a.m. there was a hold-up at Coal Point, but by 1 a.m. most had gone.

At 1 a.m. most of the inhabitants of the dirt-dump were still present, not having gone fishing. Observed three or four preliminaries to intercourse. Many were indifferent to going off, and couples were still bowing to one another. Three pairs were left by the meteorological screen after the main mass had gone off. They were present all the morning. It seems that now, as the egg-laying time approaches, life-habits begin to change. There is less and less mass action and more individuality among the occupants of the rookeries. Previously it was unusual for birds to be left behind from the fishing expeditions, now it is becoming commoner.

At 4 a.m. there were still about three hundred birds on the Island and about two hundred at Coal Point. All these had stopped at home. At 5 a.m. birds could be seen fishing round about. At 6 a.m. the first party of a hundred or so returned from fishing and by 7 a.m. a large part of the Island population had already arrived, although only a small part of the Coal Point inhabitants had returned.

At 10 p.m. a few birds from the north end of the Island and from the west slope congregated on the west ice-foot A dozen swam off and left another dozen waiting to do so. It is noticeable how the routine is changing. Previously no departures took place as early as this. A few birds at the edge of the Coal Point ice-foot were waiting to leave and were running backwards and forwards. There was, however, no general movement of birds. At 11 p.m. two parties of a hundred to two hundred birds left from the west ice-foot where there was a general congregation. About a half of the Island population was still undisturbed. There was no concerted movement yet at Coal Point, although a few birds had assembled at the starting-place.

By midnight the bulk of the penguins on the Island had already left and only a few remained about the rookery. Most of those at Coal Point had gone, except three to four hundred which were still waiting to go.

18. 11. 21. At 1.25 a.m. there were only twenty-two left on the Island and sixteen at Coal Point.

19. 11. 21. After midnight practically all the Island inhabitants had gone. The remainder left before 2 a.m. Those at Coal Point left a little after those from the Island. At 4 a.m. thirty-five birds had just returned to the Island.

At 5 a.m. there was a sprinkling of birds on both rookeries and by 6 a.m. a fair part of the population was present.

20. 11. 21. At 12.30 a.m. those at Coal Point began leaving from the same place as usual, and within five minutes the main mass had left and the rest were following leisurely. At 1 a.m. a second batch left from Coal Point. The Island birds, although assembled at the north end had not yet gone. There were still many on the rookery. Most of the ash-dump birds were present. By 2 a.m. the band at the north end of the Island had gone, but there were still many birds on the Island, though only a few at Coal Point. The birds were still on the ash-dump. At 3 a.m. all the couples near the meteorological screen and within a hundred-foot radius appeared to be on their nests. At 5 a.m. there was a fair sprinkling of birds at Coal Point, also on the Island. Contrary to their previous habits, since 3 a.m. all birds present seemed to be on their nests and going through their normal routine of life. At 6 a.m. several birds were seen coming home *viâ* Coal Point.

It was observed that many now have quite deep hollows in the snow, representing their nests. These are up to five inches deep and nine inches in diameter. One nest had a few stones in it which had thawed out from below.

By 10 p.m. the South Island birds were wending their way in column to the Island. At 11 p.m. the Coal Point birds began to form, and the rotatory performance was going on at the north-west corner of the Island. At midnight practically all the Island and Coal Point birds had gone.

Several of the nests of those which did not go fishing were each occupied by only one individual, who remained to protect them from pilferers. It was not a general rule for one to be left behind.

21. 11. 21. At 1 a.m. there were about a dozen left at Coal Point and about fifty sprinkled over the Island. A party of about three hundred, which had formed at the north-west corner of the Island after the main party had left, was returning to the north-west corner after having just visited the west slopes to find an alternative place for departure. Their numbers were reduced to about a hundred and fifty by 2 a.m., and these had given up the idea of fishing, for some were lying down at 3 a.m. and others were sleeping while standing. They were there at 4 a.m. and 5 a.m., though some were dispersing. By 3 a.m. the number of odd birds on the rookery was about a hundred, the increase being due to the return of some of those at the north-west end.

Birds started returning from fishing from 5 a.m. onwards. Some arrived in the afternoon and at 7 p.m. many birds were scattered about the rocks unable to get to the rookery.

At 10 p.m. a few birds started moving to the north end of the Island. At 11 p.m. they began to form on the Island and Coal Point. At midnight there was a general move towards the north end of the Island.

22. 11. 21. At 1 a.m. the main mass had gone from the Island and Coal Point. A sprinkling of birds over both rookeries. Single birds on all but one of the ash-dump nests. At 2 a.m. single birds present on ash- and dirt-dumps. From 7 a.m. onwards birds began to return, and by 8 a.m. the rookeries were well populated.

23. 11. 21. A general move began at Coal Point and on the Island about midnight. Whilst those at Coal Point were forming as usual, the birds on the Island had no definite place of departure. Some went one way, some another.

At 1 a.m. the Coal Point birds had not gone and there was much disorganisation. The party at the usual starting-place dissolved and then reformed. The rookery seemed as full as ever. Some attempted to come to the Island, but changed their minds.

The Island birds formed on the west slopes and were off quickly.

It was noticed that birds spend a short time washing themselves before swimming to the fishing grounds.

At 2 a.m., with the exception of perhaps three hundred which were still contemplating departure (they left or dispersed by 3 a.m.), the rookery at Coal Point seemed to be completely mated and settled, having given up the idea of fishing. There were now about a hundred and twenty birds scattered over the Island.

At 7 a.m. and 8 a.m. large numbers of penguins were coming over the glacier from Coal Point to the Island to leave from there.

First movements for fishing started at 10 p.m. on the Island and by midnight the greater part of the Island birds had left from the west ice-foot. At Coal Point the birds began to form, but altered their minds, and a large number came over to the Island. They marched in column to the west ice-foot, whence they departed.

24. 11. 21. At 1 a.m. and 2 a.m. there were still the greater part of the inhabitants left at Coal Point. Birds generally began to return from fishing at 8 a.m.

25. 11. 21. By midnight on 24. 11. 21 about five-sixths of the population from Coal Point had gone from their usual place of departure, the Island birds having gone off from the north-west point. Very few birds were scattered over the Island. Several couples were round the screen and the ash- and dirt-dumps were more or less full up.

The ash- and dirt-dumps were still congested at 2 a.m. At 4 a.m. penguins began to return in small numbers, and by 7 a.m. there was a fair population on the rookeries.

At 9 p.m. a party of six departed from the west ice-foot. At 11 p.m. a party of about a hundred departed. By midnight most of the Island had gone. A large number came over from Coal Point to the Island.

26. 11. 21. At 1 a.m. there was a thin stream of birds still coming over from Coal Point to leave from the west shore of the Island. At 2 a.m. there was a small population on the rookeries. At 8 a.m. long stream of birds arriving home on the Island *vid* Coal Point.

At 11 p.m. birds were going off in small parties from the west slopes and forming from various parts, but there was no general movement. At Coal Point there was no sign of departure.

TABLE VIII.—*Sexual Intercourse during Period of Massed Fishing Expeditions.*

Date.	Number seen.		Remarks.	Date.	Number seen.		Remarks.
	Complete.	Attempted or incomplete.			Complete.	Attempted or incomplete.	
31. 10. 21.	8	6		18. 11. 21.	Numerous.	..	
1. 11. 21.	3	2					
2. 11. 21.	6	1		19. 11. 21.	7	4	Not as common as usual, possibly because the females are near to egg-laying.
4. 11. 21.	13	7					
5. 11. 21.	6	1					
6. 11. 21.	3	3					
7. 11. 21.	1	1					
8. 11. 21.	2	1					
9. 11. 21.	9	3		20. 11. 21.	Fairly numerous.	..	
10. 11. 21.	6	3					
11. 11. 21.	9	3					
12. 11. 21.	4	1		21. 11. 21.	Do.	..	
13. 11. 21.	9	..		22. 11. 21.	Numerous.	..	
14. 11. 21.	1	1					
15. 11. 21.	4	2		23. 11. 21.	Do.	..	
16. 11. 21.	15	7	Seem to be more numerous.	25. 11. 21.	Do.	..	
				26. 11. 21.	Do.	..	
				27. 11. 21.	Do.	..	
17. 11. 21.	Numerous.	..		29. 11. 21.	Several.	..	

At midnight a few small parties were forming at the Coal Point starting-place and a large stream coming over to the Island by way of the glacier slope. There was no massed formation on the Island. As birds arrived at the west slopes they went in. Individual fishing is now becoming established.

27. 11. 21. By 1 a.m. the Island was comparatively clear. Birds were still going off a few at a time.

At 2 a.m. there were a good many birds remaining on their nests at Coal Point. Very few were left behind on the Island.

At 6 a.m. a few birds were still coming over from Coal Point to depart from the Island.

At 9 p.m. a party of half-a-dozen left the Island to go fishing. At 10 p.m. birds were going off fishing quite casually. At 11 p.m. birds from Coal Point were coming over to the Island and departing from the west shore.

By midnight most of the penguins had already left.

28. 11. 21. At 1 a.m. very few were left on the Island—only those possessing a stone or two, or, in some cases, a decent nest, as in the case of the occupants of the ash- and dirt-dumps.

At 8 a.m. birds were arriving on the West Rocks, others were coming across to the Island, having landed at Coal Point.

At 10 p.m. birds began to prepare to leave and at midnight the majority of those at Coal Point and the Island had gone—those from the Island leaving casually.

29. 11. 21. At 2 a.m. there was a bird on each of the cinder nests on the way to the tide-pole. At 3 a.m. birds were arriving on the western ice-foot. By 7 a.m. there was a fair population on the rookeries.

At 10 p.m. a large number of birds had already gone from Coal Point. Those on Island were beginning to move to the north end.

At midnight a small population was left at Coal Point and on the Island.

IX. *Period of Egg-laying.*

29. 11. 21. To-day the first eggs have been laid. At 11 a.m. an egg was found under the female of Pair XII on the ash-dump. The nest is made of cinders. A little later, to the north of the meteorological screen, another nest was found containing an egg. This was simply in a hole in the snow.

It is interesting that both Gentoos and Ringed should have laid their first eggs of the season on the same day.

30. 11. 21. At 2 a.m. birds were returning from fishing.

At 10 p.m. penguins were going in from the west slopes more generally. Many came round from Coal Point to go off from this place. At midnight birds were still leaving in small parties. Many were seen fishing close to the shore.

1. 12. 21. At 1 a.m. most of the Island birds had gone and about a third of those at Coal Point. Birds were returning at 3 a.m.

At 10 p.m. penguins were beginning to depart for fishing. At midnight birds were still leaving, and some had already returned.

2. 12. 21. As early as 9 p.m. birds were casually starting off for fishing from the west slopes. Ice prevented any departure from Coal Point. Many came over the glacier and departed from Glacier Bay.

3. 12. 21. 2 a.m. Penguins have been leaving and returning casually throughout the previous six hours. Somewhere about three-quarters of the population of both rookeries were away.

4. 12. 21. The penguins departed during the previous evening and night as usual, casually from the west slope. By 2 a.m. there was a fair population on

TABLE IX.—*Sexual Intercourse and gradual Progress of Egg-laying.*

Date.	Sexual intercourse.	Eggs laid.	Remarks.
29. 11. 21.	.....	2	First eggs of season.
30. 11. 21.	.....	2	Island and Coal Point.
1. 12. 21.	Few only. Less numerous now.	3	
2. 12. 21.	3 or 4.	8	
3. 12. 21.	2 or 3.	10	
4. 12. 21.	2 or 3.	7	
5. 12. 21.	3 or 4.	9	
6. 12. 21.	A few seen.	6	
7. 12. 21.	6.	4	
8. 12. 21.	Only 2 or 3.	Several.	
9. 12. 21.	„ „	Many.	
11. 12. 21.	3 or 4 and 2 attempted.	Do.	
12. 12. 21.	3 complete and 4 attempted.	Do.	
13. 12. 21.	9 complete and 4 attempted.	Do.	
14. 12. 21.	5 complete.	Do.	
15. 12. 21.	2 complete and 1 attempted.	Do.	Egg-laying at its peak.
16. 12. 21.	8 complete and 1 attempted.	..	Attempted coition with female on nest.
17. 12. 21.	2 complete.	..	
23. 12. 21.	1 complete.	..	This pair possessed no nest.
24. 12. 21.	1 complete.	..	
25. 12. 21.	1 attempted.	..	
7. 1. 22.	1 attempted.	..	

both rookeries. At 1 p.m. birds were going and returning from fishing. From 10 p.m. onwards a few birds were leaving by the west slopes.

5. 12. 21. At 6 p.m. penguins were going off to fish. They appear to come and go throughout the whole day now. Saw two birds at the edge of the ice-foot bow to one another and then depart into the water.

7. 12. 21. On the part of the rookery between the congested area and the tide-pole, where the snow is deep and hardly any sign of nest-making is apparent, nearly all the penguins appear to be in pairs, and for the most part quite clean, showing that they have just returned from fishing. This suggests that even

now, at the height of the nesting season, both birds go away together until proper nests can be located and built.

9. 12. 21. Laying is gradually becoming more general and many nests have one or two eggs in them.

12. 12. 21. Laying is only gradually increasing and no marked progress appears.

15. 12. 21. Egg-laying has now become about as general as possible.

At the north end of the Island rookery it was noticeable that comparatively few eggs had been laid. Many nests contained no eggs and only in a few were two found.

2. 1. 22. Although four Ringed Penguin eggs have been found containing holes pecked by the young, on searching nearly all the first layers of the Gentoos not a single egg was found so advanced.

X. *Period of Hatching.*

8. 1. 22. One complete and one attempted intercourse observed.

An egg on the ash-dump was laid this morning. It will be very late in hatching.

On the ash-dump at 11 a.m. there were two chicks which had just been hatched. These together with one at the meteorological screen were the first arrivals.

10. 1. 22. We have noticed several obviously freshly laid eggs around, three being in spots where two or three days ago there were in one case no eggs and in the other two, single eggs.

Three more young have just been hatched to-day.

11. 1. 22. No eggs have so far been found hatched except on the ash-dump and one at the screen. At both these sites conditions have naturally been more favourable.

12. 1. 22. Observations discontinued.

Family Histories.

In order to appreciate the daily life of penguins, it was necessary to watch very carefully different families over a number of days. We therefore selected certain individuals or families and marked them or fixed their positions by stones with numbers painted on them. At one time and another we had twenty-four different birds or pairs under observation. Naturally, we had many disappointments through birds disappearing, losing their marks, and so on after we had watched them for some little time, but generally we were able to obtain some interesting facts. There being no appreciable difference between the appearance of the male and female, and the difference in sex having a material bearing on the value of the observations, where possible we marked male and female differently with ink. Once we had been able to determine the sex—as, for instance,

during sexual intercourse—it was not difficult to work backwards and settle the sex during preceding observations, since we always referred to them as (*a*) and (*b*) in our notes. Thus (*a*) might have a vertical ink mark and (*b*) a horizontal one. In some cases we marked one of the pair only. With Pair VII we really had no need of markings, as the female had a lame left leg, though as a precaution we marked the male with a horizontal black band. It was found to be particularly important to mark both the birds in the earlier days of observing them. Had this not been done in the case of Pair VI, a most interesting change-over of mates would have been missed. Nearer the egg-laying time there is not so much risk of birds separating.

Whilst for easy reading it would be preferable to give these Family Histories in a narrative form, yet from a scientific point of view I have thought it better to let them remain in the form in which they appear in our notes. In this form it is easier to draw deductions as to their habits.

I have only selected families which gave sufficiently interesting results to be worth including with these notes.

Pair No. I. (*Known as Darby and Joan.*)

4. 10. 21. Both birds marked with Indian ink.

5. 10. 21. The male arrived from fishing at 11.30 a.m. He went direct to his proper spot near the screen. Later he moved away a little, but came back again. The female came from the west shore at 1.30 p.m. and made straight for her mate. The two birds united at exactly the same place as we had noticed yesterday.

6. 10. 21. The male arrived at 2.20 p.m. and we watched him come from the west shore and go straight to the nest-site. At 3 p.m. the female was followed by us from her arrival on shore until she got to the nest-site. She rested only five times and preened herself once on the way. Directly she arrived she bowed to her mate.

7. 10. 21. At 1.50 p.m. the male was on the nest-site. At 2 p.m. the female came across the rookery straight for the nest. They arrived in the same order as yesterday.

8. 10. 21. Traced the sexes. At 12.15 p.m. the male who had been the first to arrive on each of the four days was on the nest-site alone. He tried to have sexual intercourse on two occasions with a female who was not his mate, the second time being interrupted by her true mate, who giving a squawk led his spouse away to their nest near-by where they bowed to one another. It was curious that no fight took place.

The female arrived at 2.45 p.m and joined her mate.

9. 10. 21. Although not present at noon, both were on the nest-site at 1.15 p.m. The male tried to have intercourse with the female (this time his own mate).

10. 10. 21. Absent to-day. As neighbours also were absent, it was probably due to bad weather conditions.

11. 10. 21. The male was back at 12.15 p.m. and both were together at 2 p.m. They were re-marked at 4 p.m. They both went away and the female was bustled about by neighbours. In a few minutes the male returned and this time he bowed two or three times to a strange female whom he assisted in a skirmish with a neighbour. He left her, however, had a look round for his own mate, and at 6 p.m. they were together.

12. 10. 21. The male did not put in an appearance until 5 p.m. The female never turned up at all.

13. 10. 21. Both were present by 4 p.m.

14. 10. 21 to 24. 10. 21. Between these dates the birds must have been absent from the rookery or hidden away on another part for we could see no sign of them, although we searched thoroughly.

25. 10. 21. At 3.30 p.m. both birds were in their usual place and the marks were clearly visible. Both were re-marked.

26. 10. 21. At 2 p.m. the female was present, but made off on my approach. The male was present at 4 p.m., but also went away.

27. 10. 21.
28. 10. 21. } Neither bird seen.

29. 10. 21. At 3 p.m. female alone. At 5 p.m. male and female together.

30. 10. 21. Both present by 2 p.m.

31. 10. 21 to 11. 11. 21. Between these dates neither bird was observed. For no apparent reason none of the marked birds were found on 1. 11. 21 and 2. 11. 21.

12. 11. 21. Female seen alone at 4 p.m.

13. 11. 21. to 23. 11. 21. Although we kept the site under careful observation between these dates, we lost traces of the pair. On one day we had a very thorough search round the whole rookery, but without success.

Pair No. V.

6. 10. 21. One bird marked.

7. 10. 21. Arrived at 2 p.m. See note under " Friendship."

8. 10. 21. Seen at 2.30 p.m. Could not see its mate. Never seen again. This may have been an unmated bird.

Pair No. VI. (*Known as Bill and Liza.*)

7. 10. 21. While marking both birds I observed a curious habit. After marking one they both ran away, but the unmarked one did not go far and was soon back at the nest-site. On its way back the marked bird bowed to a stranger, which

reciprocated. It then returned to its mate. I then marked the second one and again they ran away. This time I saw the second bird bow to a stranger on the way home, so perhaps some birds are on terms of friendship with each other.

8. 10. 21. At 2 p.m. noticed this pair on their nest. Although they disappeared for a little while in the afternoon, they were back again at 6 p.m.

9. 10. 21. At 11 a.m. the male arrived in the Bay and the female arrived half-an-hour later. Though they were near they seemed to take no notice of each other. At 1.15 p.m. they were together on their nest on the meat pile. The male attempted intercourse with the female, but she was unwilling.

10. 10. 21. Female alone at 2 p.m. Both present at 3.15 p.m. About 5 p.m. the strong wind sent them both down into the Bay, but they returned at 6 p.m.

11. 10. 21. Both present by 2 p.m.

12. 10. 21. At 3 p.m. noticed the female bowing several times to a stranger. She went down into the Bay and was followed by the stranger. Eventually they went different ways. She was back alone at the nest by 6 p.m. No sign of the male all day.

13. 10. 21. Both seen together for first time at 4 p.m.

14. 10. 21. Not seen up to last observation at 6 p.m.

15. 10. 21. Male seen at 4 p.m. Female missing.

16. 10. 21. Female noticed on nest-site at 6 p.m. with stranger. Male absent.

17. 10. 21. Female seen at 4 p.m. with stranger. Not seen at 6 p.m. Male again absent.

18. 10. 21. The mated pair together at 5 p.m.

19. 10. 21. At 2 p.m. the male A and female B were near each other, but both had different mates. The male bowed once to his new friend, who returned the bow; after this he bowed twice, but she did not return them. She seemed to be uneasy, for later she went away and for the rest of the day he was seen alone near his wife. He carried on one or two pecking matches with his wife's new mate C, but did not fight, although he looked as if he was aware of something wrong.

The female B and her friend C bowed to each other a few times. On being disturbed they went into the Bay together.

At 4 p.m. the male A was alone and the female B was with the stranger C near-by. I marked the stranger. After this disturbance they, B and C, soon returned to the nesting-place and were seen together at 6 p.m., while the old mate A was standing near.

There appears to be some little domestic trouble with this pair. It seems that the female has changed her mate and one wonders if the new mate is the same one with whom she had been " carrying on " on 16. 10. 21 and 17. 10. 21.

20. 10. 21. At 4 p.m. noticed that the female B was with her new mate C. The old mate A was near-by, but went down into the Bay. At 6 p.m. the female B and stranger C were together and the former mate A was nowhere around.

21. 10. 21. At 2 p.m. we found the female B with her new mate C. The former mate A was alone near-by.

At 4 p.m. the female B was still with her new mate C and the former mate A was standing by what must have been his new mate D. At 6 p.m. the male A was alone.

22. 10. 21. At 2 p.m. female B alone. At 3 p.m. with her new mate C. At 6 p.m. B and C together, and the male A with his new mate D.

23. 10. 21. First noticed at 6 p.m. The male A was alone and the female B was with her new mate C. No sign of D.

24. 10. 21. The male A alone at 2 p.m., also at 4 p.m. At the latter hour the female B was with her new mate C.

25. 10. 21. Male A seen alone at 2 p.m. and female B with new mate C as usual.

26. 10. 21. At 3 p.m. female B and her mate C both present. Other male A alone at 4 p.m., the other two having gone away.

27. 10. 21. Female B with mate C at 3 p.m. Other male A alone. At 5 p.m. A was with his new mate D.

28. 10. 21. Probably present, but not seen owing to bright sunshine.

29. 10. 21. Female B and her mate C seen at 3 p.m. Former mate A alone.

30. 10. 21. Male A seen alone at 6 p.m. Others not seen.

31. 10. 21 to 3. 11. 21. None of the birds seen.

4. 11. 21. At 8 p.m. found the female B with her mate C and the old mate A alone. The party of penguins which live on the meat-dump including these families have all been absent for four days.

5. 11. 21. Female B alone seen at 1 p.m.

6. 11. 21. Male A alone seen at 5 p.m.

7. 11. 21. No search made.

8. 11. 21. Male A alone and female B with new mate C in afternoon.

9. 11. 21. Male A alone at 4 p.m. and with new mate D at 5 p.m. Female B with new mate C at 4 p.m.

10. 11. 21. Male A and female B both alone in afternoon.

11. 11. 21. Both male A and female B seen, but without their new mates. The male was first observed at 11 a.m., the female at 3 p.m.

12. 11. 21. Male A only seen.

13. 11. 21. Male A only seen.

14. 11. 21. Male A and female B both seen, but alone. The male was first observed at 8 a.m., the female at 4 p.m.

15. 11. 21. Neither of the two pairs seen.

16. 11. 21. From this date until the last day (28. 11. 21) the place was under observation, no trace of the female B or her mate C was seen.

The male A and a mate (presumably D) were first seen at 6 p.m.

17. 11. 21. Male A alone at 4.30 p.m. and with mate D at 9 p.m.

18. 11. 21. Pair A and D seen at 5 p.m.

19. 11. 21. Male A seen at 1 p.m. and later with mate D.

20. 11. 21. Male A alone at 9 a.m. in a nest hollowed out in the snow. In afternoon was with mate D.

21. 11. 21. Male A present at 8.30 a.m. and alone all day.

22. 11. 21. At 1 a.m. male A was alone. At 10 a.m. he was with mate D and then on to 10 p.m.

23. 11. 21. At 1 a.m. both had left the rookery. At 11 a.m. the male A was present. Both were at nest from 4 p.m. to 8 p.m. From 10 p.m. to midnight male A alone.

24. 11. 21. From 1 a.m. to 6 p.m. neither was present. At 8 a.m. both birds A and D were there. From 10 p.m. to midnight male A was alone.

25. 11. 21. Not seen from 2 a.m. to 9 a.m. At 9 p.m. and 10 p.m. both A and D were present and intercourse was once attempted. At midnight one departed for fishing.

26. 11. 21. Not seen from 1 a.m. to 8 a.m. Both A and D were present at 10 a.m. At 2 p.m. neither was present. At 8 p.m. both A and D were present.

27. 11. 21. Not seen from 2 a.m. to 10 a.m. At 9 a.m. one was present; at 10 p.m. both A and D were and at midnight only one.

28. 11. 21. Not seen from 1 a.m. to 8 a.m. One bird only seen later.

Pair No. VII. (*Known as Lionel and Lame Lizzie.*)

8. 10. 21. The male only marked, as the female had an injured leg and was easily recognizable.

The sexes were determined early by the fact that a male (not the mate) tried to induce the lame female to have intercourse, which she rejected. She went away to join her real mate a little way off. On arrival she bowed to him and he returned the bow.

9. 10. 21. At 1 p.m. saw the female about on the Bay ice, but no sign of male. At 3.30 p.m. the male had arrived and was with the female at their usual position.

10. 10. 21. Saw the female at 3 p.m., but not again. Have not seen male, but he may have been present, as nearly all the birds were lying on the ice in the Bay.

11. 10. 21. Male not seen. Did not find the female until 4 p.m. Followed her and saw her bow twice to another bird, who was not her mate. She then left him or her and walked away and lay down alone.

12. 10. 21. At 3 p.m. saw the male on the meat-dump. The female was some distance away on the Bay. The male went down to the Bay and the female began walking to South Island and started to climb up the slope. When the male arrived at his nest-site he suddenly crowed " āh, ăhă, ăhă, ăhă, ăhă." Immediately the female turned back from South Island and hurried towards him as fast as she could limp along. When she got fairly close she had a look around before she found him. It was curious how even at a distance she was able to recognize his call from amongst others, for immediately she heard it she turned round sharply, without hesitating.

A little later I re-marked the male and the two separated. I saw the female looking for him, but although he was lying down not far away she was unable to find him, so eventually she gave up the search and lay down herself.

13. 10. 21. The female, first noticed at 4 p.m., was alone. She made a couple of journeys down to the Bay.

14. 10. 21.
15. 10. 21. } Neither seen on these days.

16. 10. 21. Female noticed alone near meat-dump at 4.30 p.m. Not seen again.

17. 10. 21. Female seen alone near meat-dump at 4 p.m.

18. 10. 21. Female seen alone at usual place at 5 p.m.

19. 10. 21 to 22. 10. 21. Neither bird was seen between these dates.

23. 10. 21. Female seen near meat-dump at 3 p.m.

24. 10. 21. Both birds present on meat-dump at 6 p.m.

25. 10. 21. Female seen coming up to meat-dump at 4 p.m.

26. 10. 21. Female seen at 6 p.m. on Bay near meat-dump.

27. 10. 21. Both near meat-dump at 3 p.m.

28. 10. 21. Both present at 5 p.m.

29. 10. 21. At noon female seen alone.

30. 10. 21. Both seen at 6 p.m.

31. 10. 21. Female seen alone at 4 p.m.

1. 11. 21.
2. 11. 21. } Both absent, as was the case with the other occupants of the meat-dump.

3. 11. 21. Both present on Bay at 5 p.m.

4. 11. 21. Female seen at 5 p.m.

5. 11. 21. Both present at 9 p.m.

6. 11. 21. Not seen.
7. 11. 21. No search.
8. 11. 21. Both present at 6 p.m. Other pairs under observation not visible.
9. 11. 21. Female alone at 5 p.m.
10. 11. 21. Not seen.
11. 11. 21. Female alone at 1 p.m.
12. 11. 21. Not seen.
13. 11. 21. Both present at 6 p.m.
14. 11. 21.
15. 11. 21. } Not seen.
16. 11. 21. Female alone at noon.
17. 11. 21. Female alone at 8 a.m. and 1 p.m.
18. 11. 21. Female alone at 5 p.m.
19. 11. 21. Both present at 5 p.m.
20. 11. 21. Both present at 3 a.m., 4 a.m., and 8 a.m., and at 8 p.m. intercourse took place.
21. 11. 21. Not present to-day.
22. 11. 21. At 3 a.m. both present. At 4 a.m. female only present. Both absent during the rest of the day.
23. 11. 21. 1 a.m. to 8 a.m., both absent. At 10 a.m. both present. At 11 p.m. both present. At midnight both absent.
24. 11. 21 and 25. 11. 21. Both absent.
26. 11. 21. Both seen at 10 a.m.
27. 11. 21. to 2.12. 21. Although careful searches were made, no trace of the birds was seen.

The birds had chosen for their nest-site a very unsuitable place close to the meat-dump. It is obvious that when the snow melts this particular site will be covered with water. Apparently the birds have realised this, and have moved elsewhere.

Pair No. VIII. (*Known as Horace and Alice.*)

8. 10. 21. The history of Horace, our hero, and Alice, his wife, presents a typical triangle drama. The would-be wrecker of domestic felicity was Herbert. We will retain their Christian names ; it adds to the human interest.

Horace and Alice were lawful man and wife, but Herbert came along and attempted to carry away Alice. Alice preferred her husband and dutifully chased the intruder away. She had, nevertheless, a soft spot for him, and her woman's " no " meant more than half a " yes." Horace, however, emphatically disapproved and we arrived at the beginning of a battle royal between him and

Herbert. It was the fiercest fight we had ever seen. They stood up to each other, using flippers and beaks, for a *minute or two on end. First blood to Herbert* from a peck on Horace's head, yet still the battle raged. They stopped once to crow defiance at each other, then weighed in again ; then another crow, until both were so exhausted they could fight no longer. Though panting and fairly " done-up " Horace stood by his spouse, and, like the gentleman he was, bowed to the cause of the trouble. Herbert some little way off was likewise panting and exhausted. Both were spattered with blood.

After a while Herbert unwisely tried again. He went for the indomitable Horace, who was more than ready for him and soon gained mastery, chasing the scoundrel across the rookery. He returned, a doleful figure, to his wife, feeling perhaps that, although peace had been obtained, the price had been bitter. But that incredible villain, Herbert, was still at his home-wrecking tactics. He had the audacity to stand behind poor Horace's back and bow to his wife. Horace turned, rose in righteous wrath, and pursued the evil-doer with such malignancy that Herbert disappeared well out of sight across the rookery.

We marked Horace, but Alice ran away. *She was easily identifiable,* however, by a few of Horace's blood-splashes on her breast. We left Horace, who had found a very suitable nest, defending this stolen property from the lawful occupants.

At 6 p.m. Horace and Alice were together on their nest.

9. 10. 21. At 11 a.m. Horace arrived and was with Alice at 1.30 p.m. on their nest-site.

In the afternoon there was more domestic trouble. Horace was alone on the nest when up came another bird. He must have been Herbert of the day before, for directly Horace spotted him he fled and was chased across the rookery. Horace returned, but his troubles seem to be telling on him. This time he went straight to a nest a little way off and bowed to the occupant, who returned the bow. This bird was not Alice, so perhaps Horace's household life is not all it should be. At 5 p.m. we found him alone on his usual nest and Alice came up.

10. 10. 21. Horace was present at 12.30 p.m., and at 2 p.m., he had Alice with him. Most of the day he was alone, but at 6 p.m. his mate was lying down by his side.

11. 10. 21. Yesterday we marked the exact position of their nest. At 8 a.m. we found Horace occupying a position a little north-east of his correct place. At 2 p.m. he and Alice were both present, but not in the proper position. At 4 p.m. they were occupying their real nest. They went away and later Horace came back to the wrong place. They were seen again together at 6 p.m.

12. 10. 21. At 8 a.m. Horace was found having a short sleep on the Bay slope. At 10 a.m. he came up to his nesting-place. A few Sheathbills came around

and they seemed to upset him, for he went down into the Bay again. At noon he was near his nest. At 5 p.m. he was with Alice on the correct spot. At 6 p.m. they were a foot from it.

Horace never seems to trouble about where he has a nest—anywhere within five feet of his own will do and as a result he is always trespassing on other birds' property with consequent complications.

He is nearly always alone and looking very dejected. When Alice is with him his bows are half-hearted and never returned. Evidently there is something gravely wrong here.

He had a short fight with another bird in the afternoon, but lost.

13. 10. 21. Horace was not seen until noon. At 4 p.m. he was with Alice. He had kept to his correct position, except for once, to-day.

14. 10. 21. Horace noticed at 4.30 p.m. Tried to re-mark him, but like others under observation he is becoming timid. He went away into the Bay where he crowed presumably for Alice, who was absent. On his return we tried again to mark him and he went back to the Bay.

15. 10. 21. At 2 p.m. Horace was about on his correct nest, but alone. We caught him and succeeded in marking him very clearly.

16. 10. 21. At 6 p.m. both Horace and Alice were on their right nest. Horace dismal as usual.

17. 10. 21. Horace seen at 2 p.m. He went down into the Bay and was not seen again.

18. 10. 21. Both birds not seen.

19. 10. 21. At 2 p.m. the pair were together about one foot east of their nest. At 4 p.m. they were both present. At 6 p.m. Horace was alone, two feet from his nest. He went down into the Bay as soon as he was approached, although none of the other birds moved.

20. 10. 21. Both present by 2 p.m.

21. 10. 21. Both present at 4 p.m., but not in correct place.

22. 10. 21. Could not trace.

23. 10. 21. Horace seen at 6 p.m. about two feet east of his proper nest, alone.

24. 10. 21. Could not trace.

25. 10. 21. Horace seen alone at noon and at 3 p.m. he was with Alice.

26. 10. 21. Both present at 1 p.m. and also at 8 p.m.

27. 10. 21. Both present at 5 p.m.

28. 10. 21. Probably present.

29. 10. 21 to 9. 11. 21. No trace of this pair.

10. 11. 21. Both birds present at 4 p.m.

11. 11. 21 to 23. 11. 21. Although careful watch was kept between these dates, we lost trace of this pair.

Pair No. IX. (*Known as Cuthbert and Cuthbertina.*)

16. 10. 21. One bird A marked (sex not determined).

17. 10. 21. Bird A seen at 2 p.m. on proper place on South Island.

18. 10. 21. No trace up to 5 p.m.

19. 10. 21. At 4 p.m. saw bird A bowing to its mate B.

20. 10. 21. Not seen on account of strong south-west wind keeping birds away.

21. 10. 21. A seen at noon. Could not trace mate B.

22. 10. 21 to 24. 10. 21. No trace up to 6 p.m.

25. 10. 21. Not seen at noon. Both present at 4 p.m.

26. 10. 21. Both present at 4 p.m.

27. 10. 21. Both present at 5 p.m.

28. 10. 21. Not seen to-day.

29. 10. 21. Both present at 5 p.m.

30. 10. 21. Both present at 6 p.m.

31. 10. 21 to 2. 11. 21. Not seen. General absence of marked birds on 1 and 2. 11. 21.

3. 11. 21. Both present at 5 p.m.

4. 11. 21. to 10. 11. 21. Not seen.

11. 11. 21. Both present at 6 p.m.

12. 11. 21 to 14. 11. 21. Not seen.

15. 11. 21. A only seen at 6 p.m.

16. 11. 21. A seen alone at 4 p.m. Failed to re-mark it.

17. 11. 21 to 23. 11. 21. Lost trace of this pair, although we searched between these dates.

TABLE X.—*Ash-dump Pairs.*

Date.	Hour.	Pair X.	Pair XI.	Pair XII.	Remarks.
1921. Nov. 16	4 p.m.	Both present. Intercourse took place.	Both present. Intercourse took place.	Both present.	
,, 17	7.30 a.m.	1 bird alone *.	1 bird alone *.	1 bird alone *.	* Mates away fishing.
	Noon.	2 birds.	2 birds.	2 birds.	Apparently some of the birds do not go off fishing in early morning.
	11 p.m.	Intercourse took place.	.....	.....	
,, 18	Early morning.	1 bird alone.	1 bird alone.	1 bird alone.	

TABLE X. (*continued*).

Date.	Hour.	Pair X.	Pair XI.	Pair XII.	Remarks.
Nov. 18	Rest of day.	2 birds.	2 birds.	2 birds.	
,, 19	....	Both present.	Both present *.	Both present.	* Whenever he was seen round about midnight the male was still building his cinder nest. There is no question but that he must have stayed at home all night. At 10 a.m. his mate was lying, looking quite clean, on the nest and he was standing beside her still dirty from contact with the cinders on the ash-dump.
,, 20	2 a.m.	1 bird alone.	1 bird alone (male).	1 bird alone.	Others probably fishing.
	8 a.m.	2 birds (intercourse attempted).	2 birds.	2 birds.	
	10 p.m.	2 birds.	1 bird.	2 birds.	
	Midnight.	1 bird alone.	1 bird alone.	1 bird alone.	Others gone fishing.
,, 21	7 a.m.	1 bird alone.	2 birds *.	2 birds.	* Female recently returned from fishing. Male busy nest building.
	8 a.m.	2 birds.	2 birds.	2 birds.	
	Noon.	2 birds.	2 birds.	Complete intercourse.	
	10 p.m.	2 birds.	2 birds.	2 birds.	
	11 p.m.	1 bird.	2 birds.	2 birds.	
	Midnight.	1 bird.	1 bird.	2 birds.	
,, 22	1–7 a.m.	1 bird.	1 bird.	1 bird.	
	8 a.m. to 10 p.m.	2 birds.	2 birds.	2 birds.	
,, 23	1–6 a.m.	1 bird.	1 bird.	1 bird.	
	8 a.m.	1 bird.	2 birds.	2 birds.	
	10 a.m. to 11 p.m.	2 birds.	2 birds.	2 birds.	
	Midnight.	1 bird.	2 birds.	1 bird.	
,, 24	1–6 a.m.	1 bird.	1 bird.	1 bird.	
	8 a.m. to 8 p.m.	2 birds (intercourse at 6 p.m.).	2 birds.	2 birds (attempted intercourse at 11 a.m.).	

TABLE X. (*continued*).

Date.	Hour.	Pair X.	Pair XI.	Pair XII.	Remarks.
Nov. 24	8–10 p.m.	.....	2 birds.	2 birds.	
	10 p.m. to midnight.	1 bird.	2 birds.	2 birds.	
,, 25	2 a.m.	1 bird.	2 birds.	1 bird.	
	4 a.m.	1 bird.	2 birds.	2 birds.	
	6 a.m. to midnight.	2 birds.	2 birds.	2 birds.	
,, 26	2–8 a.m.	1 bird.	1 bird.	1 bird.	
	10 a.m. to 10 p.m.	2 birds.	2 birds (attempted intercourse 10 p.m.).	1 bird at 10 a.m., 2 birds 2 p.m. to 10 p.m.	
	Midnight.	1 bird.	1 bird.	1 bird.	
,, 27	2–6 a.m.	1 bird.	1 bird.	2 birds.	
	8 a.m. to 8 p.m.	2 birds.	2 birds.	2 birds.	
	10 p.m.	1 bird.	2 birds.	2 birds.	
	Midnight.	1 bird.	2 birds.	1 bird.	
,, 28	2 a.m. and 4 a.m.	1 bird.	2 birds.	1 bird.	
	8 a.m. to midnight.	2 birds.	2 birds.	2 birds.	
,, 29	....	2 a.m. to 10 p.m., 2 birds. Midnight, 1 bird.	2–6 a.m., 1 bird. 8 a.m. to midnight, 2 birds.	2–8 a.m., 1 bird. 11 a.m., 1st egg laid. 11 a.m. to 8 p.m., 2 birds. 10 p.m. and midnight, 1 bird.	
,, 30	....	2–8 a.m., 1 bird. Noon to 8 p.m., 2 birds. 10 p.m., 1 bird. Midnight, 2 birds.	2 a.m. to 10 p.m., 2 birds. Midnight, 1 bird.	2–8 a.m., 1 bird. 2–10 p.m., 2 birds. Midnight, 1 bird.	
Dec. 1	....	2 a.m., 1 bird. 4 a.m., 2 birds (one just arrived). 4 a.m. to 10 p.m., 2 birds. Midnight, 1 bird, 1st egg laid.	2 a.m., 1 bird. 4 a.m. to 10 p.m., 2 birds. Midnight, 1 bird.	2 a.m. to midnight, 2 birds. 2nd egg laid at 1 p.m.	
,, 2	....	2–4 a.m., 1 bird. 6 a.m. to 8 p.m., 2 birds. Midnight, 1 bird.	2 a.m., 1 bird. 4–8 a.m., 2 birds. Midnight, 1 bird.	2–8 a.m., 1 bird. Midnight, 1 bird.	

TABLE XI.

Date.	Hour.	Pair XIII.	Pair XIV.	Pair XV.
1921.				
Nov. 20	2 a.m.	1 bird.	1 bird.	.....
	8 a.m.	2 birds.	2 birds.	2 birds.
	10 p.m.	2 birds.	2 birds.	2 birds.
	Midnight.	1 bird.	1 bird.	1 bird.
,, 21	2–6 a.m.	1 bird.	1 bird.	Absent.
	8 a.m.	2 birds.	2 birds.	2 birds.
	Noon.	.....	Intercourse.	.....
	10 and 11 p.m.	2 birds.	2 birds.	2 birds.
	Midnight.	1 bird.	1 bird.	1 bird.
,, 22	1 and 2 a.m.	1 bird.	1 bird.	1 bird.
	3 a.m. to 10 p.m.	2 birds.	2 birds (1 from 3–8 a.m., 2 from 10 a.m. to 10 p.m.).	2 birds.
,, 23	1–6 a.m.	1 bird.	1 bird.	Absent.
	8 a.m.	2 birds.	2 birds.	Absent.
	8 a.m. to 11 p.m.	2 birds.	2 birds.	2 birds (11 a.m. to 11 p.m. only).
	Midnight.	1 bird.	1 bird.	?
,, 24	1–6 a.m.	1 bird.	1 bird.	Absent.
	8 a.m.	2 birds.	1 bird.	1 bird.
	10 a.m. to 10 p.m.	2 birds.	2 birds.	2 birds.
	Midnight.	1 bird.	1 bird.	2 birds.
,, 25	2–6 a.m.	1 bird.	1 bird.	1 bird.
	8 a.m.	2 birds.	1 bird.	2 birds.
	10 a.m. to 10 p.m.	2 birds.	2 birds.	2 birds.
	Midnight.	1 bird.	1 bird.	2 birds.
,, 26	2 a.m.	2 birds.	1 bird.	1 bird *. * Also alone at 1 a.m.
	4 a.m.	1 bird.	1 bird.	1 bird.
		6–10 a.m., 1 bird.	8 a.m. to 10 p.m., 2 birds.	6–10 a.m., 1 bird.
		2–10 p.m., 2 birds.	Midnight, 2 birds.	2–10 p.m., 2 birds.
		Midnight, ?		Midnight, 1 bird.
,, 27	....	2–6 a.m., 1 bird.	2–11 a.m., 1 bird.	2–8 a.m., 1 bird.
		8 a.m. to 10 p.m., 2 birds.	10 p.m. to midnight, 2 birds.	11 a.m., absent. 10 p.m., 2 birds.
		Midnight, 1 bird.	.....	Midnight, 1 bird.
,, 28	....	2 and 4 a.m., 1 bird.	2 a.m. to 10 p.m., 2 birds.	1–4 a.m., absent.
	....	8 a.m. to 10 p.m., 2 birds.	(At 4 a.m., attempted intercourse.)	7–10 a.m., 1 bird.

TABLE XI. (*continued*).

Date.	Hour.	Pair XIII.	Pair XIV.	Pair XV.
1921.				
Nov. 28	....	Midnight, 1 bird.	Midnight, 1 bird.	11 a.m. to midnight, 2 birds.
Nov. 29	....	2–4 a.m., 1 bird.	2 a.m., 1 bird.	2–8 a.m., 1 bird.
		6 a.m. to midnight, 2 birds.	4 a.m. to midnight, 2 birds.	Noon to 5 p.m., 2 birds.
				10 p.m. to midnight, 1 bird.
,, 30	2 a.m.	2 birds.	2 birds.	1 bird.
	4 a.m. to 10 p.m.	2 birds.	2 birds.	2 birds.
	Midnight.	1 bird.	1 bird.	1 bird.
Dec. 1	2–6 a.m.	1 bird.	2 birds.	1 bird (2 at 6 a.m.).
	8 a.m.	1 bird.	2 birds.	2 birds.
	Noon to 10 p.m.	2 birds.	(1 bird at 10 p.m.)	2 birds.
	Midnight.	1 bird.	1 bird.	2 birds.
,, 2	1 a.m.	.....	.....	2 birds.
	2 a.m.	1 bird.	2 birds.	2 birds (1st egg laid).
	4 and 6 a.m.	2 birds.	2 birds.	2 birds.
	8 a.m.	1 bird.	2 birds.	2 birds.
	11 a.m.	2 birds.	.....	.....
	Midnight.	1 bird.	1 bird.	2 birds.

TABLE XII.—Pair No. XVII. (*Known as Sarah Couple.*)

Date.	Hour.		Date.	Hour.	
1921.			1921.		
Nov. 20	3 a.m.	1 bird.	Nov. 23	1 a.m. to 10 p.m.	2 birds (intercourse at 10 a.m.).
	8 a.m.	2 birds.			
	10 p.m.	2 birds.		11 p.m. and midnight.	1 bird.
	11 p.m. and midnight.	1 bird.	,, 24	1–6 a.m.	1 bird.
,, 21	2–8 a.m.	Absent.		7 a.m. to midnight.	2 birds.
	10 a.m.	2 birds.	,, 25	2 a.m.	2 birds.
	10 p.m.	2 birds.		3–6 a.m.	1 bird.
	11 p.m. and midnight.	1 bird.		7 a.m. to 10 p.m.	2 birds.
				Midnight.	1 bird.
,, 22	1–7 a.m.	1 bird.	,, 26	1–10 a.m.	1 bird.
	8 a.m. to midnight.	2 birds.		2 p.m. to midnight.	2 birds.

TABLE XII. (*continued*).

Date.	Hour.		Date.	Hour.	
1921.			1921.		
Nov. 27	2–6 a.m.	2 birds.	Nov. 30	10 p.m.	Attempted intercourse.
Hourly	8 a.m.	Intercourse.			
observations	10 a.m. to 9 p.m.	2 birds (attempted intercourse		11 p.m. and midnight.	1 bird.
commence.	10 p.m.	at 8 p.m.). Male alone.	Dec. 1	1–3 a.m.	1 bird.
	Midnight.	Attempted intercourse by male with stranger.		4 a.m. to midnight.	2 birds.
			,, 2	1–7 a.m.	2 birds.
				8 a.m.	Male on nest.
				9 a.m to 8 p.m.	2 birds (female on nest at 9 a.m.).
Nov. 28	1 and 2 a.m.	Male alone.			
	3 a.m. to 11 p.m.	2 birds (intercourse at 6 a.m.).		9 and 10 p.m.	2 birds (female on nest).
,, 29	1–7 a.m.	Female alone.		11 p.m.	2 birds (male on nest).
	8 a.m. to 11 p.m.	2 birds.			
	Midnight.	Attempted intercourse.		Midnight.	2 birds (female on nest).
,, 30	1 a.m to 9 p.m.	2 birds.			

For further observations, see " Spells of Duty on Nest."

TABLE XIII.—Pair No. XVII.—*Spells of Duty on Nest.*

Date.	Time.	Number present.	On nest.	Date.	Time.	Number present.	On nest.
1921.				1921.			
3rd Dec.	1 a.m.	2	Male.	3rd Dec.	4 p.m.	1	Male.
,,	2 a.m.	2	Female.	,,	5 p.m.	2	Female.
,,	3 a.m.	2	Female.	,,	6 p.m.	2	Female.
,,	4 a.m.	2	Female.	,,	7 p.m.	2	Female.
,,	5 a.m.	2	Female.	,,	8 p.m.	2	Male.
,,	6 a.m.	2	Female.	,,	9 p.m.	2	Female.
,,	7 a.m.	2	Female.	,,	10 p.m.	2	Female.
,,	8 a.m.	2	Female.	,,	11 p.m.	2	Female.
,,	9 a.m.	2	Female.	,,	Midnight.	2	Female.
,,	10 a.m.	2	Female.				
,,	11 a.m.	1	Male.	4th Dec.	1 a.m.	2	Female.
,,	Noon.	2	Female.	,,	2 a.m.	1	Female.
,,	1 p.m.	2	Female.	,,	3 a.m.	1	Female.
,,	2 p.m.	2	Female.	,,	4 a.m.	1	Female.
,,	3 p.m.	2	Female.	,,	5 a.m.	1	Female.

TABLE XIII. (*continued*).

Date.	Time.	Number present.	On nest.	Date.	Time.	Number present.	On nest.
1921.				1921.			
4th Dec.	6 a.m.	1	Female.	5th Dec.	9 p.m.	2	Male.
,,	7 a.m.	2	Female.	,,	10 p.m.	2	Male.
,,	8 a.m.	2	Female.	,,	11 p.m.	1	Female.
,,	9 a.m.	2	Female.	,,	Midnight.	1	Female.
,,	10 a.m.	2	Female.				
,,	11 a.m.	2	Male.	6th Dec.	1 a.m.	1	Female.
,,	Noon.	2	Male.	,,	2 a.m.	1	Female.
,,	1 p.m.	2	Female.	,,	3 a.m.	1	Female.
,,	2 p.m.	2	Female.	,,	4 a.m.	1	Female.
,,	3 p.m.	2	Female.	,,	5 a.m.	2	Female.
,,	4 p.m.	2	Female.	,,	6 a.m.	2	Male.
,,	5 p.m.	2	Female.	,,	7 a.m.	2	Male.
,,	6 p.m.	2	Female (1st egg laid).	,,	8 a.m.	2	Male.
				,,	9 a.m.	2	Male.
				,,	10 a.m.	2	Male.
,,	7 p.m.	2	Female.	,,	11 a.m.	2	Female.
,,	8 p.m.	2	Female.	,,	Noon.	2	Female.
,,	9 p.m.	2	Female.	,,	1 p.m.	2	Female.
,,	10 p.m.	2	Male.	,,	2 p.m.	2	Female.
,,	11 p.m.	2	Male.	,,	3 p.m.	2	Female.
,,	Midnight.	2	Male.	,,	4 p.m.	2	Female.
				,,	5 p.m.	1	Male.
5th Dec.	1 a.m.	2	Male.	,,	6 p.m.	2	Male.
,,	2 a.m.	2	Male.	,,	7 p.m.	2	Male.
,,	3 a.m.	2	Male.	,,	8 p.m.	2	Male.
,,	4 a.m.	2	Male.	,,	9 p.m.	2	Male.
,,	5 a.m.	2	Male.	,,	10 p.m.	2	Male.
,,	6 a.m.	2	Male.	,,	11 p.m.	2	Male.
,,	7 a.m.	2	Female.	,,	Midnight.	1	Female.
,,	8 a.m.	2	Female.				
,,	9 a.m.	2	Female.	7th Dec.	1 a.m.	1	Female.
,,	10 a.m.	2	Female.	,,	2 a.m.	1	Female.
,,	11 a.m.	1	Female.	,,	3 a.m.	1	Female.
,,	Noon.	2	Female.	,,	4 a.m.	1	Female.
,,	1 p.m.	2	Female.	,,	5 a.m.	1	Female.
,,	2 p.m.	2	Female.	,,	6 a.m.	1	Female.
,,	3 p.m.	2	Female.	,,	7 a.m.	2	Female.
,,	4 p.m.	2	Male.	,,	8 a.m.	1	Male.
,,	5 p.m.	2	Male.	,,	9 a.m.	2	Male.
,,	6 p.m.	2	Male.	,,	10 a.m.	2	Male.
,,	7 p.m.	2	Male.	,,	11 a.m.	2	Male.
,,	*8 p.m.*	*2*	*Male.*	,,	*Noon.*	*2*	*Male.*

TABLE XIII. (*continued*).

Date.	Time.	Number present.	On nest.	Date.	Time.	Number present.	On nest.
1921.				1921.			
7th Dec.	1 p.m.	2	Male.	9th Dec.	3 a.m.	1	Female.
,,	2 p.m.	2	Male.	,,	4 a.m.	1	Female.
,,	3 p.m.	2	Male.	,,	5 a.m.	1	Female.
,,	4 p.m.	2	Female.	,,	6 a.m.	1	Female.
,,	5 p.m.	2	Female.	,,	7 a.m.	2	Female.
,,	6 p.m.	2	Female.	,,	8 a.m.	2	Female.
,,	7 p.m.	1	Female.	,,	9 a.m.	2	Female.
,,	8 p.m.	2	Female.	,,	10 a.m.	2	Female.
,,	9 p.m.	1	Female.	,,	11 a.m.	2	Female.
,,	10 p.m.	1	Female.	,,	Noon.	2	Female.
,,	11 p.m.	1	Female	,,	1 p.m.	2	Female.
			(2nd egg	,,	2 p.m.	2	Female.
			laid).	,,	3 p.m.	2	Female.
,,	Midnight.	1	Female.	,,	4 p.m.	2	Female.
				,,	5 p.m.	2	Female.
8th Dec.	1 a.m.	1	Female.	,,	6 p.m.	2	Female.
,,	2 a.m.	1	Female.	,,	7 p.m.	2	Male.
,,	3 a.m.	1	Female.	,,	8 p.m.	1	Male.
,,	4 a.m.	1	Female.	,,	9 p.m.	1	Male.
,,	5 a.m.	1	Female.	,,	10 p.m.	1	Male.
,,	6 a.m.	2	Female.	,,	11 p.m.	1	Male.
,,	7 a.m.	2	Male.	,,	Midnight.	1	Male.
,,	8 a.m.	1	Male.				
,,	9 a.m.	2	Male.	10th Dec.	1 a.m.	1	Male.
,,	10 a.m.	2	Male.	,,	2 a.m.	1	Male.
,,	11 a.m.	2	Male.	,,	3 a.m.	2	Male.
,,	Noon.	1	Male.	,,	4 a.m.	2	Male.
,,	1 p.m.	1	Male.	,,	5 a.m.	2	Male.
,,	2 p.m.	2	Male.	,,	6 a.m.	2	Male.
,,	3 p.m.	2	Male.	,,	7 a.m.	2	Male.
,,	4 p.m.	1	Male.	,,	8 a.m.	1	Male.
,,	5 p.m.	1	Male.	,,	9 a.m.	1	Male.
,,	6 p.m.	1	Male.	,,	10 a.m.	1	Male.
,,	7 p.m.	1	Male.	,,	11 a.m.	1	Male.
,,	8 p.m.	2	Male.	,,	Noon.	1	Female.
,,	9 p.m.	2	Female.	,,	1 p.m.	1	Female.
,,	10 p.m.	1	Female.	,,	2 p.m.	1	Female.
,,	11 p.m.	1	Female.	,,	3 p.m.	1	Female.
,,	Midnight.	1	Female.	,,	4 p.m.	1	Female.
				,,	5 p.m.	2	Female.
9th Dec.	1 a.m.	1	Female.	,,	6 p.m.	2	Male.
,,	2 a.m.	1	Female.	,,	7 p.m.	1	Male.

TABLE XIII. (*continued*).

Date.	Time.	Number present.	On nest.	Date.	Time.	Number present.	On nest.
1921.				1921.			
10th Dec.	8 p.m.	1	Male.	12th Dec.	Noon.	1	Female.
,,	9 p.m.	1	Male.	,,	1 p.m.	1	Female.
,,	10 p.m.	1	Male.	,,	2 p.m.	1	Female.
,,	11 p.m.	1	Male.	,,	3 p.m.	1	Female.
,,	Midnight.	1	Male.	,,	4 p.m.	2	Female.
				,,	5 p.m.	2	Female.
11th Dec.	1 a.m.	1	Male.	,,	6 p.m.	2	Female.
,,	2 a.m.	1	Male.	,,	7 p.m.	2	Female.
,,	3 a.m.	1	Male.	,,	8 p.m.	2	Female.
,,	4 a.m.	1	Male.	,,	9 p.m.	1	Female.
,,	5 a.m.	2	Male.	,,	10 p.m.	1	Female.
,,	6 a.m.	2	Female.	,,	11 p.m.	1	Female.
,,	7 a.m.	1	Female.	,,	Midnight.	1	Female.
,,	8 a.m.	1	Female.				
,,	9 a.m.	1	Female.	13th Dec.	1 a.m.	1	Female.
,,	10 a.m.	1	Female.	,,	2 a.m.	1	Female.
,,	11 a.m.	1	Female.	,,	3 a.m.	1	Female.
,,	Noon.	1	Female.	,,	4 a.m.	2	Female.
,,	1 p.m.	1	Female.	,,	5 a.m.	2	Female.
,,	2 p.m.	2	Female.	,,	6 a.m.	2	Female.
,,	3 p.m.	2	Female.	,,	7 a.m.	2	Female.
,,	4 p.m.	2	Female.	,,	8 a.m.	1	Male.
,,	5 p.m.	1	Male.	,,	9 a.m.	1	Male.
,,	6 p.m.	1	Male.	,,	10 a.m.	1	Male.
,,	7 p.m.	1	Male.	,,	11 a.m.	1	Male.
,,	8 p.m.	1	Male.	,,	Noon.	1	Male.
,,	9 p.m.	1	Male.	,,	1 p.m.	1	Male.
,,	10 p.m.	1	Male.	,,	2 p.m.	1	Male.
,,	11 p.m.	1	Male.	,,	3 p.m.	1	Male.
,,	Midnight.	1	Male.	,,	4 p.m.	1	Male.
				,,	5 p.m.	1	Male.
12th Dec.	1 a.m.	1	Male.	,,	6 p.m.	1	Male.
,,	2 a.m.	1	Male.	,,	7 p.m.	1	Male.
,,	3 a.m.	1	Male.	,,	8 p.m.	1	Male.
,,	4 a.m.	1	Male.	,,	9 p.m.	1	Male.
,,	5 a.m.	1	Male.	,,	10 p.m.	1	Male.
,,	6 a.m.	1	Male.	,,	11 p.m.	1	Male.
,,	7 a.m.	1	Male.	,,	Midnight.	1	Male.
,,	8 a.m.	2	Female.				
,,	9 a.m.	1	Female.	14th Dec.	1 a.m.	1	Male.
,,	10 a.m.	2	Female.	,,	2 a.m.	1	Male.
,,	11 a.m.	1	Female.	,,	3 a.m.	1	Male.

TABLE XIII. (*continued*).

Date.	Time.	Number present.	On nest.	Date.	Time.	Number present.	On nest.
1921.				1921.			
14th Dec.	4 a.m.	1	Male.	15th Dec.	2 p.m.	1	Male.
,,	5 a.m.	1	Male.	,,	3 p.m.	1	Male.
,,	6 a.m.	2	Female.	,,	4 p.m.	1	Male.
,,	7 a.m.	1	Female.	,,	5 p.m.	1	Male.
,,	8 a.m.	1	Female.	,,	6 p.m.	1	Male.
,,	9 a.m.	1	Female.	,,	7 p.m.	1	Male.
,,	10 a.m.	2	Female.	,,	8 p.m.	1	Male.
,,	11 a.m.	2	Female.	,,	9 p.m.	1	Male.
,,	Noon.	1	Female.	,,	10 p.m.	1	Male.
,,	1 p.m.	1	Female.	,,	11 p.m.	1	Male.
,,	2 p.m.	1	Female.	,,	Midnight.	1	Male.
,,	3 p.m.	1	Female.				
,,	4 p.m.	2	Female.	16th Dec.	1 a.m.	1	Male.
,,	5 p.m.	2	Female.	,,	2 a.m.	1	Male.
,,	6 p.m.	2	Female.	,,	3 a.m.	2	Female.
,,	7 p.m.	2	Female.	,,	4 a.m.	1	Female.
,,	8 p.m.	1	Male.	,,	5 a.m.	1	Female.
,,	9 p.m.	1	Male.	,,	6 a.m.	1	Female.
,,	10 p.m.	1	Male.	,,	7 a.m.	2	Female.
,,	11 p.m.	1	Male.	,,	8 a.m.	1	Female.
,,	Midnight.	1	Male.	,,	9 a.m.	1	Female.
				,,	10 a.m.	2	Female.
15th Dec.	1 a.m.	1	Male.	,,	11 a.m.	1	Female.
,,	2 a.m.	1	Male.	,,	Noon.	1	Female.
,,	3 a.m.	1	Male.	,,	1 p.m.	1	Female.
,,	4 a.m.	1	Male.	,,	2 p.m.	1	Female.
,,	5 a.m.	1	Male.	,,	3 p.m.	1	Female.
,,	6 a.m.	1	Male.	,,	4 p.m.	1	Female.
,,	7 a.m.	1	Male.	,,	5 p.m.	1	Female.
,,	8 a.m.	1	Male.	,,	6 p.m.	1	Female.
,,	9 a.m.	1	Male.	,,	7 p.m.	2	Female.
,,	10 a.m.	1	Male.	,,	8 p.m.	2	Female.
,,	11 a.m.	1	Male.	,,	9 p.m.	2	Female.
,,	Noon.	1	Male.	,,	10 p.m.	2	Female.
,,	1 p.m.	1	Male.	,,	11 p.m.	2	Female.
				,,	Midnight.	2	Female.

" Number present " indicates whether both birds were present at nests or whether only one was present.

The first egg was hatched on 8th January, 1922, and the second on 11th January, 1922 (see Table III., page 199, nos. 6 and 6*a*).

Pair No. XVII. *Analysis of Observations on the Spells of Duty on the Nest.*

Period covered=14 days=336 hours.
Out of 336 hours the female had 183 hours on duty.
„ „ male „ 153 „ „
Interval between laying of 1st and 2nd eggs=77 hours.

Periods of Duty on Nest (in hours).

1	by the male followed by	9	by the female.		
1	„	4	„	„	
1	„	3	„	„	
1	„	14	„	„	
2	„	9	„	„	1st egg.
9	„	9	„	„	
7	„	7	„	„	
5	„	6	„	„	
7	„	8	„	„	
8	„	15	„	„	2nd egg.
14	„	22	„	„	
17	„	6	„	„	
12	„	11	„	„	
15	„	24	„	„	
22	„	14	„	„	
31	„	22	„	„	
153		183			

Pair No. XVII.

An examination of the above table will show that up to the laying of the first egg the male took spells on duty of from one to two hours at a time to the female's three to fourteen hours. Between the laying of the first egg and that of the second, spells of five to fifteen hours at a stretch were taken in more or less equal proportion until the second egg was due to be laid. After the laying of the second egg, spells of duty lengthened to from six to thirty-one hours at a stretch without any fishing trips and consequently without food. Although during the time the pair were under observation the female had the most hours of work it should none the less be noticed that the male had the longest individual spell (thirty-one hours !).

Additional Notes.

23. 11. 21. The female is becoming very tame. As long as we approach her home at the foot of the meteorological screen cautiously, she does not even rise from her nest, which is only about a foot from where we stand. This is not so with the male ; he generally clears off when we come (Pl. VII. fig. 1).

3. 12. 21. A strange female was on the nest. Mr. Sarah attempted intercourse with her, but the strange female got up on seeing Mrs. Sarah return. Mr. Sarah got annoyed with the female he was trying to seduce and gave her a good hiding, but this punishment was comparatively light compared with the beating he gave his own wife later on. He attempted to either force the stranger down or else out of the nest. She was only too willing to get away, and, although I am not positively certain, I am almost sure this female returned to her lawful husband on a nest three feet away. In the meantime, Mrs. Sarah had returned to the nest and was met with severe pecking and flipping from Mr. Sarah, who seemed annoyed at his wife's sudden inopportune return. After venting his disappointed rage on her, they bowed, the latter not at all indignant. Mr. Sarah now occupied the nest, and apparently for nothing but sheer bad temper kicked the stones to the rear with his feet. Naturally the occupants of the next nest gathered up the " windfall " as quickly as possible. Mr. Sarah resented this and flew round on the gatherer and a mild though rapid fight ensued. After this all was peace and quiet again. A most immoral comedy !

4. 12. 21. At 2 a.m. three birds were trying to rob Mrs. Sarah, who was alone on her nest. At 5 a.m. she was still beset by the three robbers. Three stones were stolen in half a minute. Her husband did not return until 7 a.m.

6. 12. 21. At 5 a.m. Mr. Sarah had just returned from fishing. Mrs. Sarah also returned. She had been absent, but had not been fishing. On changing watch over the nest the female rose, both crowed, the male stepped on to the nest, then two more bows and the guard was changed.

7. 12. 21. We have been able to ascertain for this pair the exact interval between the laying of the two eggs:—

First egg laid on December 4th between 5 p.m. and 6 p.m.
Second egg laid on December 7th between 10 p.m. and 11 p.m.
Interval=77 hours.

11. 12. 21. The same performance of relieving guard as seen on 6. 12. 21 was again observed to-day.

Conclusion.

Further observations are very desirable and might with advantage be made in order to settle some interesting points on which our observations are not conclusive. For instance :—

(1) Would a Gentoo completely rear a young Ringed Penguin or *vice versa* ? This could be tried by exchange of eggs.

(2) How long do birds fast when they are moulting ? This could easily be ascertained by ringing or marking several birds.

(3) Do birds come back after their partial migration unmated or are they sometimes already mated? This could be ascertained by ringing numerous birds.

(4) If the young birds do not return to their own rookery the following season, where do they go?

(5) What is the length of the life of a Gentoo? This could only be obtained by dated rings and the careful searching of selected rookeries by subsequent expeditions.

THE RINGED OR ANTARCTIC PENGUIN
(*Pygoscelis antarctica*).

Rookeries and occasional Observations.

Deception Island.—This is the species which we found inhabiting the large rookery on the east coast of the Island in December 1920. On 26. 12. 20 we found several young just hatched from the eggs.

We also visited a rookery on the south-west coast.

Water-Boat Point.—Lat. 64° 48′ S., long. 62° 43′ W. There were smallish rookeries of these on Coal Point and South Island. It was on these rookeries that the observations which follow were collected. We estimated on 1. 1. 22 that there were about four hundred and fifty on South Island and seven hundred at Coal Point.

Andvord Bay.—We found on 7. 2. 21 a rookery of Ringed and Gentoo Penguins on the south point of the entrance to this bay. This we called Shag Point.

Nansen Island.—Between 14. 1. 22 and 1. 3. 22 we saw occasional birds on the rocks near the ships, the greatest number seen at one time being a dozen. One was incapacitated through contact with the fat from one of the factory ships.

On 21. 1. 22 we found a small rookery on a little island off the south end of Nansen Island. Young were present in all the nests.

Cape Reclus.—30. 1. 22. We found a small rookery here. The young were too big to lie under the adult.

Rocks off Cape Murray.—4. 3. 22. About twenty birds seen.

6. 3. 22. About twenty birds resting on a rock.

Two Hummocks Island (small island N.E. by N. of this).—5. 3. 22. A moderate-sized rookery observed.

Two Hummocks Island.—9. 3. 22. On the south-west shore we saw a large rookery.

East of Liège Island.—7. 3. 22. Half a dozen seen swimming.

Between Liège Island and Christiania Island.—7. 3. 22. Several seen swimming around.

Cape Murray.—9. 3. 22. On the larger of the two rocks to the north of Cape Murray there appears to be a small rookery. On the island forming Cape Murray Harbour we saw ten Ringed.

Off Cape Kaiser.—9. 3. 22. At 5 p.m. saw four on one iceberg and five on another. At 6 p.m. there were three to four hundred on a large iceberg and some two hundred on another. On the south or larger of the two small islands off Cape Kaiser, there is a moderate-sized rookery, probably of Ringed, as many of this kind were seen in the vicinity.

Brialmont Bay.—24. 3. 22. Several seen swimming around.

De Gerlache Strait.—30. 3. 22. In De Gerlache Strait between Cape Reclus and Cape Murray birds were numerous. Throughout the day in the passage up to Smith Island we saw birds swimming and resting on pieces of ice. In the evening midway between Smith Island and Snow Island we saw a few birds swimming towards Snow Island.

Physical Characteristics.

The Ringed or Antarctic Penguin stands about 1 ft. 6 in. high, being a little shorter than the Gentoo and Adélie. Its distinguishing feature is the black chin-strap which crosses the throat and the white face-marking with a cap of bluish-black feathers running up from the back and along the back of the neck. The plumage of the back is a slaty-blue colour. The throat and ventral regions are pure white with a beautiful sheen. The beak is black and the legs and feet are a greyish-pink colour.

Like the Gentoo the plumage becomes duller as the season advances.

Methods of Progression on Land and in Water.

These are exactly the same as employed by the Gentoos. If anything the Ringed is a little more agile than the Gentoo both on land and in water. It is also more energetic, as is proved by its preference for nesting on the higher parts of the rookeries.

Sexual Intercourse.

The same procedure takes place as with the Gentoo, but with the Ringed the flippers seem only to serve for steadying purposes and not to heighten sensation as with the Gentoo. More often than not there is no flipper play at all, the flippers being kept close to the side. I watched one intercourse particularly carefully, and only once during the whole performance did the male raise his flippers slightly to preserve his balance.

Nest-making.

Like the Gentoo the normal nest consists of a heap of stones, roughly circular and saucer-shaped. The nests are not as large or so well built as those of the Gentoo.

A dozen normal-sized nests were measured. They averaged 20 in. diameter at the base, 14 in. diameter at the top, and 2½ in. deep in the hollowed-out part. The largest measured 23 in. in diameter at the base and 17 in. in diameter at the top. The smallest measured 16 in. in diameter at the base and 12½ in. in diameter at the top.

TABLE XIV.

No.	Order of laying.	Date of laying.	Date of hatching.	Time of incubation.
				Days.
1.....	1st.	Nov. 29, 1921.	Jan. 8, 1922.	40
2.....	1st.	Nov. 29, 1921.	Jan. 5, 1922.	37
3.....	1st } same	Nov. 29, 1921.	Jan. 5, 1922.	37
3 *a* ...	2nd } clutch.	Dec. 3, 1921.	Jan. 7, 1922.	35
4.....	1st.	Nov. 29, 1921.	Jan. 5, 1922.	37
5.....	1st } same	Dec. 4, 1921.	Jan. 9, 1922.	36
5 *a* ...	2nd } clutch.	Dec. 7, 1921.	Jan. 10, 1922.	34
6.....	1st.	Dec. 8, 1921.	Jan. 15, 1922.	38
7.....	2nd.	Dec. 8, 1921 ?	Jan. 11, 1922.	34
8.....	3rd.	Dec. 6, 1921 ?	Jan. 11, 1922.	36
9.....	2nd.	Dec. 5, 1921.	Jan. 10, 1922.	36
10.....	1st } same	Dec. 4, 1921.	Jan. 12, 1922.	39
10 *a* ...	2nd } clutch.	Dec. 8, 1921.	Jan. 14, 1922.	37
11.....	1st.	Dec. 6, 1921 ?	Jan. 11, 1922.	36
12.....	1st.	Dec. 6, 1921 ?	Jan. 11, 1922.	36
			Average	37
			Range	34–40

A normal-sized nest was found to contain three hundred and fifty stones. The nests consist principally of stones, but there are also tail-feathers and bones. The stones are generally flat slaty ones.

It is interesting that on all the Ringed Penguin rookeries we found that the occupants showed marked preference for the higher ground for nesting-sites. At Water-Boat Point the highest parts of South Island and Coal Point were

occupied by Ringed. The Island being lower had no Ringed on it. It was very noticeable at Shag Point, where nests were perched quite high up on the rock exposure.

Eggs.

Like the Gentoo, the Ringed normally lays two eggs—very rarely three. They are smaller than the Gentoo's and more pointed. The yolk is a yellowish colour as against the reddish colour of the Gentoo's yolk. The shell is a slightly greenish white, whereas the Gentoo's egg is white with a slight bluish tinge.

Although at Coal Point on 19. 12. 21 I looked under nearly every bird, I found only one nest containing a clutch of three eggs.

Incubation Period.

Table XIV. (p. 273) summarises successful results of observations to establish the incubation period and may be regarded as absolutely reliable. It was an easier matter to obtain figures from the Ringed than the Gentoo, as the former are rather more orderly and quiet in their mode of living.

It will be noted that in the three cases where both eggs of the same clutch were observed, the incubation period of the second was two days shorter, whereas in the one similar case observed in the Gentoo there was no difference (p. 199).

Adoption of Eggs.

Although no experiments were conducted, I see no reason why the behaviour of the Ringed should differ from the Gentoos in this respect.

Adoption of Young.

I should not, however, like to assume that the Ringed would adopt one another's young without experiment. The mentality of the Ringed is somewhat different, and quite possibly they might have a tendency to kill rather than foster someone else's offspring.

Stages of Down.

For the reason explained under this heading in the section devoted to the Gentoo, no observations were made of the two stages of down of the young.

Method of feeding Young.

This is the same as with the Gentoo.

Food.

The Ringed and Gentoo have the same main food-supply—the Euphausiæ.

Drinking.

Ringed were occasionally observed taking up beakfuls of snow to drink.

Disgorging.

I observed no case of this, apart from feeding young.

Sleep.

As with the Gentoo.

Crowing.

The Ringed has only one way of producing noise. This is the equivalent of a crow and is produced by stretching out the neck, expanding and contracting the chest, and gradually working up into a shrill cackle. It is quite a different sound from that made by the Gentoo, being of higher note and sounding like " kulaak, kulaak, kulaak." It is also accompanied by a queer buzzing sound. The purpose of the crow is to demonstrate affection, pleasure, and to call the mate. This corresponds to the " ecstatic " attitude described by Levick in his description of the habits of the Adélie Penguins.

To show affection, the two birds will wave their necks close together first on one side and then on the other, often rubbing heads (Pl. VI. figs. 4, 5; Pl. VII. fig. 3).

Frequently we saw single birds waving their flippers and crowing, evidently from sheer *joie de vivre* (Pl. VI. fig. 2; Pl. VII. fig. 4). This occurred only when they were on their nest-sites.

19. 11. 21. Saw a bird crow and the mate immediately ran up. Later saw another crow. The mate hurried to it and carried on the " kulaaking," followed by the queer buzzing noise and oscillating of heads.

Preening and Cleaning.

The notes given under the Gentoo section apply equally to the Ringed.

Fighting.

In general, the Ringed and Gentoo have the same tactics, though the Ringed is a fiercer fighter than the Gentoo and more tenacious.

Illness.

I saw no case of illness among the Ringed, except, of course, during the moulting period, when they, in common with the Gentoo, have a very dejected appearance and obviously suffer.

Mortality.

Mortality of eggs and young is considerable, but I should think the Ringed are much better and more responsible parents than the Gentoos. They protect their eggs and young more than the Gentoos.

6. 12. 21. The breakage and loss of eggs must be pretty considerable. To-day I found that of the twenty-four observation birds' eggs three had disappeared and one had been broken.

Enemies and Scavengers.

The same remarks which were made under this heading for the Gentoos apply equally to the Ringed.

7. 11. 21. Three Ringed were on the ice in the Bay amongst a large band of Gentoos which were harassed by a Leopard Seal.

24. 11. 21. A Leopard Seal was lying on a small floe with a dead Ringed alongside its head. A Dominican Gull and a Brown Skua were standing close by. The Gull behind made a noise and attracted the Leopard's attention. It swung round on the Gull, who flew off. The Leopard Seal obviously feared the loss of its meal. It slept with the carcass as a pillow, at times it half held it in its mouth and occasionally tried it between its teeth, as if to see if it were tender. The penguin appeared to have received no outward damage beyond ruffled plumage. Directly the Leopard Seal saw the observer it grabbed its prey, and started off into the water, where it allowed the penguin to float for a moment or two before looking round, grabbing it once more, and vanishing.

4. 12. 21. A Brown Skua was seen swooping down on Ringed Penguins, evidently in search of eggs.

Intelligence.

I should rate the Ringed as possessing more sagacity than the Gentoo, but not as much likeable cunning.

Affection.

The adult birds have obviously greater affection for one another than the Gentoos and are more demonstrative of that affection. Their crowing (of the affectionate variety) is more frequent.

See also " II. Period of Moulting " (p. 278).

Bravery and Timidity.

The Ringed is a much braver bird than the Gentoo both in fighting and in the protection of eggs and young. It will also attack a human being more readily.

12. 2. 21. While climbing up the rocks on the Shag Point rookery I was set on by a few Ringed *en masse*, and had a good deal of difficulty in shaking them off.

24. 11. 21. We often try to stroke the Ringed and it is noticeable that the females are much more susceptible to petting than the males. The males

evidently become very jealous and peck at our mittens. They also give their mates pecks, and on two occasions we have seen the male give the female a good hiding for permitting such familiarities from us.

Friendship.

I saw no evidence of the neighbourly friendships recorded under the Gentoo.

Persistence.

27. 11. 21. To prove the Ringed's persistence we have tried this little experiment on various occasions :—I swung my fur mitten (which has a piece of string on it to hold it round my neck) in front of a bird. He immediately went for it with beak and flippers, as if it were another penguin. He never seemed to tire of it and for a quarter of an hour I placed it at intervals in front of him and he repeated the performance.

Inquisitiveness.

The Ringed are not so highly developed in this respect as the Gentoo, though the bulk of the inquisitiveness found amongst the Gentoos arose from the irresponsible immature birds.

Immorality.

No case of immorality amongst the Ringed was observed. This may have been due to the fact that we did not observe the Ringed so intensively, though from their general behaviour we came to regard them as more respectable than the Gentoos.

Thieving.

Thieving is part of a penguin's nature and is so universally indulged in that it may be regarded as a normal habit rather than a sin. Whilst the Ringed were no pattern, they certainly did not seem so adept at it as the Gentoos.

Recognition.

Much the same remarks apply to the Ringed as to the Gentoo. They certainly recognize one another's call even at a distance.

Unusual Incidents.

19. 11. 21, 2 a.m. A very noticeable tremor of flippers was shown by many birds both when the flippers were stretched out and by the side. Yesterday this was also noticed.

Relationship with Gentoo Penguins.

See under Gentoo Penguins.

Immature Birds.

We saw no birds comparable with those which we so frequently came across on the Gentoo rookeries.

YEARLY LIFE-CYCLE OF THE RINGED PENGUIN.

As with the Gentoo the life-cycle of the Ringed falls into various periods characterized by the changes in their habits. These are, in the order in which we observed them :—

I. Period of Rearing of Young.
II. ,, Moulting.
III. ,, total Migration.
IV. ,, partial Reoccupation of Rookeries.
V. ,, complete Occupation of Rookeries.
VI. ,, Preliminaries to Egg-laying.
VII. ,, Egg-laying.
VIII. ,, Hatching.

It will be observed that two periods which occur with the Gentoo are missing with the Ringed. These are :—

Period of Visiting Parties.
Period of Massed Fishing Expeditions.

The first is accounted for by the complete migration of the Ringed and the second by the fact that the Ringed have preference for individual or semi-individual fishing as opposed to the massed excursions of the Gentoos.

I. *Period of Rearing of Young.*

When we first arrived at Water-Boat Point we found the young fairly well developed. They had often a slate-grey coloured down all over and no other markings.

2. 3. 21. Several young are learning to swim off the rocks. They are just like child-beginners. They hesitate time and again, then plunge in and rush out of the water as quickly as possible. They have deeper water to practice in than the Gentoos, who prefer the shallow water along the shores.

II. *Period of Moulting.*

At the beginning of February the adults were beginning to moult.

14. 3. 21. I went up to the Ringed rookery this morning to kill some young birds for food, but did not find a single young one there. The only occupants

were the old birds in a moulting state or about to moult. Even when moulting they show great affection for each other and still continue the waving of their heads together and screeching.

III. *Period of total Migration.*

27. 3. 21. At 8 a.m. there was only one bird on South Island and a few at Coal Point, but later a few more returned.

1. 4. 21. For the last three or four days there have been only a few (perhaps a dozen or two) Ringed on the rookeries during the day.

14. 4. 21. For the last few days the rookeries been have deserted. An occasional bird may, however, be seen. Migration of the Ringed Penguins has evidently taken place. With the few exceptions it may be reckoned that the main migration took place during the first week of April.

19. 4. 21. There are no Ringed on the rookeries now.

1. 11. 21. To-day the Ringed have returned after their winter absence. At 5 a.m. on Coal Point I found that three birds had just arrived. At 8 a.m. two more had appeared on South Island and at 5 p.m. their number had increased to three.

As far as we can judge these birds are not mated.

It is extraordinary that the naturalists of the 'Scotia' Expedition found them returning from migration at the South Orkneys on November 2nd, 1903, only a day behind ours.

IV. *Period of partial Reoccupation of Rookeries.*

TABLE XV.

Date.	Number seen on rookeries.		Remarks.
	South Island.	Coal Point.	
2. 11. 21.	3	10	
3. 11. 21.	—	6	Also 1 on Island.
4. 11. 21.	—	2	
5. 11. 21.	1	12	
6. 11. 21.	5 seen.		
7. 11. 21.	3	—	A dozen seen in Channel.
8. 11. 21.	8 *	Crowings heard.	* Apparently unmated.
9. 11. 21.	19	14	
10. 11. 21.	27 *	110 **	* No sign of mating. ** Five or six pairs mated. Two complete intercourses seen.

V. *Period of complete Occupation of Rookeries.*

The exact fitting in of Periods IV., V., and VI. is not so satisfactory as with the Gentoos, since during Period IV. no sexual intercourse was observed with the Gentoos (see Period V.), whereas it had already taken place with the Ringed before the rookeries were apparently completely occupied. It was rather difficult to fix an even approximate date for complete occupation by the Ringed, because their irregular fishing habits prevented one judging when the full complement was there. I am assuming, therefore, that reoccupation was about complete by now.

11. 11. 21. At 6 p.m. there were about sixty birds on South Island. Noticed two pairs mated.

12. 11. 21. At 8 a.m. about sixty on South Island. Many on Coal Point.

13. 11. 21. At 6 p.m. usual number on South Island.

14. 11. 21. At 8 a.m. there were many at Coal Point. Counted seventy-two on South Island. Noted two pairs.

15. 11. 21. At 9 a.m. several birds on South Island. At 3 p.m. about ninety on South Island. Four pairs noted. The birds evidently go off fishing in the earlier hours of the day.

16. 11. 21. Visits were paid to South Island rookery at midnight, 1 a.m., 2 a.m., 3 a.m., 5 a.m., 8 a.m., 11 a.m., and no evidence was seen of the birds having left the rookery for fishing. Three odd birds were seen, however. One was fishing, one was in the Bay, and one on the Island at the place of departure for fishing. From these observations it would appear that the Ringed do not leave their rookeries *en masse* for fishing as do the Gentoos, but most probably go off one by one at any time throughout the day. This is supported by the fact that we often see odd birds fishing in the Channel even in the late afternoon and on various parts of the rookery where they must have landed in order to get to their own rookery.

At 7 p.m. saw two or three endeavouring to jump on to the ice-foot on South Island.

At 9 p.m. one bird near hut, one on west slope of Island, and one crossing Bay ice.

17. 11. 21. At 1 a.m. Ringed apparently as yesterday. No sign of departure *en masse*. At 6 a.m. one had just landed on the west ice-foot with a party of Gentoos returning from fishing. At 7 a.m. two more arrived and one came from Coal Point *viâ* the glacier. At noon about a hundred and fifty birds on South Island.

For "Sexual Intercourse," see Table XVI. (p. 281).

See also under " Family Histories " (pp. 283, 284).

VI. *Preliminaries to Egg-laying.*

18. 11. 21. Midnight. No birds seem to have departed. At 1 a.m. counted about two hundred and fifty on South Island, including eighteen pairs. The birds have in many instances hollowed out quite deep holes in the snow for nests.

At 4 a.m. Ringed apparently all present. Five birds seen near the edge of the ice-foot. At 7 a.m. all present. At 8 a.m. one bird had just returned from fishing. At 2 p.m. one on west shore. At 3 p.m. one fishing off-shore. At 6 p.m. three landed on west ice-foot and walked past the hut to South Island.

TABLE XVI.—*Sexual Intercourse during* (V.) *Period of complete Occupation of Rookeries,* (VI.) *Preliminaries to Egg-laying.*

Date.	Number seen.		Remarks.	
	Complete.	Attempted or incomplete.		
14. 11. 21.	1	..	8 a.m.	Period V.
17. 11. 21.	1	..		
20. 11. 21.	..	1 *	* 2 a.m. Much fighting at 5 a.m.	Period VI.
21. 11. 21.	2	..	Midnight.	
22. 11. 21.	1	1	8 p.m.	
23. 11. 21.	4	..	4 a.m. and 8 a.m. 11 a.m. and midnight.	
25. 11. 21.	3	..	4 a.m. and noon. Midnight.	
26. 11. 21.	1	..	6 p.m.	
27. 11. 21.	2	..		

19. 11. 21. At 8 a.m. one on west ice-foot. At noon counted twenty-eight pairs of birds at Coal Point. At 2 p.m. one bird returned from fishing.

20. 11. 21. As usual the Ringed have been on their rookeries all night and day. At 5 a.m. there was much fighting amongst the birds on South Island. At 10 p.m. birds as usual on rookeries.

21. 11. 21. At 1 a.m., 2 a.m. and 5 a.m. Ringed appeared to be present at both rookeries.

22. 11. 21. At 1 a.m. seven birds on north end of Island. At 2 a.m. a dozen at Coal Point were waiting to go off fishing.

23. 11. 21. At 1 a.m. apparently mostly present on South Island. There appear to be a few nests with only one bird " at home."

25. 11. 21.
26. 11. 21. } As usual the birds remained on their rookeries through the night.

28. 11. 21. It was observed that some birds were peeping over the snow-drift which covers them.

For " Sexual Intercourse," see Table XVI.

TABLE XVII.—*Sexual Intercourse and gradual Progress of Egg-laying.*

Date.	Sexual inter-course.	Eggs laid.	Remarks.
29. 11. 21.	6	9	
30. 11. 21.	3	22	One nest with 2 eggs.
1. 12. 21.	..	10	,, ,,
2. 12. 21.	1	7	,, ,,
5. 12. 21.	..	Few more.	
6. 12. 21.	..	Few more.	
7. 12. 21.	1	4	
2. 1. 22.	1	..	First signs of hatching.

VII. *Period of Egg-laying.*

29. 11. 21. To-day the first eggs have been laid:—
At 11 a.m. there were two eggs.
By 3 p.m. there were three eggs.
By 8 p.m. there were six eggs.
By 10 p.m. there were nine eggs.

These have been laid simply in hollows in the snow (Pl. VII. fig. 5). In one case the egg is in a pool of water.

It is curious that both Ringed and Gentoos should have commenced to lay on the same day.

30. 11. 21. One pair at Coal Point possessed two eggs in their nest. It is possible that one of these was laid as early as 25. 11. 21.

6. 12. 21. Odd birds seen on the west slopes of the Gentoo rookery.

2. 1. 22. This morning at Coal Point I found in one nest two eggs with holes through which the chicks were pecking their way. On searching most of the nests I found two more eggs with the beginnings of holes.

VIII. *Period of Hatching.*

4. 1. 22. At Coal Point in the afternoon I found one young one just hatched and heard two more. On South Island in the evening four eggs were found containing holes through which the chicks were pecking their way.

5. 1. 22. At 6 p.m. on South Island three chicks were found to be hatched.

8. 1. 22. On South Island a three days' old chick measured 6 inches in length with a flipper length of $1\frac{3}{4}$ inches.

10. 1. 22. One complete intercourse seen.

Observations discontinued.

FAMILY HISTORIES.

Pair No. I.

16. 11. 21. Both birds marked with Indian ink at 4 p.m.

17. 11. 21. Both present at 4 a.m., 6 a.m., 8 a.m., 10 a.m., noon, 4.30 p.m., 9 p.m., 11 p.m. They had evidently not left the rookery at all.

18. 11. 21. At 1 a.m. they were still present. At 10 a.m. still present and judging by their dirty state had not left the rookery. Noticed that both were present at 2 p.m., 6 p.m., 8 p.m., 10 p.m., and midnight.

19. 11. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 8 a.m., noon, 4 p.m., 5 p.m., 9 p.m., and 11 p.m.

20. 11. 21. Both present at 1 a.m., 5 a.m. They looked a little cleaner. It is possible, but very improbable, that they might have gone off fishing between 1 a.m. and 5 a.m.—but from the state of their ink marks, I doubt it. Moreover, they would not be likely to return together. Both were present at 8 a.m., 10 a.m., noon, 3 p.m., 5 p.m., 6 p.m., 8 p.m., 10 p.m., and midnight.

21. 11. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 8 a.m., 10 a.m., noon, 2 p.m., 5.30 p.m., 8 p.m., 10 p.m., and midnight.

22. 11. 21. Both present at 2 a.m., 4 a.m., etc., to 10 p.m.

23. 11. 21. Both present at 1 a.m., 4 a.m., 6 a.m., 8 a.m., 11 a.m., 1 p.m., 2 p.m., 4 p.m., 6 p.m., 8 p.m., 10 p.m., and midnight.

24. 11. 21. Both present at 2 a.m., 4 a.m., etc., to 8 p.m.

25. 11. 21.
26. 11. 21.
27. 11. 21.
28. 11. 21. } Both present at 2 a.m., 4 a.m., etc., to midnight.

29. 11. 21. Both present at 2 a.m., 4 a.m., etc., until midnight. At 3 p.m. first egg laid.

30. 11. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 10 a.m., noon, 2 p.m. One bird only at 4 p.m. Both present at 6 p.m., 8 p.m., 10 p.m., and midnight.

It was noticeable that when both were present at 6 p.m. one looked as if it

had had a bathe. This is the first time we have noticed one of these birds to be absent since we have had them under observation.

1. 12. 21. Both present at 2 a.m. and 4 a.m. One bird only at 6 a.m. Both present at 8 a.m., 10 a.m., etc., until midnight.

2. 12. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 8 a.m., 10 a.m., noon, and midnight.

Pair No. II.

16. 11. 21. One bird only marked—the male. Was alone at 4 p.m.

17. 11. 21. The male A was seen alone all day and not until 9 p.m. did the mate B turn up. At 11 p.m. both present.

18. 11. 21. At 1 a.m. they were still present. At 10 a.m. still present and to judge by their dirty state had not left the rookery. Noticed that both were present at 2 p.m., 6 p.m., 8 p.m., 10 p.m., and midnight.

19. 11. 21. Both seen at 4 a.m., 6 a.m., 8 a.m., noon, 5 p.m., 9 p.m., and 11 p.m. Intercourse took place at noon.

20. 11. 21. Noticed at 1 a.m. Not looked for again until 10 a.m., when both were present. No sign of having been away from rookery. Present at 10 a.m., noon, 3 p.m., 5 p.m., 6 p.m., 8 p.m.

21. 11. 21. One bird only at 4 a.m. and 6 a.m. At 8 a.m. both were present, the mate having apparently just returned from fishing. Both present at 8 a.m., 10 a.m., noon, 6 p.m., 8 p.m., 10 p.m. and midnight.

22. 11. 21. Both present at 2 a.m., 10 a.m., noon, 2 p.m., 4 p.m., 8 p.m.

23. 11. 21. Both present at 4 a.m., 6 a.m., 8 a.m., 11 a.m., 1 p.m., 6 p.m., 10 p.m., midnight.

24. 11. 21. Both present at 2 a.m., 10 a.m., 11 a.m., noon, 1 p.m., 2 p.m., 4 p.m., 6 p.m., 8 p.m., 10 p.m., midnight.

25. 11. 21.
26. 11. 21. } Both present at 2 a.m., 4 a.m., etc., to midnight.

27. 11. 21. Both present at 2 a.m., 4 a.m., etc., to midnight. They were absent at 8 a.m., evidently out for a walk, for they showed no signs of having been fishing when next seen at 10 a.m.

28. 11. 21.
29. 11. 21.
30. 11. 21.
1. 12. 21. } Both present at 2 a.m., 4 a.m., etc., to midnight.

2. 12. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 8 a.m., 10 a.m., noon, and midnight.

Pair No. III.

26. 11. 21. Bird distinguished by its bloody eye. This bird was present alone at 2 a.m., 4 a.m., etc., to midnight.

27. 11. 21. Present at 2 a.m., 4 a.m., etc., to midnight.

28. 11. 21. Present with mate at 2 a.m., 4 a.m., alone at 6 a.m. Present with mate at 8 a.m., 10 a.m., noon, 2 p.m., and 4 p.m. At 6 p.m. alone. At 8 p.m., 10 p.m., and midnight with mate.

29. 11. 21.
30. 11. 21. } Both present at 2 a.m., 4 a.m., etc., to midnight.

1. 12. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 8 a.m., 10 a.m., noon, 2 p.m., and 4 p.m. One bird (the one with the injured eye) alone at 6 p.m. and 8 p.m. The other had evidently been fishing. Both present at 10 p.m. and midnight.

2. 12. 21. Both present at 2 a.m., 4 a.m., 6 a.m., 8 a.m., 10 a.m., noon, and midnight.

THE ADÉLIE PENGUIN

(*Pygoscelis adeliæ*).

Deception Island.

26. 12. 20. I found one on the large rookery on the east shore, and a little before one was seen on the shore in Port Foster.

Water-Boat Point.

The nearest rookery to our base at Water-Boat Point was that at Port Lockroy on Wiencke Island, so we were only able to observe the occasional visitors to our Island and learned nothing of their habits. In Table XVIII. (p. 286) are given the various records of their appearance.

Nansen Island.

14. 1. 22. Three or four seen on small bergs near Nansen Island.

30. 1. 22. One seen on rocks at Nansen Island.

Cape Kaiser.

9. 3. 22. Two seen on an iceberg.

MACARONI PENGUIN

(*Eudyptes chrysolophus*).

December 1920. We found a small colony of these in amongst the Ringed Penguin rookery on the east shore of Deception Island. They seemed to exist quite happily with the Ringed. Several times we saw them isolated amongst the other penguins and not at all worried.

These penguins have a yellow tuft on top of their heads. Their beaks are much larger than the Ringed and their voice much deeper and rather unpleasant. They are about the same size as the Ringed.

I was informed that there is another rookery of them on the west coast of Deception Island.

TABLE XVIII.—*Visits by Adélie Penguins to Water-Boat Point.*

Date.	Number of visitors.	Remarks.	Date.	Number of visitors.	Remarks.
3. 2. 21.	2 or 3	Up to this date.	21. 11. 21.	2	On floe off-shore.
20. 2. 21.	1		22. 11. 21.	1	See note 5.
21. 2. 21.	1	Same bird.	23. 11. 21.	1	
22. 2. 21.			24. 11. 21.	1	Near hut.
25. 2. 21.	1	Same bird.		2	On floe near shore.
27. 2. 21.		In moulting state.		10	On floe. One party.
27. 3. 21.	1	See note 1 below.		2	On floe.
27. 4. 21.	3	Together.	25. 11. 21.	1	
28. 4. 21.	1		26. 11. 21.	2	
11. 5. 21.	2		27. 11. 21.	7	See note 6.
28. 5. 21.	6	Together.	28. 11. 21.	23	See note 7.
30. 6. 21.	6	Together.	29. 11. 21.	5	One on floe.
25. 9. 21.	1		30. 11. 21.	3	
13. 10. 21.	1		1. 12. 21.	4	
15. 10. 21.	9	Arrived with Gentoos.	5. 12. 21.	5	
19. 10. 21.	1		6. 12. 21.	3	
23. 10. 21.	1		7. 12. 21.	5	
24. 10. 21.	1		9. 12. 21.	2	
26. 10. 21.	1		10. 12. 21.	6	
28. 10. 21.	1		11. 12. 21.	4	
29. 10. 21.	1		12. 12. 21.	1	
31. 10. 21.	5		13. 12. 21.	1	
1. 11. 21.	2		14. 12. 21.	1	
3. 11. 21.	1		15. 12. 21.	1	
4. 11. 21.	4	See note 2.	16. 12. 21.	5	Three on floes.
5. 11. 21.	4		17. 12. 21.	1	
6. 11. 21.	2		18. 12. 21.	3	
9. 11. 21.	1		20. 12. 21.	2	
12. 11. 21.	1		21. 12. 21.	4	
14. 11. 21.	1		22. 12. 21.	1	
15. 11. 21.	1		30. 12. 21.	1	
17. 11. 21.	3		1. 1. 22.	1	
18. 11. 21.	2		2. 1. 22.	1	
19. 11. 21.	3		5. 1. 22.	1	
20. 11. 21.	3	See note 3.	6. 1. 22.	1	
21. 11. 21.	3	On Island (see note 4).			

Notes.

1. A young or immature bird with a full tail but no white ring round the eyes.
2. As one passed a Gentoo, the latter pecked at it.
3. Two were lying down, apparently asleep, on a floe travelling north up Channel.
4. One of these seemed to be an immature bird, for its throat, instead of being the usual black colour with a sharply defined edge between the black and white feathers, was very distinctly whitish, and in the lower part there was about an equal proportion of white and black, and in one part an excess of white feathers (Pl VII. fig. 2).
5. It was near the screen and was chased away by a Gentoo.
6. Four seen apparently asleep on an " express floe " coming from the south.
7. Of these, six were seen with two Gentoos on a large floe. At midnight there were ten on an iceberg coming up from the south.

Comparisons with the Habits of Adélie Penguins as recorded by Dr. G. MURRAY LEVICK, R.N., Member of the British Antarctic Expedition (1910–1913).

HAVING recorded the habits of the Gentoo and Ringed Penguins as far as we were able to observe them at Water-Boat Point, it is interesting to see how our notes agree with, differ from, or supplement those made by Dr. Levick on a different species—the Adélie. His observations are contained in two publications :—

(1) Natural History of the Adélie Penguin. British Antarctic (' Terra Nova ') Expedition, 1910. Natural History Report, Zoology, vol. i., no. 2, pp. 55–84. British Museum (Natural History), 1915.

(2) Antarctic Penguins. A Study of their Social Habits. 1914.

I have used Levick's headings in the comments which follow.

In these comparisons allowance must be made for the fact that the rookery at Cape Adare in South Victoria Land, where Dr. Levick made his observations, is situated in lat. 71° 14′ S., long. 170° 10′ E. This difference in latitude is naturally responsible for more severe and regular ice conditions than we sustained in lat. 64° 48′ S. By " regular," I mean that there were none of those periods of open water or leads of water which enabled visits to be made to our own rookery by parties of Gentoos.

The Adélies resemble more the Ringed in that they have a period of total migration as compared with the partial migration of the Gentoos.

1. *Arrival at the Rookery.*

The first Ringed arrived at our rookery on November 1st after their winter migration. The first Adélie arrived at Cape Adare on October 13th.

Neither Gentoos nor Ringed had any ice to traverse on the way to our rookeries at the time of their reoccupation. The whole journey was apparently performed by water. In the case of the Adélies, Levick mentions that some were much fatigued after their long journey across the sea-ice.

2. *Mating.*

I saw nothing in the habits of the Gentoo or Ringed supporting with certainty the statements by Levick that " mating takes place after the birds arrive at the rookery " * and that nest-sites were commonly taken up by " unmated hens waiting for mates to come to them " †. In my opinion a point worthy of further investigation is whether the Gentoos and Ringed do not in most cases arrive at the rookeries already mated after their winter absence. I recorded under 24. 6. 21 during the Period of Visiting Parties, " This afternoon twenty-four birds (Gentoos) visited the rookery. They seem to be mated still."

I did not notice any incidents which might be classed as the rivalry and fighting of cocks for hens, as appears common with the Adélies ‡. We saw, however, some individual domestic troubles, as, for instance, the divorce of Bill and Liza (Pair No. VI, p. 251 *et seq.*) and the triangle drama of Horace, Alice, and Herbert (Pair No. VIII, p. 256 *et seq.*).

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* Report, p. 59.

† Book, p. 19, also p. 36.

‡ Report, p. 60; Book, p. 35.

3. *Nesting, Eggs, Incubation, Feeding, and Fighting.*

Levick mentions the case of a cock being seen to pick up a lump of snow in his beak and carry it to his mate on the nest, who ate it to alleviate her thirst *. He also mentions that Mr. Priestley, when he was at Cape Royds in 1908, had seen the same thing occur. I am inclined to think that in view of the note we made on 9. 12. 21 (p. 196) of a nest being composed of small frozen balls of snow that the cocks had in mind the intention of nest-building rather than the quenching of their mates' thirsts.

The first Adélie's egg was recorded on November 3rd. The Gentoos and Ringed laid theirs on November 29th.

The two records given by Levick on the incubation period † of the Adélies compare very closely with those of the Gentoo and Ringed. In the case of the Adélie, Levick gives thirty-seven days for one observation, thirty-three ‡ for another, and thirty-one for a third. For the Gentoo, the average of seven observations gave thirty-seven days, the lowest period being thirty-five days. Our average for fifteen observations of Ringed gave thirty-seven days, the lowest period being thirty-four days.

Levick gives an average of four observations to show the interval between the laying of the first and second eggs as 3·5 days §. Seven records of the Gentoos gave us an average of 3·2 days and eleven of the Ringed an average of 3·4 days.

In one respect the Gentoos differ from the Adélies. Levick states that " Not until the eggs have been laid does either of the birds go to feed " ||. Examination of the Family Histories of the Gentoos (pp. 250–270) show no such habit, though one of our Family Histories of the Ringed (Pair No. I) indicates a possible period of fasting.

From the " watch-bill " kept by Mr. Priestley and quoted by Levick ¶ to show the spells of duty on a nest by a pair of Adélies, it is deduced that " the hen was not relieved by the cock until a fortnight after she had laid her egg (in this case there was only one egg), so that she must have been without food for a month. Then she left, and only returned to relieve the cock after the lapse of another fortnight. . . . ."

Unless the observations given by Levick are in a condensed form, it is possible that relief might have taken place during the night hours, despite the apparent evidence of differently coloured guano at each relief time. It is, of course, also possible that something, such as exceptionally adverse ice conditions, might have been a contributary cause of the long absences. At any rate, our observations of the Gentoos are contrary to the " watch-bill " of the Adélies. (See particularly Pair No. XVII.)

Levick cites a most interesting account of the attempt by three or four penguins to stop a fierce fight between two birds **. We saw nothing comparable with either Gentoos or Ringed.

4. *The Games of Adélie Penguins.*

Although we saw numerous instances of penguins riding on ice-floes in the Channel we never regarded it as amusement such as is described by Levick ††, nor did we see anything on the scale he mentions.

Our impression was that the birds were resting (sometimes we saw them actually asleep) or in some cases that they had mistaken a floe for terra firma.

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* Report, p. 64 ; Book, p. 57.
† Report, p. 66 ; Book, p. 53.
‡ Given as 34 in Book, p. 53.
§ Report, p. 65 ; Book, p. 53.
|| Report, p. 66.
¶ Report, p. 67 , Book, p. 91.
** Report, p. 70 ; Book, pp. 64, 65.
†† Report, p. 72 ; Book, p. 77.

5. *Enemies of the Adélie Penguin.*

I quite agree with Levick that the Killer Whale (*Orca gladiator*) is no enemy to penguins.

His examination of the contents of a Leopard Seal's stomach * is interesting in that it demonstrates that these beasts may eat penguins whole (as proved by the presence of feathers) and do not necessarily strip them first. We noticed that they eat them either whole or strip them first as they feel inclined.

7. *Mortality.*

In describing the robbing of the Adélie's eggs by Skuas, Levick states that " should one of them see a nest vacated and the eggs exposed, if only for a few seconds, it swoops at this, and with scarcely a pause in its flight, transfixes an egg upon its beak and carries it to an open space on the ground, there to devour the contents " †. I think that he was mistaken in his observation, for, in the cases we saw of Skuas or Gulls carrying off eggs, they most certainly carried them in their beaks, which they could open wide enough to accommodate an egg.

Whilst there must have been a good number of unmated birds about, we saw no evidence of straying chicks suffering at their hands as is mentioned by Levick in the section of his book dealing with " hooligan " cocks ‡.

Our observations confirm the interesting note that " however badly a penguin was injured it was never molested by the others." We had one minor sexual exception (see p. 209).

9. *Departure from the Rookery.*

Neither with the Gentoos nor the Ringed did we see anything comparable with the " drilling on the sea-ice " witnessed by Levick on three occasions §, " late in the season." At the opposite end of the breeding season we had the same kind of organized formation with the Gentoos (" Period of Massed Fishing Expeditions "), which may have a similar reason. Before the actual egg-laying, the Gentoos indulged in communal as opposed to individual life, a habit which perhaps did not appear with the Adélies until they had shed their parental responsibilities and were thinking of migration.

It is a pity that Levick records no night observations during this period, as these might have proved that the massing occurred regularly and was not confined to three isolated occasions.

Levick comments on the vagueness of our knowledge of the habitat of the penguins during the winter ‖. One would much like to know more of their existence in the pack-ice, which is assumed to be their living place during the Antarctic winter. Our observations on the Gentoos help a little to explain what takes place (" Period of partial Migration " and " Period of Visiting Parties "). No doubt, apart from the formation of sea-ice preventing accessibility, changes in temperature conditions must have some effect on food-supply by regulating the movement of the minute creatures on which the Euphausiæ live.

At Cape Adare the Adélies were completely absent from March 14th to October 13th. At Water-Boat Point we had odd visitors on seven occasions (Table XVIII.) between these dates, so that it would appear that somewhere a little to the north of us interesting results might be obtained as to the habits of these birds during the migration period.

The presence of immature birds among the Gentoos prior to and during the nesting season proves that there are exceptions to the rule that first-year birds remain behind for two winters in the pack-ice before commencing their regular annual returns southward to breed ¶.

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* Report, p. 75 ; Book, p. 87.
† Book, pp. 54, 55.
‡ Book, p. 98.
§ Report, pp. 80, 81 ; Book, pp. 108–111.
‖ Report, pp. 81, 82 ; Book, pp. 7, 15.
¶ Book, p. 8.

TABLE XIX.—*French Expeditions.*

Winter quarters.	Period of observations.	Adélie.							Gentoo.						
		Numbers on rookeries.	First arrivals.	First eggs.	Incubation period.	First chicks hatched.	Migration.	Remarks.	Numbers on rookeries.	First arrivals.	First eggs.	Incubation period.	First chicks hatched.	Migration.	Remarks.
Booth-Wandel Island. 'Français,' 1903–1905.	Mar. 1 to end Dec. 1904.	400 to 500.	Oct. 15 to Nov. 1.	Nov. 3	..	..	End May onwards.		About 4000.	Oct. 15 to Nov. 1.	Nov. 4	About four weeks.	..	Between June 1 and June 15.	Party of 500 visited island in August. Up to end Sept. small bands seen when open water appeared.
Petermann Island. 'Pourquoi Pas ?,' 1908–1910.	Jan. to end Nov. 1909.	Several thousands.	First arrival Oct. 12. More generally from Oct. 22.	Nov. 9	33–36 days.	Second fortnight in Dec.	Mar.	Visitors when open water allowed in April, May, June, July, August, Sept. Numerous at times.	About 150.	Oct. 29 (two weeks later than Adélies).	Nov. 18	..	..	Commenced from April 5.	Entirely absent June 2 to July 29. Odd parties seen in August and September.

Our notes agree that the old birds do not migrate from the rookeries before the young *. On our rookeries there were a good many old birds in moulting state left behind after the main mass had departed for migration, partial in the case of the Gentoos and complete in the case of the Ringed.

Comparisons with the Habits of Adélie and Gentoo Penguins as recorded by the French Expeditions led by Dr. J. CHARCOT.

DURING 1903–1905 and 1908–1910, Dr. J. Charcot led two French expeditions into the Antarctic regions. These were known as the 'Français' and 'Pourquoi Pas?' respectively. In the case of the first the winter quarters were at Booth-Wandel Island and in the case of the second at Petermann Island. Both were no great distance from Water-Boat Point.

The notes obtained by the naturalists on these expeditions are important. I have selected only a few to show comparisons with our own. These are contained in Table XIX.

Gain, who studied the penguins during the 1908–1910 Expedition, points out that during the winter the Adélies do not go far North, but remain on the edges of the ice-belt—their movements, like those of the Gentoos, being controlled by the presence of open water. He considers that the Gentoos move further North than the Adélies during the winter. Their winter visits to Petermann Island were rarer than the Adélies'.

Two exceedingly important discoveries were made by ringing birds. On the first visit of the 'Pourquoi Pas?' to Petermann Island on January 12th, 1909, fifty adult and seventy-five young Adélies were marked with rings. In October and November 1909, when the birds had returned to the rookery, twenty-five of the ringed adults were traced, proving that they return the following season to the same rookery. No marked young birds were found, thus supporting the theory that they remain absent from their birth-place for a season. In addition, the whalers found some of the marked birds in November and December 1910, proof of their return year after year to the same rookeries.

Similar discoveries were made with the Gentoos. At Port Lockroy, fifty adults were ringed on December 28th, 1908, and twenty adults and twenty young at Petermann Island on January 12th, 1909. When the birds returned in October and November 1909, five marked adults were found on Petermann Island and two were traced during a short visit to Port Lockroy. No marked young were found. Again, whalers found other ringed birds at Port Lockroy in 1911.

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* Book, p. 113.

PLATE I.

PLATE I *.

Fig. 1. Water-Boat Point showing The Island and the hut between South Island and the meteorological screen. The Channel and Lemaire Island in the distance. Ringed Penguins in foreground, Gentoos in distance.

Fig. 2. South Island and the Bay, Water-Boat Point.

Fig. 3. Coal Point, Water-Boat Point, with the mainland of Graham Land beyond.

Fig. 4. Gentoo Penguins. Sexual intercourse. 27.10.21.

* All the Plates are from photographs taken by the author at Water-Boat Point.

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PLATE II.

PLATE II.

Fig. 1. Typical middle-class Gentoo Penguin nests. 10.1.22.
Fig. 2. A Gentoo on a normal-sized nest. 6.1.22.
Fig. 3. Gentoo Penguins bowing to one another at their nest on the ash-dump.
Fig. 4. Gentoo Penguins. Crowing.

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PLATE III.

PLATE III.

Fig. 1. Gentoo Penguins. A squabble with a neighbour.
Fig. 2. A pair of Gentoos bowing to each other.
Fig. 3. An inquisitive Gentoo.
Fig. 4. Leopard Seal with Gentoos on a detached portion of the Bay ice. 11.11.21.

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PLATE IV.

PLATE IV.

Fig. 1. Immature Gentoo Penguin. 10.1.22.
Fig. 2. Immature Gentoo (to left) with normally marked adults. 10.1.22.
Fig. 3. Gentoos homeward bound after a fishing expedition. 25.9.21.
Fig. 4. Archie (a Gentoo) does a little thieving at the ash-dump.
Fig. 5. The hut and meteorological screen from the Bay with Gentoos returning to their nest-sites after fishing. 25.9.21.

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PLATE V.

PLATE V.

Fig. 1. A dangerous place for a nest (see p. 230).
Fig. 2. Gentoo Penguins jumping on to the ice in the Bay. 29.9.21.
Fig. 3. Gentoos panicking on the detached floe in the Bay. 10.11.21.
Fig. 4. The Bay ice—a haunt of the Leopard Seal.

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PLATE VI.

PLATE VI.

Fig. 1. Gentoo Penguins. Anne, queen of the ash-dump.
Fig. 2. *Joie de vivre.* A Ringed Penguin about to crow.
Fig. 3. A Ringed Penguin yawns and stretches.
Fig. 4. Signs of affection between a pair of Ringed Penguins.
Fig. 5. Love-making amongst the Ringed Penguins.

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PLATE VII.

PLATE VII.

Fig. 1. Mrs. Sarah—a Gentoo (Pair XVII)—covers her chick. 8.1.22.
Fig. 2. An Adélie Penguin. Probably immature. Note whitish throat. 21.11.21.
Fig. 3. Ringed Penguins. Rapture.
Fig. 4. Ringed Penguins. A serenade. Note the soloist to the left of the pair.
Fig. 5. Ringed Penguins. Owners of the first eggs on the rookery at South Island. The numbered stone in the foreground is one of many used for identification purposes. 29.11.21.

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