NOTES ON RECOVERIES AND BREEDING BEHAVIOUR OF ADELIE PENGUINS OF KNOWN AGE AT CAPE HALLETT

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INTRODUCTION

Sladen (1958) provisionally classified Adelie Penguins (*Pygoscelis adeliae*) in adult plumage into three classes:

(a) established breeders (i.e. experienced)
(b) unestablished breeders (i.e. inexperienced)
(c) non-breeders (i.e. wanderers)

and listed behavioural and breeding criteria to distinguish between these. His placing of physically identical birds into different age and breeding categories was based on thorough observation and astute deduction, but as he stresses, proof of status can only come from birds of known age. Subsequent to his pioneer studies he has, through both personal co-operation and through the United States Antarctic Bird Banding Program assisted the diversified ecological studies by New Zealanders and others at several rookeries in the Antarctic. The aspects of the Cape Hallet studies dealt with in this discussion were initiated by Sladen and B. E. Reid in January 1959 and may best be regarded as preliminary work on certain phases of breeding biology and population ecology which are now being extensively studied by Sladen and Wood at Cape Crozier. Results obtained in consecutive seasons up to and including the 1965/66 summer are dealt with.

AIMS OF STUDY

Considerable information has been collected on egg loss and pre-fledging mortality (Sladen, 1958; Taylor, 1962; Reid, 1964; etc.). Chicks are known to leave the breeding grounds when about two months old, and because of the distinctive plumage markings of yearlings, Adelie Penguins are known not to breed at the end of their first year. However, from this time on data on young birds are negligible. This study was therefore undertaken to provide some information on the behaviour and breeding of young birds.

THE STUDY AREA

The Cape Hallett rookery is the summer home of some 140,000 - 150,000 Adelie Penguins. The breeding population varies between 56,000 - 62,000 pairs. These nest in several hundred colonies (some containing fewer than 10, others more than 1,000 pairs) situated on raised mounds and ridges of the 100 acre shingle spit (Reid, 1964).

During the four summers 1958/59 to 1961/62 inclusive, over 5,300 birds were banded as part of various population studies. This particular investigation of breeding age and behaviour of young birds is based on 457 chicks banded on well-defined colonies (A, B, C, D, E, F, K1, K3, K4, K20 and K22; Reid, 1964) at the eastern end of the rookery, where human interference has remained negligible.

The behaviour of the species (Sladen, 1958), along with the size and physical complexity of the Cape Hallett rookery, makes the

locating of all banded birds difficult. Nonetheless, because of the comparable pattern and intensity of search effort throughout this study, we may reasonably assume that the differences in the number of chicks recovered in various age classes do, in fact, reflect the relative strength of each age class in the population.

RECOVERIES AND AGE OF BIRDS AT RETURN TO THE ROOKERY

Only 31 individuals (i.e. 6.8%) of the 457 chicks banded have subsequently been recovered*. In a total of 50 different recoveries (consisting of two 2-year-old, eight 3-year-old, eighteen 4-year-old, seven 5-year-old, nine 6-year-old and six 7-year-old birds) two were first recaptured when two years old, seven when 3 years, seventeen when 4 years, three when 5 years, one when 6 years, and one was not seen until it was 7 years old. Twenty of the 31 birds were recovered in one season only, six in two different seasons, two in three seasons and three in four seasons.

Although a few yearlings return to the rookery every summer for a short time and a small number moult there later, none of the banded chicks were recovered as yearlings. Not until the birds are two years old do they frequent the rookery in appreciable numbers. Recovery rates based on the limited data available from this study suggest that 5 - 10% of the surviving 2-year-old birds come ashore during the summer months, some 25 - 30% of the surviving 3-year-olds and approximately 80% of the surviving 4-year-old birds return to the rookery (Reid et. al., unpublished). Thus, probably all birds aged five and more years return to land during the breeding season.

BREEDING AGE

A preliminary statement on results from Cape Crozier (Sladen, et. al. 1966) mentions that a small number of 3-year-old birds bred. The earliest breeding age recorded at Cape Hallett was 4 years (Table 1). Of the birds in this age class (a total of 18) that were recorded on shore, only 25% bred. However, recoveries suggest that between 80/90% of 5-year-olds and 85 - 95% of 6-year-old birds breed.

CLUTCH SIZE

Data obtained (Tables 1 and 2) show that only one egg is laid by 4-year-old females. Some 5-year-old males were paired with females of unknown age, which had laid two eggs. However, the two breeding 5-year-old females laid only one egg each. Both 6-year-old females laid 2 eggs each.

WANDERING

Some birds ('Wanderers,' Sladen, 1958) are always on the move. They visit colonies but never occupy nest sites for more than a day or two. Data from this study show that both 2-year-olds, three of the seven 3-year-olds and two of the eighteen 4-year-olds were wanderers. This behaviour seems to be characteristic for younger birds, and the proportion of wanderers decreased with increasing age. No 5-year-old or 6-year-old birds were recorded as wanderers (Table 4).

* This low recovery rate does not reflect mortality alone and considerable band loss must occur.

Breeding Status and Clutch Size, ALL BIRDS.

Table 1

Age	Status, All Birds				A as %	Clutch Size		Ave. Clutch Size	
	A	B	C	Total	A & B	1E	2E	A	A & B
2	0	2	0	2	0	-	-	-	-
3	0	4	4	8	0	-	-	-	-
4	3	9	6	18	25	3	0	1.00	0.25
5	5	1	1	7	83	3	2	1.40	1.17
6	7	1	1	9	88	1	6	1.86	1.62

A = Breeding, B = Not Breeding, C = Status Unknown

Breeding Status and Clutch Size, FEMALES only.

Table 2

Age	Status, Females			A as %	Clutch Size		Ave. Clutch Size	
	A	B	Total	A & B	1E	2E	A	A & B
4	2	2	4	50	2	0	1.00	0.50
5	2	1	3	67	2	0	1.00	0.67
6	2	0	2	100	0	2	2.00	2.00

A = Breeding, B = Not Breeding.

Date Birds First Located in Rookery

Table 3

Age	Week Starting									Total Birds
	November					December				
	1	8	15	22	29	6	13	20	27	
2								1	1	2
3						1		3	1	5
4		2	3	1	1	1	2	2	1	13
5	2	3	1				1			7
6	6	2	1							9

Number of Wanderers and Number of Birds occupying Central or Peripheral Nest Sites in Each Age Class

Table 4

Age	Nest Position		Percent Central	Wanderer	No Detail	Total
	Central	Peripheral				
2	-	-		2	-	2
3	1	3	25	3	1	8
4	4	10	29	2	2	18
5	4	2	66		1	7
6	7	2	78			9

TIME OF RETURN TO ROOKERY

None of the 2-year or 3-year-old birds was seen until late in the season (i.e. during the 're-occupation period,' Sladen, 1958). Five of the thirteen 4-year-old birds arrived during the middle of the 'occupation period,' one late during this period and the remaining seven arrived at the rookery during the 're-occupation period.' All 5 and 6-year-old birds arrived during the 'occupation period,' the majority of the 6-year-olds returning earlier than the 5-year-olds (Table 3). Thus older birds tend to arrive in the rookery earlier in the season than younger birds.

STRENGTH OF COLONY BOND

Fifty percent (i.e. 15 of the 31 recoveries) of the birds, when first recovered, were found on their colony of origin. Although this may be higher than the true percentage, because search efforts were grater at, and in the vicinity of these colonies, the results indicate a strong tendency for chicks, on reaching the age of 3 - 5 years, to return to their colony of origin. Of the remaining 16 birds, all except 4 were within 100 yards of their colony of origin, and eight of these were on colonies neighbouring their parents' colonies.

Five out of six young birds bred on the same colony they originally settled on, in the following year(s). The sixth bird (a female), a 4-year-old when first breeding, bred at a neighbouring colony in her fifth year, and returned to the same neighbouring colony to breed in her sixth year.

PAIR BOND

In several instances, when birds were recovered in two or more seasons, their partners were not identified. Nevertheless, data on three 4-year-old birds show that they had different partners the following year. Two 6-year-old birds, however, had the same partners when recovered again a year later. Thus, pair bonds between young breeders may not be as durable as those formed by older birds.

NESTING SITES

Young birds, particularly those breeding for the first time (and also non-breeders, seeking territories during the 're-occupation period') tend to occupy periphal nest sites. Established breeders, however, tend to shift to more central areas of the colonies, as nest sites in these areas become available (Table 4).

DISCUSSION

Because of the relatively small number of chicks banded during this study and consequently the small number of recoveries made, many of the above preliminary results require confirmation. No results were obtained on other points such as dispersal of young birds to other rookeries; the social status of young birds within each colony; irregularities in incubation routines by young birds; nest building; and the breeding success of inexperienced breeders. All these must await the analysis of very extensive data resulting from current American studies at Cape Crozier.

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