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Distribution and numbers of birds and pinnipedes on Penguin Island (South Shetland Islands) in January 1979*)

ABSTRACT: Observations were carried out in Penguin Island on 27 January 1979. The results of the birds census were as follows: *Pygoscelis adeliae* — 1710 pairs, *P. antarctica* — 7058 pairs, *Macronectes giganteus* — 512 pairs, *Oceanites oceanicus* — 47 pairs, *Chionis alba* — 5, *Stercorarius skua lonnbergi* — 6 pairs, *Larus dominicanus* — 63 pairs, *Sterna vittata* — 18. Other species showed different requirements as regards breeding grounds.

Simultaneously the following *Pinnipedia* were observed on Penguin Island: *Mirounga leonina* — 202 specimens, *Arctocephalus gazella* — 48 adult and 6 young individuals, *Leptonychotes weddelli* — 2, *Lobodon carcinophagus* — 1.

Key words: Antarctic, birds, pinnipedes

1. Introduction

The first information on the occurrence of birds on Penguin Island comes from a comprehensive report of the "Bird Banding Program, 1958–1965 and 1966 cruises, as follows: *Fregatta tropica* (Gould), *Stercorarius skua maccormicki* (Saunders) and *Sterna vittata* (Gmelin).
was noted: *Pygoscelis papua* (Forster), *P. adeliae* (Hombron et Jacquinot), *P. antarctica* (Forster), *Eudyptes chrysolophus* (Brandt) and *Macronectes giganteus* (Gmelin). In the summarized report concerning the distribution of birds in the Antarctic and sub-Antarctic regions (Watson et al. 1971) this information was omitted. For the regions of Penguin Island, however, the data were given mentioning the species observed during the 1964, 1965 and 1966 cruises, as follows: *Fregatta tropica* (Gould), *Stercorarius skua maccormicki* (Saunders) and *Sterna vittata* (Gmelin).

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Fragmentariness of these data and quick changes in the distribution and the numbers of some species in the Antarctic regions (Conroy 1975) motative the expediency of a permanent bird monitoring.

The object of this study was to evaluate the number of the groups of birds and pinnipedes on Penguin Island (62°06′ S, 57°53′ W).

2. Methods

Observations of the distribution and the numbers of birds and seals were made on January 27, 1979. The census of the colonies of *Pygoscelis adeliae* and *P. antarctica* in the western part of the island (Fig. 1) was made along 1-metre-wide strips. For the accuracy of counting the strips were marked off by ropes. The approximate number of the breeding pairs of *P. adeliae* was calculated in the following way: first, young individuals in the colony were counted, then, knowing the total number of young birds and the number of young per 1 pair of adult individuals in the colonies numbering 1000–2500 pairs, which amounts to 0.96, the total number of the breeding pairs in Penguin Island was calculated according to the formula: 1 breeding pair = 0.96 young individuals, thus:

$$x \text{ pairs} = \frac{\text{the total number of young birds}}{0.96}$$

The number of *P. antarctica* in large colonies was determined as follows: 1-metre wide strips containing 150–200 nests were marked off and the area with a known number of breeding pairs was measured, as well as the area of the whole colony. On the basis of the proportion of the two measured areas approximate numbers of the birds were determined.

The number of the remaining species was determined on the basis of a systematic survey of the investigated areas.

The count of the *Pinnipedia* was carried out between 1600 and 1700.

Breeding sites of the species nesting separately, regions of colonies and resting-places of pinnipedians are mapped after a photomap made by the Department of Polar Research, Institute of Ecology, Polish Academy of Sciences (Fig. 1).

3. Results and discussion

In Penguin Island nesting of 8 species of birds was observed. The summary number of pairs is shown in Table I. Moreover, the following three species of non-hatching birds were noticed: *P. papua* — 11 individuals, *Eudyptes chrysolophus* — 1 individual, *Stercorarius skua maccormicki* — 1 individual.

Pygoscelis adeliae.

This species nested within a mixed colony together with *P. antarctica* in the spots where on the slanting slope there was a trodden (rock)

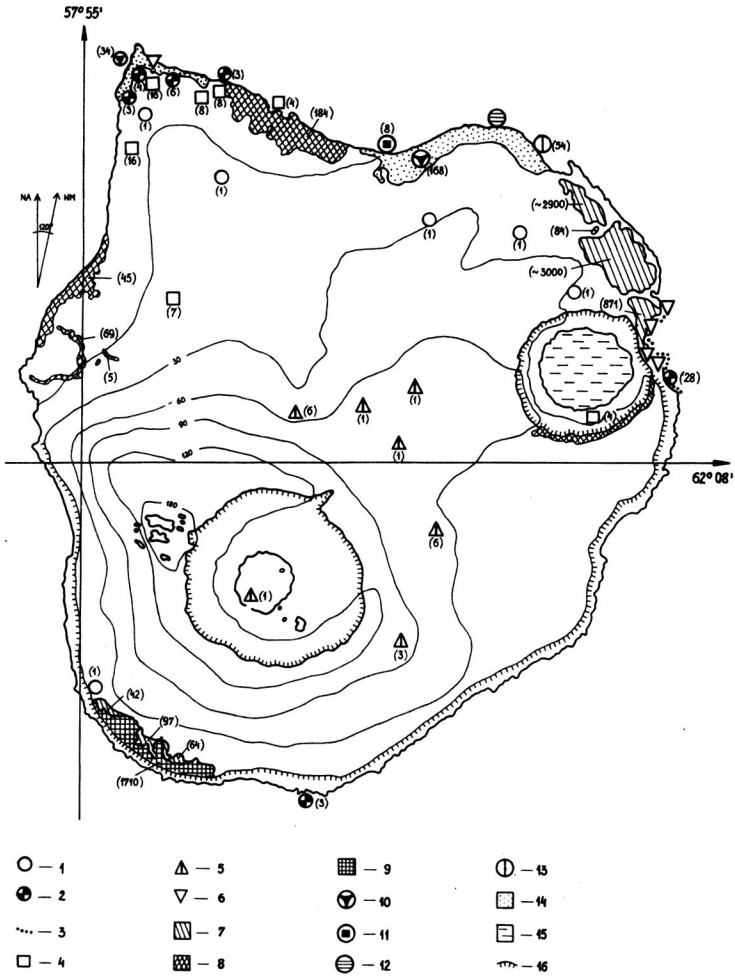

Fig. 1. Distribution of nests and number of pairs of breeding birds and resting *Pinnipedia* in Penguin Island

1 — *Stercorarius skua lonnbergi*, 2 — *Oceanites oceanicus* (small aggregation, 3 — *Oceanites oceanicus* (large aggregation), 4 — *Larus dominicanus*, 5 — *Sterna vittata*, 6 — *Chionis alba*, 7 — the area of the colony of *Pygoscelis antarctica*, 8 — the area of the colony *Macronectes giganteus*, 9 — the area of the colony *Pygoscelis adeliae*, 10 — resting regions of *Mirounga leonina*, 11 — resting region of *Leptonychotes weddelli*, 12 — resting site of *Lobodon carcinophagus*, 13 — resting region of *Arctocephalus gazella*, 14 — beach (flat coast), 15 — Petrel Lake (crater filled with water), 16 — escarpment

Figures in brackets — numbers of pairs.

debris (Fig. 1). The number of breeding pairs, amounting to 1710, was estimated on the basis of the known number of young and the coefficient of hatching productivity (i.e. the number of young per one pair of parents). At the end of January only a part of the adult individuals remained within the area of the colony. Altogether 572 adult birds and 1642 young

Table I.
Number of pairs of breeding birds in Penguin Island (January 1979)

Species	Number of pairs
Pygoscelis adeliae	1710
Pygoscelis antarctica	7058
Macronectes giganteus	512
Oceanites oceanicus Kuhl.	47
Chionis alba Gmelin	5
Stercorarius skua lonnbergi Matheus	6
Larus dominicanus Lichtenstein	63
Sterna vittata	18

were recorded. On the day of the counts young *P. adeliae* were not yeat completely moulted. They have lost the down only above the tail and over large areas of the back. According to the scale of the changes of plumage given by Taylor (1962) this stage of early plumage occurs at the age of 30–40 days. At the same time young birds at Admiralty Bay (King George Island) were at the more advanced stage of their development and had only a few tufts of down on their heads or were already full-fledged and were going away from the colony. It may be surmised that the retardation in the development of young birds on Penguin Island was due to less favourable conditions (too large angle of the inclination of the slope, rendering the ascent of the birds difficult) for the establishment of a colony (Syroječkovskij 1959, 1966).

Pygoscelis antarctica.

Breeding aggregation within the area of the *P. adeliae* colony numbered 203 pairs of birds. It consisted of three small colonies (42, 97 and 64 nests) situated on rocky shelves in the peripheral areas of the *P. adeliae* colony (Fig. 1). A larger breeding aggregation in the eastern part of the island consisted of four colonies numbering altogether 6855 nests (Fig. 1). The colony numbering 871 pairs of birds was located on the steep slope of the crater. The remaining colonies, numbering about 3000, 2900 and 84 pairs, were localized on a gently inclined slope covered with rock slabs.

Macronectes giganteus.

Breeding agglomeration in the northern part of the island (Fig. 1) consisted of four colonies situated between the rocky combs along the cliffy coast (together 303 nests). Another breeding group constituted one colony (209 nests) situated on the ridge of the hillocks surrounding Petrel Lake (Fig. 1). This colony exists since 1960, at least, at that time its presence was reported by González-Ferrán and Katsui (1970). Out of the total number of 512 nests three had a bed of lichen and moss, one was bedded with shells and the remaining were made of flat pebbles. In sub-Antarctic islands nests are made of plant material (Warham 1962, Conroy 1972). During the censuses in the region of Petrel Lake three abandoned nests were found with dead nestlings, weighing 250–300 g, and one with

a cracked egg. The time of hatching was fairly differentiated. This is evidenced by a high percentage of empty nests on which adult birds were resting and the presence of eggs (Table II) and young birds with strongly differentiated body weight (Table III). The breeding period in Penguin Island is much more regular than in the islands in the sub-Antarctic regions (Conroy 1972). Birds with brown wings prevailed in Penguin Islands, whereas in the neighbouring King George Island birds with gray wings were more common (Table IV). The percentage of the white form among the young in the region of the South Shetlands is much alike: Penguin Island — 3.9%, King George Island (Admiralty Bay) — 3.3% (personal data), Nelson Island — 3.0% (Araya and Aravena 1965).

Oceanites oceanicus.

The greatest breeding aggregation was observed in the area of a precipice close to large *P. antarctica* colonies — 28 pairs. Other aggregations

Table II.

Phenological status of *Macronectes giganteus* reproduction in Penguin Island in January 1979

Contents of the nests			
Number of empty nests	Number of nests with eggs	Number of nests with young	Total
131	10	367	512

Table III.

Frequency of *Macronectes giganteus* nestling in various weight-groups (Penguin Island, January 1979)

Body weight (kg)	Number of young	%
0.19—0.20	1	0.3
0.21—0.30	8	2.2
0.31—0.40	15	4.1
0.41—0.50	13	3.5
0.51—0.60	15	4.1
0.61—0.70	16	4.3
0.71—0.80	28	7.6
0.81—0.90	25	6.8
0.91—1.09	15	4.1
1.10—1.20	62	16.9
1.30—1.49	32	8.7
1.50—1.69	24	6.5
1.70—1.89	28	7.6
1.90—2.09	40	10.9
2.10—2.29	28	7.6
2.30—2.49	14	3.8
2.50—2.69	3	0.8
Total	367	100.0

Table IV.
Colouration of nesting *Macronectes giganteus* in Penguin Island, January 1979

Colouring of one the parents		Number of individuals
Brown	Brown plumage	68
	Brown wings, remaining parts of plumage white with brown spots	217
	Brown wings, remaining parts of plumage white	8
Gray	Gray wings, remaining parts of plumage white	120
	Light gray wings, remaining parts of plumage white	21
White		25
Indefinite		49
Total		512

numbered: 3, 3, 6, 4 and 3 pairs. Out of the total number of 47 nests 35 were controlled; eggs were found in 29 nests.

Chionis alba.

Four nests were found in cracked rock boulders near large *P. antarctica* colonies and one nest within a colony of *Larus dominicanus* (Fig. 1). There were: 3 nests with a pair of adult birds with 2 young, each, 1 nest with 3 eggs and 1 nest inaccessible (with a brooding bird).

Stercorarius skua lonnbergi.

Nests were found on a flat ground overgrown with *Usnea antarctica.* Two pairs of birds were localized in the vicinity of a colony of *M. giganteus* one pair at the foot of the crater in the neighbourhood of the *P. adeliae* colony, 3 pairs in the area of a large breeding aggregation of *P. antarctica* (Fig. 1). Altogether 6 pairs and 8 young (1.33 young per 1 pair).

Larus dominicanus.

The principal breeding colony was localized on the coast against the cliffs overgrown with *Usnea antarctica* in the north and northwest part of the island (Fig. 1). In these breeding aggregations the following numbers of pairs were recorded: 4, 8, 8, 16, 16, moreover 7 pairs were observed at a distance of about 150 m from the shore. Another 4 pairs nested on the rocks within the area of the old crater (Petrel Lake) (Fig. 1). There were altogether 62 pairs with 107 young (1.73 young per one pair) and one nest with 2 eggs in an advanced stage of incubation. Nests were badded with *U. antarctica.*

Sterna vittata.

Scattered breeding aggregations were observed on loose layers of volcanic cinders in the northeast part of the sialnd, at the foot of the crater (Fig. 1). The numbers of paris found in these aggregations was: 3, 6, 2, 6,

moreover one pair was observed on the top of the crater (Fig. 1). From among 18 nests — 12 had altogether 17 young, 5 nests had 7 eggs and one nest was empty.

Pinnipedia.

The greatest aggregation of *Mirounga leonina* Linn. was found near a colony of *P. antarctica* (Fig. 1). The observed groups of these animals numbered: 52, 28, 36, 1, 5, 12, 3, 31 individuals. On the promotory in the northern part of the island the presence of a group of 34 specimens was noted. Altogether 202 individuals were recorded on the island. *Arctocephalus gazella* (Peters) occurred in groups numbering 26, 11, 1, 10 adult and 6 young individuals (Fig. 1). Altogether 48 adult and 6 young animals were recorded. Moreover the presence of two solitary specimens of *Leptonychotes weddelli* (Lesson) and one specimen of *Lobodon carcinophagus* (Hombron et Jacquinot) was noticed (Fig. 1).

4. Summary

The occurrence of 11 species of birds was found on Penguin Island on the 27th January 1979. Eight species were nesting ones: *Pygoscelis adeliae, Pygoscelis antarctica, Macronectes giganteus, Oceanites oceanicus, Chionis alba, Stercorarius skua lonnbergi, Larus dominicanus, Sterna vittata* (Table I), there were also three migratory species: *Pygoscelis papua, Eudyptes chrysolophus* and *Stercorarius skua maccormicki.* The nests of particular species were located in various sites, different in their localization and surroundings. Different demands of particular species for nesting places allow the efficient utilization of the inhabited area.

Among *Pinnipedia* the following species were found: *Mirounga leonina, Arctocephalus gazella, Leptonychotes weddelli* and *Lobodon carcinophagus.* The most numerous were *M. leonina* (202 individuals) and *A. gazella* (54 individuals).

5. Резюме

27 января 1979 г. констатировано на появление 11 видов птиц, среди них 8 выводковых: *Pygoscelis adeliae, Pygoscelis antarctica, Macronectes giganteus, Oceanites oceanicus, Chionis alba, Stercorarius skua lonnbergi, Larus dominicanus, Sterna vittata* (таблица I), а также 3 негнездовых — *Pygoscelis papua, Eudyptes chrysolophus, Stercorarius skua maccormicki.* Гнезда отдельных видов находились в разных местах острова по окружению и подпочве. Неодинаковые требования этих видов с точки зрения гнездовых мест разрешают эффективнее использовать заселяемый ними район.

Среди *Pinnipedia* установлено на острове: *Mirounga leonina, Arctocephalus gazella, Leptonychotes weddelli, Lobodon carcinophagus.* Особенно многочисленно выступали *M. leonina* (202 шт) и *A. gazella* (54 шт.).

6. Streszczenie

Dnia 27 stycznia 1979 roku stwierdzono na Wyspie Pingwin występowanie 11 gatunków ptaków, w tym 8 gatunków lęgowych: *Pygoscelis adeliae, Pygoscelis antarctica, Macronectes giganteus, Oceanites oceanicus, Chionis alba, Stercorarius skua lonnbergi, Larus dominicanus,*

Sterna vittata (tabela I) oraz 3 nielęgowych — *Pygoscelis papua, Eudyptes chrysolophus* i *Stercorarius skua maccormicki*. Gniazda poszczególnych gatunków ptaków znajdowały się w odmiennych miejscach wyspy, ze względu na podłoże i otoczenie. Odmienne wymagania tych gatunków względem miejsc lęgowych pozwalają efektywniej wykorzystać zasiedlany teren.

Spośród *Pinnipedia* stwierdzono na wyspie: *Mirounga leonina, Arctocephalus gazella, Leptonychotes weddelli, Lobodon carcinophagus*. Najliczniej występowały *M. leonina* (202 osobniki) i *A. gazella* (54 osobniki).

7. References

1. Araya B., Aravena A. 1965 — Las aves de Punta Armonia, Isla Nelson Antarctica Chilena: censo y distribucion — Inst. Ant. Chileno. 7: 1–18.
2. Conroy J. W. N. 1972 — Ecological aspects of the biology of the Giant Petrel, *Macronectes giganteus* (Gmelin), in the maritime Antarctic — Brit. Antarct. Surv. Sci. Rep. 75: 1–74.
3. Conroy J. W. H. 1975 — Recent increases in penguin populations in Antarctica and the Subantarctic (In: The biology of penguins, Ed. B. Stønehouse) — London, 321–336.
4. González-Ferrán O., Katsui Y. 1970 — Estudio intergral del volcanismo cenzoico superior de las Islas Shetland der Sur, Antarctica — Contr. Inst. Antart. Chileno, Ser. Cient. 1: 123–174.
5. Sladen W. J. L., Wood R. C., Monagham E. P. 1968 — The USA RP bird banding programm, 1958–1965 (In: Antarctic Research Series, 12, Antarctic bird studies) — Baltimore, 213–262.
6. Syroječkovskij E. E. 1959 — Veter, relef i osobennosti ekologii ptic Antarktiki — Ornitologija., 2: 282–286.
7. Syroječkovskij E. E. 1966 — Ornitologičeskie nabludenija v Antarktide i nekotorye voprosy biogeografii suši Antarktiki (In: Antarktika) — Moskva, 103–129.
8. Taylor R. H. 1962 — The adelie penguin, *Pygoscelis adeliae* at Cape Royds — Ibis., 104: 176–204.
9. Warham J. 1962 — The biology of the Giant Petrel, *Macronectes giganteus* — Auk., 79: 139–160.
10. Watson G. E., Angle J. P., Harper P. C., Bridge M. A., Schlatter R. P., Tickell W. L. N., Boyd J. C., Boyd M. M. 1971 — Birds of the Antarctic and Subantarctic (In: Antarctic Map Folio Series) — Folio 14, New York.

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