

Fluctuation of Adélie Penguin Populations in Two Small Rookeries of the Syowa Station Area, Antarctica

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昭和基地付近における2カ所のアデリーペンギンルッカリーにおける
ペンギン個体数の変動

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要旨：昭和基地付近にあるアデリーペンギン (*Pygoscelis adeliae*) のルッカリーのうち、オングルカルベン (69°01' S, 39°26' E) および、まめ島 (69°01' S, 39°29' E) のルッカリーにおいて、ペンギン個体数の推移を調査した。

オングルカルベンルッカリーでは、1961-62年繁殖期の個体数は110であり、1966-67年、1970-71年には、それぞれ、103、156であった。ところが、1971-72年以降、個体数は著しく減少し1975-76年には1970-71年の約1/3となった。しかし、それ以後は、わずかに減少するに止っている。まめ島ルッカリーにおいても、オングルカルベンと同じ傾向の個体数変動が認められた。

観測隊員によるペンギン観察の頻度は、個体数減少の原因となるほど多いとは考えられず、むしろ、海水条件が個体数に影響を与えると考えた方がよさそうである。「ふじ」が昭和基地へ接岸できたか否かを、アデリーペンギンにとっての海水条件の良否の指標と考えると、個体数の減少は「ふじ」が接岸できなくなっ
てから起こっていることから、この推定が成り立つ可能性は大きいものと思われる。

Abstract: The fluctuation of the Adélie penguin population was investigated at the Ongulkalven rookery (69°01' S, 39°26' E) and the Mame-zima rookery (69°01' S, 39°29' E) near Syowa Station (69°00' S, 39°35' E), Antarctica. Number of bird in the Ongulkalven rookery was 110, 103 and 156 in the breeding seasons of 1961-62, 1966-67 and 1970-71, respectively. From 1971-72 season, the population of penguin began to decrease and in 1975-76 season it reached about one-third of that of 1970-71 season. Thereafter, the reduction of population became gradual. The same tendency in population fluctuation as mentioned above was also observed at the Mame-zima rookery.

The disturbance by the expedition members seemed to be little

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because of the low frequency of their penguin watching. A possible relation between the penguin populations in two rookeries and the sea ice condition in the breeding season was observed. Since Japanese Antarctic Relief Ship, Icebreaker FUJI, succeeded to approach Syowa Station from 1965-66 to 1970-71 seasons but failed after 1971-72 except 1977-78 summer, the ice condition between 1965-66 and 1970-71 breeding seasons seemed to be advantageous to the Adélie penguin but to become unfavorable after 1971-72 season.

1. Introduction

The importance of the periodic census of sea bird species in selected localities was emphasized for the purpose of identifying changes in the abundance and distribution of such prey species as the Antarctic krill, *Euphausia superba*. The problems on the sea bird population monitoring were discussed at the Subcommittee on Bird Biology and the Subcommittee on Biological Monitoring of the Working Group on Biology of the Scientific Committee on Antarctic Research (SCAR) at its fifteenth meeting which was held at Chamonix from 16 to 26 May, 1978 (*cf.* SCAR Bulletin No. 60). Moreover, the periodic census of a sea bird population seems to be able to give information to clarify the relationship between the fluctuation of the sea bird population and the physical environmental conditions as well as the changes in the prey populations. By way of example, the present authors describe the relation between the fluctuation of the Adélie penguin (*Pygoscelis adeliae*) populations in the rookery of Ongulkalven ($69^{\circ}01' \text{ S}$, $39^{\circ}26' \text{ E}$) and the Mame-zima rookery ($69^{\circ}01' \text{ S}$, $39^{\circ}29' \text{ E}$) near Syowa Station ($69^{\circ}00' \text{ S}$, $39^{\circ}35' \text{ E}$) and the ice conditions in the breeding seasons.

Part of this report was read under the title of "Fluctuation of the Adélie penguin population in a small rookery of the Syowa Station area" by HOSHIAI and MATSUDA at the fourth Antarctic Biology Symposium of National Institute of Polar Research, which was held in Tokyo on 18 and 19 September, 1980. It was also presented at the meeting of Subcommittee on Bird Biology of the sixteenth SCAR meeting, which was held at Queenstown, New Zealand, between 13 and 24 October, 1980. After the meetings, NAITO carried out the population census at both rookeries. The data obtained by him were compatible with the view mentioned by HOSHIAI and MATSUDA. Therefore, the report presented at two meetings is extended here, including MATSUDA's unpublished data and NAITO's results.

2. Results and Discussion

HOSHIAI and MATSUDA (1979) recorded twelve rookeries of the Adélie penguin from the Prince Olav Coast and the Sôya Coast, where the Japanese Antarctic Research Expeditions (JARE) have continued their scientific studies since 1957. After the completion of manuscript of their report, another Adélie penguin rookery was discovered in Cape Omega ($68^{\circ}34' \text{ S}$, $40^{\circ}59' \text{ E}$) by Mr. Kiichi MORIWAKI, geomorphologist of JARE-18, on 9 January 1977. The geographical position of thirteen rookeries is illustrated in Fig. 1 with the estimated population size. The total population of birds in thirteen rookeries is estimated as about 2000 to 3500. This figure seems to indicate that the region dealt with here is not very suitable for the breeding of the Adélie penguin.

MATSUDA (1964) carried out an ecological investigation on the Adélie penguin population at the Ongulkalven rookery (Fig. 1) in the breeding season of 1961-62. He observed that 33 per cent of the eggs laid succeeded to hatch

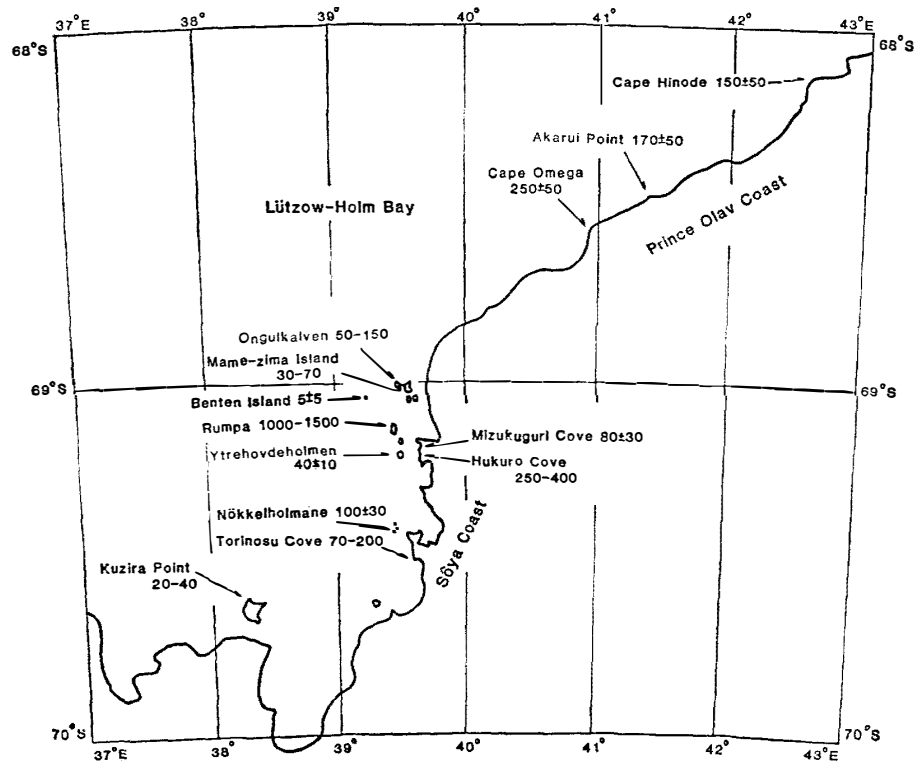


Fig. 1. Adélie penguin rookeries and their population size in the vicinity of Syowa Station (Modified from HOSHIAI and MATSUDA, 1979).

out and he assumed that about a half of chicks hatched out might grow to the young bird. This low survival rate was considered to be the effects of bad ice conditions which prevent the breeding birds from the sufficient food supply. STONEHOUSE (1967) discussed the advantageous effect of open water to the Adélie penguin population in the west coast of the Ross Sea.

In the Ongulkalven rookery, MATSUDA (1964) recorded 110 individuals of the Adélie penguin in 1961-62 season, and he also observed 103 and 156 birds in 1966-67 and 1970-71 seasons (MATSUDA, unpublished). After 1970-71, the population size decreased remarkably. In 1975-76 season, it reached about one-third of the 1970-71 population. Thereafter, the gradual reduction of population has continued (Fig. 2). THOMSON (1977) discussed the variation of the Adélie penguin population in the rookery of Cape Royds, Ross Island in relation to the human disturbance. However, it is difficult to ascribe the decrease of the Adélie penguin population in the Ongulkalven rookery to the disturbance by the JARE personnel, because the frequency of the penguin watching has been low and the measures for the natural conservation have been well observed since 1957 when the Japanese Antarctic research activity has commenced.

At the Mame-zima rookery, which is situated near the Ongulkalven rookery, the population of birds is less than a half of that in the latter. In

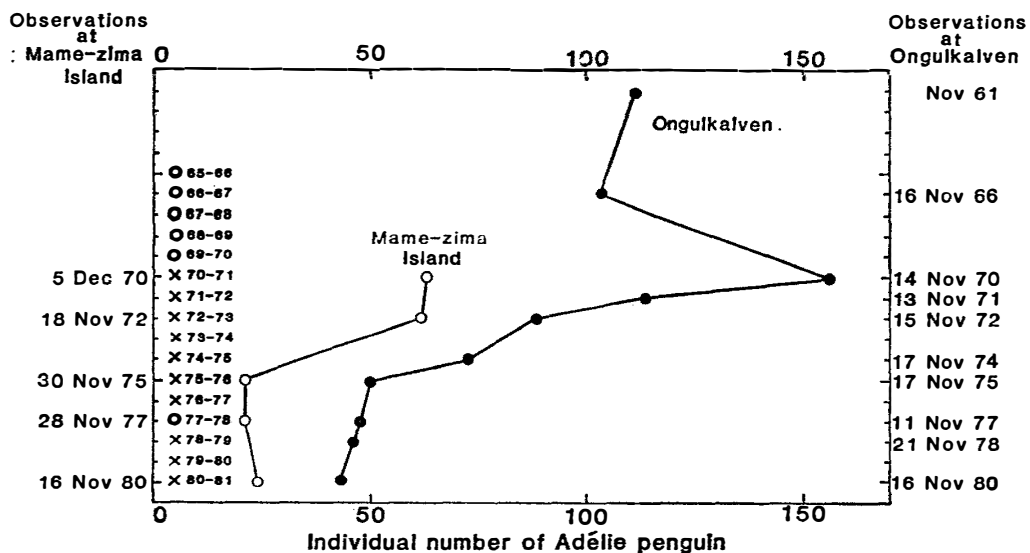


Fig. 2. Fluctuation of Adélie penguin population in the Ongulkalven rookery and the Mame-zima rookery. Success and failure of Icebreaker FUJI in access to Syowa Station are shown ○ and × in the corresponding seasons.

addition, it is difficult to approach the rookery in the late breeding season because of the bad ice condition. Consequently, the frequency of penguin watching by the JARE personnel has been less than at the Ongulkalven rookery and available data on the population fluctuation of the Adélie penguin at this rookery are scarce. However, as shown in Fig. 2, it seemed that the population fluctuation in this rookery is the same as in the Ongulkalven rookery. This fact supports the postulation that the reduction of the Adélie penguin population was due to other causes than the human activities.

Similar but incomplete data are available. At the Rumpa rookery, where the frequency of penguin watching was extremely low, about 1000 birds were observed by HOSHIAI in 1967-68 but NAITO recognized that the population decreased to about 500 in 1980-81 season.

The present authors considered that the population size of the Adélie penguin fluctuates depending on the sea ice conditions during some successive breeding seasons. Then, the relation of the Adélie penguin population to the ice conditions in summer was examined. As one of the indicators of the sea ice conditions along the Sôya Coast, the authors dealt with whether the Japanese Antarctic Relief Ship, Icebreaker FUJI succeeded to approach close to Syowa Station since her first voyage of 1965-66 summer. In Fig. 2, the success and the failure in the arrival of FUJI at Syowa Station are denoted as ○ and × in corresponding seasons. FUJI succeeded to approach Syowa Station between 1965-66 and 1970-71 seasons, when the population of Adélie was high at both rookeries. The reduction of birds has continued since 1971-72 season, in which FUJI failed in the access to Syowa Station except 1977-78 season. It seems to indicate that the fluctuation of the Adélie penguin populations coincides with the ice conditions. However, the available data are still insufficient to ascribe completely the population fluctuation of Adélie penguin in the vicinity of Syowa Station to the ice conditions. Further studies are necessary. The periodic census of the Adélie penguin in some rookeries along the Sôya Coast including two rookeries dealt with in the present work is continued as part of the biological monitoring programs of JARE.

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(Received March 20, 1981)