THE STUDY OF BIRDS IN THE ANTARCTIC AND SUBANTARCTIC

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During the last 15 years there has been a great increase in the interest various nations have taken in the Antarctic and Subantarctic with the result that many permanent stations have been established.

Modern transport has facilitated travel and even enabled short visits to be made to these regions during the summer. These developments have encouraged many scientists of various disciplines to become interested in the problems of the Antarctic and Subantarctic, and ornithology, like other branches of biology, has benefited. The ornithological studies have covered many aspects, the range of which may be envisaged from the following brief comments.

Penguins are a group of bird always associated with the Southern seas. They are easy to catch on land, faithful to their nesting site within a colony so individuals can be recaptured repeatedly, and relatively easy to observe individually when banded with a flipper band. These are important considerations when contemplating an intensive study. Another attribute of the Royal Penguin, *Eudyptes schlegeli*, is that it breeds only on Macquarie Island, so the status of the world population can be assessed as required during a study. It is not surprising therefore that this species, which has so much to offer an ecologist, is being studied.

Regular annual banding of chicks in a selected colony has produced a colony containing many birds of known age, and their breeding history has been studied for several years. Carrick *et alii* (Carrick and Murray, 1964) have found that only the heaviest of the birds, which first come ashore to breed rear a chick successfully. There is apparently a direct relationship between the nutritive status of the bird, the activity of its gonads, and its subsequent breeding success. The implications of such findings are not restricted to penguins, and demonstrate the suitability of certain Antarctic and Subantarctic species of birds to study fundamental problems of population dynamics.

Penguins are, however, intrinsically interesting particularly the Emperor Penguin *Aptenodytes forsteri*. The Emperor Penguin is truly an Antarctic bird, and like many other birds of the Antarctic and Subantarctic has been able to evolve its mode of life because of the absence of terrestrial predatory mammals. Much of our detailed knowledge of this bird comes from the studies of the French ornithologist, Jean Prévost (1961), who lived with the birds throughout the winter. The Emperor Penguin breeds during the winter, and when it comes ashore it is plump and fat, but these food reserves must be conserved if it is to successfully rear a chick. A fascinating combination of physiological and behavioural adaptations have been evolved to assure success.

The feathers of a penguin are rigid exteriorly and downy near to the skin. Air is trapped around the body by the feathers, and, as they are coated with a secretion which prevents them being wetted, the air is maintained in the feathers when a penguin is in water. The rigid outer feathers prevent displacement of this blanket of air by the pressure of the water when the penguin dives, and also prevent ruffling of the feathers in strong wind. Thus a blanket of still air is kept around the bird's body to keep it warm. This insulation can be improved by erection of the feathers to increase the depth of the air blanket, and by reduction of the surface area of the bird.

For example, Emperor Penguins sit in a hunched position and not with their necks extended. Heat loss is further prevented by reduction of the amount of blood circulated through the flippers and feet. If all these measures should be inadequate, the bird must use its fat reserves to produce extra energy to maintain its body temperature. To draw on these reserves would probably jeopardize the breeding success of an Emperor Penguin, and behavioural mechanisms

have been evolved to supplement the physiological. In cold windy weather emperor penguins huddle together; and the constant movement of the birds in a huddle gives all an opportunity to be innermost. Many persons have testified of the warmth within a huddle.

A penguin swimming in the sea has a limited horizon compared with a flying bird, yet they are able to locate islands in the ocean and the specific sites on the coast where the colony in which they breed is located. This suggests they possess a highly developed homing ability, and American scientists are now studying the problem.

Birds which return to the same nesting site are frequently parasitised by fleas or ticks which remain in the old nest until the bird returns. Penguins are no exception and heavy infestations may be found at certain colonies at Macquarie Island (Murray, 1964). Infested burrows of Dove Prions and White-headed Petrels have also been found. But recently a discovery was made at Wilkes which has excited many parasitologists. The Silver-grey Fulmar, *Fulmarus glacialoides*, returns to its breeding site on Ardery Island while the ground is covered with snow. It burrows into this apparently featureless terrain to its original nest site and nests in a snow cave while the snow melts. A flea, *Glaciopsyllus antarcticus*, has been found on the chicks and in the nests of the Silver-grey Fulmar, and it probably overwinters under the snow (Smit and Dunnet, 1962).

Mass banding of chicks of albatrosses and the Giant Petrel *(Macronectes giganteus)* has given much information on their movements on leaving their breeding islands, and the circumpolar dispersal of the Giant Petrel is well known. There is a limit however to the information which may be obtained from such chance recoveries from dead birds. A major advance therefore has been the development of techniques to capture birds at their "wintering" quarters.

The Wandering Albatross, *Diomedea exulans*, breeds on islands in the Subantarctic, and at Macquarie Island the adults and chicks have been banded for several years. Some of these chicks have commenced to return after 5 to 8 years (Carrick, personal communication). Data on immature albatrosses during these years, and on non-breeding adults, have been few until recently when the New South Wales Albatross Study Group commenced their activities (Gibson, 1963a, 1963b). The recovery of birds banded off the New South Wales coast at Kerguelen, at Marion Island and in numbers at South Georgia, and the remarkable number of birds recaptured in subsequent years, which suggests that the albatrosses return to the same feeding area, clearly show the value and potential of such studies.

It is now possible in the Antarctic and Subantarctic to visit many bird colonies, and to band large numbers of chicks to obtain data on dispersal. Permanent stations have enabled a continuity of effort so that the return of birds, banded as chicks, to breed can be observed, and birds with long life cycles can be studied. The laboratory facilities at these stations have encouraged specialists to become interested. Banders elsewhere in the world are developing techniques to capture these southern birds at their "wintering" quarters.

Recently a committee, comprising one member from each interested nation, was formed under the auspices of S.C.A.R. (Scientific Committee for Antarctic Research) to keep a watchful eye on ornithological studies in the area, so that confusion through the indiscriminate use of colour bands may be prevented, and rapid circulation of information to ornithologists in the field may become possible. The opportunities for excellent studies in the Antarctic and Subantarctic are very good indeed, and await the interested ornithologist.

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