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Areas of barren rock and scree around the edge of Antarctica provide a breeding ground for two of the continent's most well-known species of bird: the south polar skua and the Adélie penguin. This book considers the relationship between these two species, taking as its study site Ross Island. Through detailed observations of the foraging ecology of the skua, the traditional view that skuas are totally dependant on penguin eggs and chicks for food is challenged. In addition, studies of the impact of skuas on penguin breeding and the extent to which the skua breeding cycle is functionally related to that of the penguin provide further evidence to suggest that the two species occur together independently as a consequence of limited breeding space, rather than as a result of a distinct predator-prey relationship.

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## *Preface*

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The drama of antarctic bird life is not without its villain. Theft and pillage, murder, cannibalism and infanticide, these crimes are all in the repertory of the South Polar Skua

Siple and Lindsey, 1937.

On 16 November 1959 I arrived by helicopter at Cape Royds on Ross Island to make up the second half of a New Zealand team studying penguins and skuas. For the rest of that quite beautiful summer we worked together to unravel as much as we could of the biology of these two extraordinary species. We were living in Shackleton's 1908 hut and working about the local area made so familiar from the photographs and accounts of early expeditions.

Much of the skua's biology seemed pretty ordinary and they acted as one would have expected of any large gull, with a scavenging–predatory lifestyle. However, there were two surprises.

First, for some seemingly inexplicable reason the parents allowed the older of the two chicks to harass the younger and chase it from the nest area. Almost none of the younger chicks survived. This problem has since engaged a great deal of research, with a fine study of its causation being undertaken later at Cape Bird by one of the students there. It also set me off on a comparative study of chick behaviour and chick survival of the brown skua among the grasses and shrubs of the benign Chatham Islands environment. The consequences of this decision are still being played out with a long-term study of communal breeding among the skuas there. But that is a separate story.

Second, most skuas were found to feed not at the penguin colony, as expected from the lurid accounts of penguins and skuas by earlier writers, but foraged at sea – plunge diving to take small fish. The penguin colony

was defended by a few pairs and these kept all the other skuas in the area away. But even those resident on the colony also fed at sea at times during the season. This re-appraisal of the skua's feeding ecology was not universally accepted for two reasons. First, because the Royds colony was so small it had little food anyway compared with that to be found in a really big colony – like Crozier or Hallett. And second, because at other (bigger) colonies there was bound to be so many penguin chicks dying during summer they would provide a 'larder' of food for the skuas when the penguins had departed for the year.

There did not seem to be any way to answer these criticisms except by looking at skuas at a larger penguin colony. In early November 1965 we began working at Cape Bird, selecting the Northern Colony of the three there from aerial photographs as the best place to work. It was a good choice. It was much more sheltered than the others, much more scenic and an excellent natural laboratory with a wide range of penguin breeding groups in different situations and with lots of skuas. One of its greatest advantages was that there were several marvellous observation points overlooking groups of skuas and penguins. We got to know H Beach and EF Block very well from these high points over the coming years.

The first season was spent in tents. For the following year a hut was in place, which has since been expanded and refurbished. It has now been a summer home to numerous research people.

This then is an account of the first five years' work on the penguins and skuas at Cape Bird. It should have been written up years ago. However, the long delay has been of value. The study of birds has advanced wonderfully in the meantime; there is now a much better understanding of population processes and of the behavioural motivation of animals; there have been numerous studies of both penguins and skuas at many different places around the continent and its islands, and there have been studies also of related species; and much more is known also of the glacial history of Antarctica and of the history of life there. There has also been the opportunity to return twice to the research area and to neighbouring colonies, bringing memories up to date and providing new insights into the association between the two species. All of this information has changed the way the original results have been analysed and initial conclusions re-interpreted. Even so, the long delay in publication is inexcusable.

The research in Antarctica was carried out while the author was a member of the Zoology Department at Canterbury University. The writing up has been done since appointment to the University of Auckland.

*Preface*

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*Acknowledgements*

First, thanks must go to the University of Canterbury and the Zoology Department for supporting this long-term research programme and to the Antarctic Division, Department of Scientific and Industrial Research for support and transport while in Antarctica. It was the wintering-over staff at Scott Base in 1966 that prefabricated the hut and transported and erected it at Cape Bird in time for the next summer's research. The programme each year was funded by the Research Committee of the University Grants Committee. I am grateful for the invariably sympathetic and interested involvement of this committee – and mourn its replacement by a faceless Wellington bureaucracy.

Each year several students and colleagues from the Zoology Department assisted with the study, either directly as research assistants or indirectly by carrying out complementary research programmes for their postgraduate courses. In the first year, however, Antarctic Division provided a field assistant cartographer. Reg Blezard, over two seasons, produced the maps of all three penguin colonies at Cape Bird that have underpinned research there ever since. These people are listed below for each year of study with notes of their research involvement.

1965–66 Reg Blezard.

1966–67 John Darby, Jim Peterson and Dennis Procter.

Many of the photographs used in the book were taken by John. Dennis Procter carried out research on sibling aggression and survival in skua chicks while Jim Peterson researched hormone balance and change in incubating Adélie penguins – an ambitious project for the time.

1967–68 John Darby, Jim Peterson, Eric Spurr and Morgan Williams.

Eric began a four-year study of penguin breeding behaviour for his doctoral thesis, most of which appeared to be done from the top of a step-ladder overlooking his study groups, and Morgan Williams began a two-year masters degree study of skua territorial behaviour.

1968–69 Eric Spurr and Morgan Williams with Trevor Crosby and Tony Harrison as research assistants in the general research programme on skua–penguin interactions.

1969–70 Eric Spurr with Peter Kettle, David Smith and Pamela Young as research assistants.

It has been most gratifying over the years since this Antarctic experience to see the universal success of these students and colleagues to senior positions within the New Zealand science community. Pamela Young, the first New Zealand woman to work in a science programme in Antarctica, has since this time raised to independence the family shown as small children in her book of the Antarctic while teaching at Epsom Girls Grammar School in Auckland.

The work of producing this account has been encouraged and helped by colleagues at Auckland and overseas. Bob Furness of Glasgow University and John Croxall at the British Antarctic Survey, Cambridge have been especially helpful and tolerant of the many questions put to them, on providing unpublished information and in reading sections of the text. At Auckland statistical advice has come from Brian McArdle and Diane Brunton. The art work heading each chapter and most of the figures in the text were produced by Vivian Ward and all of the photographs were produced by Iain MacDonald.

Some photographs of skua–penguin interaction have appeared previously in Young, P. M. (1971).

E. C. Young