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The Biological Investigation of Marion and Prince Edward Islands

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The South African islands Marion and Prince Edward are very important from the biological point of view. They belong together with the Crozet, Kerguelen and Maquarie Islands, to the real sub-antarctic group of islands which are situated in a very typical climatic setting. To the north of this region the warmer and temperate islands such as the Tristan group, St. Paul and New Amsterdam show a very different biological aspect as they are surrounded by sub-tropical water. These islands possess a more luxuriant type of vegetation in which tall ferns, shrubs and even small trees play a part. The sub-antarctic region of the southern ocean is windswept and much colder, lying north of the Antarctic Convergence. Marion and Price Edward, which are situated very near this Convergence, have a "tundra" vegetation of cushion—and low herbaceous plants with a dominance of Cryptogams. This vegetation shows typical adaptations to the rigorous climate of this region.

The real Antarctic islands south of the Antarctic Convergence have a very sparse vegetation, in which Cryptogams play an even greater part.

The geographic position of Marion and Prince Edward is important not only in that they are situated very near the Antarctic Convergence but also because they are near to the region of minimum salinity which surrounds the Antarctic continent in the southern Indian Ocean roughly along the 50th parallel of latitude. It is very likely that these important oceanographic boundaries have shifted considerably even during the Quaternary and this will have had a marked influence on the ecosystem of the islands.

The biological setting of these islands is in many respects unique and asks for a thorough scientific investigation of all its interesting problems of taxonomy, biogeography, environment, food chains, and of the origin and history of its most peculiar flora and fauna.

The South African Biological-Geological Expedition of 1965-1966 wishes to do an extensive survey of these islands and will collect as many data on these problems as possible. It took me very many years before we could start this scientific work and it is to be hoped that this expedition will stimulate the establishment of a permanent scientific centre on one of these islands. Close co-operation has been obtained with the French colleagues, as they are doing excellent work on the Kerguelen Islands, which are situated in an identical position. Lively exchange of data and personnel should also be established in future with the British scientists who have been doing pioneer work on islands like the Tristan group and Signy Island, respectively situated in the more temperate and in the real Antarctic region. The South African effort is a contribution to the scientific work done by all the nations belonging to SCAR with the aim to explore and discover the scientific secrets of the white sixth continent of the earth and its surrounding immense ocean. Our expedition is still in progress and it is far too early to describe any of its results yet. The South African Scientific Committee for Antarctic Research, under whose guidance the expedition has been organised, decided to publish the combined results in one monograph. It is to be hoped that this volume will be a valuable contribution to our vast growing knowledge of the southern end of the earth. Two extremely important recent volumes "Biologie Antarctique" and "Biogeography and Ecology in Antarctica" have set a high standard for future work.

The South African Biological-Geological Expedition has been sponsored by the South African Government, especially by the Department of Transport, which is also responsible for the weather stations in the south. The expedition consists of the following members:

Prof. van Zinderen Bakker with the "kings" on Marion Island.

Dr. E. M. van Zinderen Bakker Sr., botanist, leader;
Mr. N. R. Fuller, B.Sc., University of Cape Town, marine biologist;
Mr. B. J. Huntley, B.Sc., University of Natal, botanist;
Mr. O. Langenegger, B.Sc., Geological Survey, surveyor and geologist;
Mr. E. M. van Zinderen Bakker Jr., University of the O.F.S., ornithologist;
Dr. W. J. Verwoerd, Geological Survey, chief geologist.

The geological research is being done under the responsibility of the Geological Survey in Pretoria, while the ornithological programme falls under the guidance of Prof. J. M. Winterbottom, director of the Percy Fitzpatrick Institute for African Ornithology at the University of Cape Town.

The expedition team had a very good voyage on the RSA under the command of Captain McNish and arrived on Marion Island on January 4th, 1965. On the Island we enjoyed the friendly hospitality and assistance of the weather station team and settled happily in Marion House. The first task of the expedition was to transform one of the stores, which has the dignified name of Governor's House, into a field laboratory. The two geologists equipped their office and store in part of this wooden building, while the biologists were very busy with carpentry and painting to fit a laboratory room with four working benches, gas, power plugs water and shelves for all the apparatus and collecting outfit. The laboratory is provided with equipment for work on cytotaxonomy, microclimatology, osmotic pressure measurements, titrations, measurements of pH and conductivity, microscopy, palynology, etc.

It was of great value for the organisation of the expedition that a reconnaissance trip could be made to the Island by the author and his son with the relief ship in March 1963. The C.S.I.R. and the University of the O.F.S. also enabled the author to take part in the VIII SCAR meeting in Paris, which was very valuable for making contacts and for purchasing equipment in Europe.

The expedition team worked on the Island for 2½ months. The field work had often to be done under very trying conditions, such as snowfall, fog, heavy rain, and gales which nearly swept the workers off their feet. The participants will never forget those days during which they had to battle physically with the elements of nature, the camping in the soggy vegetation with too many mice as company at night, and other discomforts such as wading through the treacherous swamps. During those days the wise advice given by Captain Naves in 1873 was acknowledged generally, as he said: "It is therefore advisable to avoid this neighbourhood unless some considerable object is to be gained by visiting them". The Island, however, also has its occasional beautiful days when the sun shines out of a clear sky, the penguins and elephant seals bath on the beaches and thousands of white birds are circling over the blue ocean.

The team left the Island on the 17th March 1965 and landed safely on Prince Edward Island with rafts under the command of Captain McNish and Mr. Funk. We had five unforgettable days on this paradise island with its undisturbed vegetation and bird life. Four members then returned to Cape Town, while the botanist B. J. Huntley and the ornithologist E. M. van Zinderen Bakker Jr. returned to Marion Island for a full years' stay. They will return to South Africa in March 1966.

The biological programme of the expedition is very extensive and comprises first of all the collecting of representative samples of all the plant and animal species. This work includes the few flowering plants and ferns, the many mosses, liverworts, and lichens, marine and fresh water algae, fungi, birds, land and sea invertebrates, microbiological samples, etc. Many of the first collections have already been despatched to specialists for determination and study.

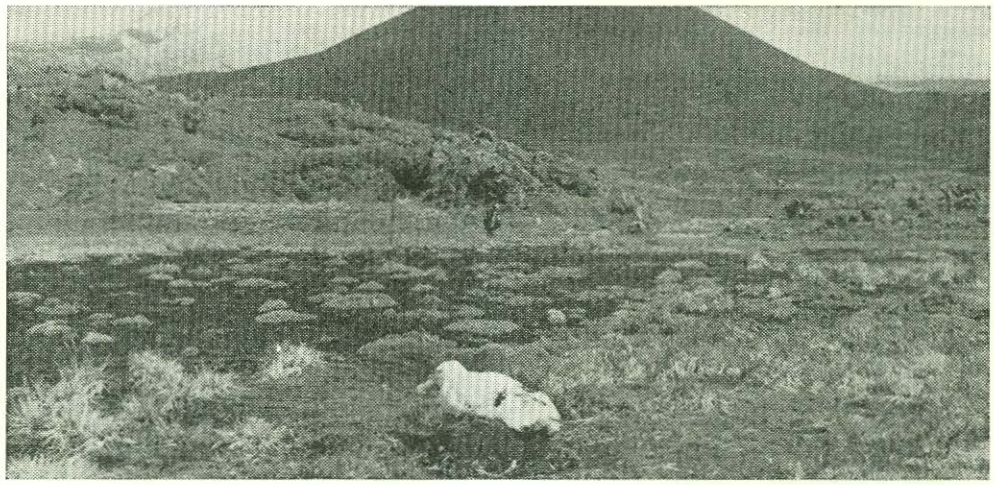
Another important aspect of the programme is the study of the plant communities and their microclimatic and chemical environment. In this connection important relations exist between the leaching effect of the heavy rainfall and certain plant communities. Other plant associations again live under the extreme influence of salt spray along the coast or are exposed to the concentrated chemical influence of the bird rookeries and seal wallows. Many of these ecological influences, including frost, wind force, insolation, and exposure, can be studied under ideal circumstances as textbook examples. The windswept high lava ridges covered with a veldmark vegetation of Azorella cushion, the oligotrophous swamps, the areas covered by patterned soil, the high exposed screes, where the sparse vegetation is hidden under the scoria pieces, are all examples of habitats which are extremely interesting from the biological point of view. The same can be said of the intertidal zone with its rich variety of plant and animal life which depend very much on the degree of shelter or exposure. This part of the work provides very interesting material for the Department of Zoology of the University of Cape Town, which has such a wide experience in intertidal research.

The bird population on the Island is one of the wonders of nature. The thousands and ten thousands of penguins, nightbirds, the gulls, albatrosses, peddies, and terns and all those other birds, which live on the products of the rich surrounding ocean, show how the ecosystem of the Island is interrelated with that of the sea. These birds have at the same time a great influence on the plant communities, their succession and on the process of soil erosion. The movement of the birds is being studied with the aid of markings and bands. The expedition is, for the sake of uniformity, using the bird bands from the United States Antarctic Banding Programme. The ornithologist is especially studying the behaviour of the Sooty Albatross and the Gentoo Penguin, which occur in isolated colonies along the shore.

Another important point of the scientific programme is the study of the history of the vegetation and climate of this Island. For this purpose borings have been made in the swamps, the samples of which are being used for pollen analysis and radiocarbon age determination. In this connection the influence of the ocean currents and the part played by the birds in the colonisation of the islands, is also being investigated as far as possible.

I cannot here discuss all the other subjects which are receiving attention as for instance salt tolerance, limnology, cytotaxonomy of plants, endemism and adaptation.

The islands are treasure houses for biological research for a long time to come. The highly adapted flora and fauna, which range amongst the greatest wonders of nature on our earth, deserve the highest form of protection. The South African Government is doing a great service to the cause of science by preserving the beauty of these isolated islands in the southern ocean in its original state. The results of the expedition will be a valuable asset to the vast research programme which is being carried out by the twelve nations belonging to the international organisation of SCAR.



Royal Albatross breeding in swamp near Junior's Kop on Marion Island.