

SCIENTIFIC SOUTH AFRICA

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Antarctica and South Africa

This year, Cape Town attracted eminent scientists and famous explorers from all over the world for the 1963 meeting of the internationally organized Scientific Committee on Antarctic Research.

SOUTH AFRICA owes its initial development to its geographical position. For centuries it was little more than a staging post at the cross-roads of the southern seas. The people who settled at the Cape were not a seafaring people. They journeyed inland to open up and develop the interior. It was left to others to explore the seas south of the Cape of Good Hope and to discover the great frozen continent of Antarctica.

However, as South Africa emerged from its first early stages of pioneering development, interest in the Antarctic regions quickened. The development of the



An historic event occurred in Pretoria during September when Sir Vivian Fuchs, leader of the 1958 Transantarctic expedition, was guest of honour at the South African Antarctic Association's monthly meeting, where he met Johannesburg's Dr. Harvey Pirie, veteran of the 1903 Scottish National Antarctic expedition. Our picture shows, left to right, H. la Grange (the first South African to have reached the South Pole), Dr. Pirie, Sir Vivian Fuchs, and Professor S. P. Jackson, the association's patron.



Two of the snow tractors used by the South African Antarctic expedition during the International Geophysical Year.

rich fishing grounds off the west coast called for more information about the nutritious cold waters drifting up from the Antarctic. Whaling enterprises were similarly interested.

But it is the cold air which sweeps up from the Antarctic regions bringing rain to the western Cape and frost to the plateau, which constantly reminds South Africans of the chilly neighbour, 2,000 miles to the south.

Vagaries of the weather, which affect all human enterprises, continue to defy the challenge of man to master his environment. Yet, slowly but surely, the secrets of nature are yielding to the inexorable processes of scientific research. In the modern context, the weather is a natural resource, to be exploited for the benefit of man, and "weather control" is already a recognised field of research. However, these great advances in knowledge and understanding of the weather notwithstanding, much painstaking collection, analysis, and study of data on a global scale is required before the large-scale processes of interaction of the atmosphere with the sun, the oceans and the land masses are understood sufficiently well to make possible the modification of climate or even of weather on more than a very local scale. Short and long-range forecasts of sufficient accuracy to enable enterprises and individuals to take advantage of changes in the weather, or at least to avoid disruption of their plans, form the present goal.

In southern Africa, even this presents difficulties because of the lack of observational data from the vast areas of the southern oceans which encircle the entire globe. The southern hemisphere could indeed be described as the ocean hemisphere, with its oceans extending northwards into the northern or land hemisphere. South America and southern Africa could thus be regarded as extending southward into the main ocean area of the southern hemisphere. In this area, where the ocean girdles the globe, the oceanic drifts and atmospheric circulation are not impeded by intruding land masses. Here can be studied in splendid isolation the basic processes of interaction between the cold air sliding off the Antarctic ice cap

and the warm humid air of the tropics, which is drawn into the swirling eddies of the westerly circulation to produce the storms which chase each other round the globe. Yet in these ocean wastes, there are few points from which regular observations can be made, and the understanding of geophysical phenomena requires simultaneous observations at many points.

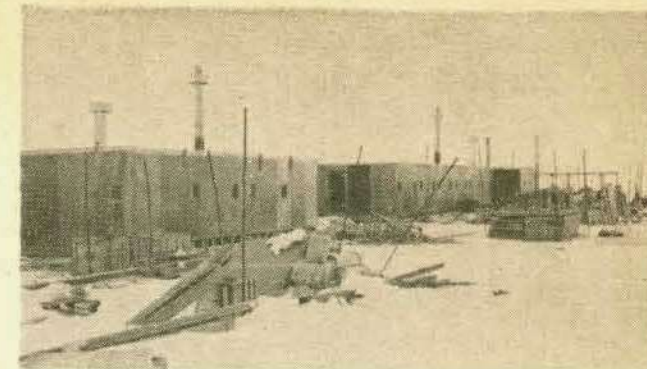
In these circumstances, it is not surprising that South Africa's scientific interest in Antarctic regions has been spearheaded by the weather men. In 1942 a meteorological observing station was established on lonely Tristan da Cunha, in the South Atlantic. This was followed by the establishment of a second station on uninhabited Marion Island, in the southern Indian Ocean, in 1948.

Then came the International Geophysical Year 1957-58—the I.G.Y.—a direct descendant of the International Polar Years of 1882 and 1932. The I.G.Y. inspired the ideals of science and the thrill of high adventure so that many nations sent expeditions to Antarctica. South Africa supported the effort of the British Commonwealth—the Transantarctic Expedition led by Sir Vivian Fuchs. Symbol of this financial support was a lone representative—Hannes la Grange—who on this expedition was the first South African to reach the South Pole. History was made.

Behind South Africa's participation in this expedition was Dr. Theo Schumann, director of the Weather Bureau, a member of C.S.A.G.I. (the Special Committee for the International Geophysical Year set up by the International Council of Scientific Unions). Dr. Schumann was also chairman of the South African National Committee for the I.G.Y. He was instrumental in the establishment of a third island station in 1956, on Gough Island, south-east of Tristan da Cunha. This station is still in operation today and has become more important since the evacuation of Tristan following the 1961 volcanic eruption.

Despite the glamour of Antarctic exploration and research, Theo Schumann never lost sight of the importance of the ocean areas between Antarctica and South Africa. He pressed for the establishment of a station on Bouvet Island, an ideal and an objective which could not be realized because of insuperable logistic problems. Nevertheless, a station on Bouvet remains the aim and object of all South African scientists concerned with Antarctic research.

South Africa's interests and efforts were recognized when the Weather Bureau was allotted the task of analysing the southern hemisphere weather charts for the I.G.Y. This involves the analysis of synoptic weather charts south of latitude 20°S; the northern hemisphere charts were allocated to the U.S.A., and the tropical zone to Western Germany. Further recognition came in an invitation from I.C.S.U. (the International Council for Scientific Unions) to serve on S.C.A.R. (the Scientific Committee on Antarctic Research), originally set up as a special committee for the I.G.Y. and subsequently constituted as a permanent committee. Other members of this 12-nation committee are Argentine, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, Russia, the U.K. and the U.S.A.



"Sanae" station under construction (1962).

During the I.G.Y., the scientists of these 12 nations had demonstrated what could be achieved through co-ordinated scientific endeavour. This was recognised by the governments concerned and on October 15, 1959, a conference of these 12 nations was convened in Washington D.C. to draft an Antarctic treaty. Final ratification of the treaty on June 13, 1961, brought to Antarctica, by common consent of the 12 governments, the status of the first large area of the Earth to be set aside for peaceful purposes, with freedom of scientific inquiry secured throughout the area. Under the terms of the treaty, all territorial claims in the area are frozen for a period of not less than 30 years. The ice-capped continent had brought the first thaw in the cold war!

The first Antarctic consultative meeting organized under the treaty was held in Canberra in July, 1961. A second consultative meeting was held in Buenos Aires in July, 1962. At these meetings recommendations were adopted on matters such as the interchange of data and information, exchange of personnel, nature conservation, radio communications, reciprocal assistance among expeditions, and preservation of historic sites.

In the meantime the planning of scientific programmes has continued under the auspices of S.C.A.R., in the fields of upper atmosphere physics, meteorology, geomagnetism, geology, gravity, geodesy and cartography, glaciology, oceanography, terrestrial biology and medical research. South Africa has discharged her responsibilities through maintenance of the island stations on Gough and Marion, and a station on Antarctica—this last she was able to do through the courtesy of the Norwegian Government which allowed South Africa to occupy Norway Station on Queen Maud Land (70°30'S, 2°52'W).

The first expedition, which sailed for Cape Town in the Polarbjorn on January, 1960, under Hannes la Grange, South Africa's Antarctic veteran, was organized by the Department of Transport within three months—a remarkable achievement. Since then this station has been continuously manned, and relieving expeditions arrive every summer. In January, 1961, the vessel R.S.A., built in Japan to the specifications of the Department of Transport for relief trips to the "weather islands" and Antarctica, made its first trip to the far south. The next year, 1962, the R.S.A.

Antarctica — continued

South Africa's Magnetic Observatory at Hermanus co-operates in a world-wide programme to measure the changes in the direction and strength of the earth's magnetic field. The left-hand illustration shows the annual variation, in "gammas," of the strength of the vertical component of the field in 1912, and the right-hand picture shows the same variation for 1942. Note the way in which the zone of very high variation East of South Africa in 1912 has moved to a position South of the Republic in 1942.

Studies of this highly anomalous area are of vital importance to an understanding of the Earth's magnetic shield.



carried a relieving expedition which built a new station, near the existing Norway Station.

The Department of Transport, through its Antarctic division, is responsible for mounting and maintaining the South African expeditions. An inter-departmental committee consisting of the secretaries for transport and foreign affairs and the president of the C.S.I.R. has been established to ensure high-level co-ordination in the execution of South Africa's Antarctic activities. This committee is advised on scientific aspects of Antarctic programmes by the scientific committee for Antarctic research of the C.S.I.R., which is responsible for South African membership of S.C.A.R.

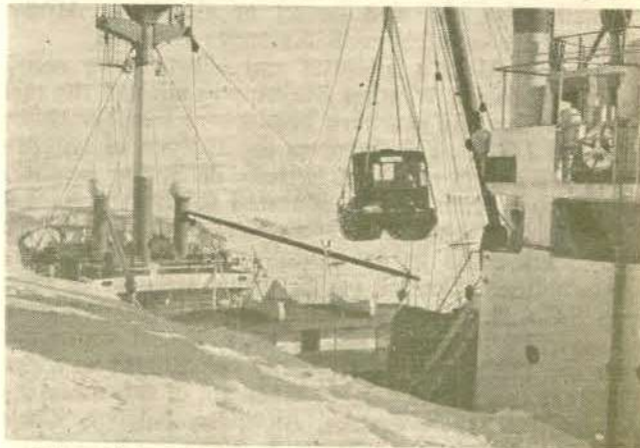
This scientific committee is responsible for organizing the participation of university scientists and semi-government agencies in Antarctic research. It has evolved a five-year programme which has been approved by the Government, involving a total expenditure over the five-year period of R175,000, over and above the cost of the meteorological and other observing programmes, and the cost of maintaining the base in Antarctica. The main emphasis during this period will be on transient phenomena which are of particular interest to the programme of the International Quiet Sun Year (I.Q.S.Y.) in the fields of meteorology, upper atmosphere physics and geomagnetism.

In the latter two fields there is particular interest in the so-called "magnetic anomaly" south-west of the Cape Peninsula: The anomalous behaviour of the Earth's magnetic field in the area is associated with a zone of exceptionally high concentration of ionized particles, recorded above the South Atlantic Ocean by American and Russian artificial Earth satellites. The objective of this programme is to supplement the satellite observations with observations of the effects of these phenomena from the Earth's surface.

International collaboration in these scientific programmes is achieved through S.C.A.R. which, in addition to annual meetings held in a different country each year, has working groups for each of the major scientific disciplines—upper atmosphere physics, meteorology, geomagnetism, geology, gravity, geodesy and cartography, glaciology, oceanography, terrestrial

biology, medical research, logistics and communications. These working groups comprise national co-ordinators in each field in each of the 12 member countries, one of whom in each field is chairman and responsible for co-ordinating the mutual exchange of information in periods between meetings of the working groups, of which not more than two gather at each S.C.A.R. meeting. Usually a symposium is organised by one of the working groups in conjunction with S.C.A.R. meetings.

This year, S.C.A.R. met in Cape Town during September. The meeting was preceded by a geological symposium, held in association with the International Union of Geological Sciences. The holding of the symposium in South Africa was particularly appropriate, as the geology of certain areas of South Africa is very similar to that of Antarctica. Petrological and paleobotanical evidence indicate that South Africa, India, Australia, Antarctica and South America once formed part of the same continent—to which proponents of the theory of continental drift have given the name of Gondwanaland. Fossils collected by the Fuchs expedition were sent to Dr. Edna Plumstead, the distinguished geologist and paleobotanist at the University of the Witwatersrand, for identification and description. Dr. Plumstead has been awarded the Gondwana Gold Medal of the Geological Mining and



The R.S.A. loading a "Muskeg" tractor in the far South before returning to South Africa.



H. la Grange, leader of the 1960 expedition to the Antarctic, shown here reading a thermometer for three-hourly meteorological observations.

Metallurgical Society of India and the Jubilee Gold Medal of the Geological Society of South Africa.

South African geologists, through their familiarity with South African geological formations, are in a favourable position to contribute to Antarctic geological exploration. However, geological surveys in the vast frozen wastes of Antarctica, 5.5 million square miles (almost the size of Europe and the U.S.A. combined) comprising 29% of all land south of the Equator is not a task which can be lightly undertaken. Until South Africa is equipped to play her full part in this great enterprise, South African geological scientists must content themselves for the most part, with contributing to the field work undertaken by the bigger nations. They have demonstrated their willingness to share their experience with geologists of other lands by arranging the geological symposium in Cape Town, and in organising an excursion to areas in South Africa which are of particular interest to Antarctic geologists.

S.C.A.R. is not a government organisation. It is an agency run by scientists for scientists—even though the funds are provided by governments through the national academies or research councils which adhere to I.C.S.U., which is the parent body. It is an outstanding example of the benevolent patronage of science by governments—an arrangement through which the scientific creativity, resourcefulness and enthusiasm of scientists is made available for the common good in the highest professional tradition.

South Africa's interest in Antarctic research has led to the development of an Antarctic Association, with a nationwide membership of 130, which through regular meetings and an exhibit at the Permanent Exhibition of Modern Science, Pretoria, cultivates an interest in Antarctic and related matters. There is also a very exclusive Antarctic Club, membership of which is restricted to those hardy individuals who have spent a winter in Antarctica. These flourishing associations afford ample evidence (if any were needed) of the interest of South Africans in Antarctic exploration and research and their desire to be associated with this great adventure of the human spirit.

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