ANTARKTIESE BULLETIN

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Patrons/Beskermhere: Prof. S. P. Jackson, M.A., D.I.C., Ph.D.
Dr. S. Meiring Naudé, M.Sc., Ph.D., D.Sc.h.c., L.L.D.h.c.

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REDAKSIONEEL — EDITORIAL

At the recent Antarctic Association dinner Mr. D. G. Kingwill said: "South Africa is a country which abounds in opportunities for individual contributions to research. This fact has been recognized from the earliest times mainly by visiting scientists. It is the special task of the CSIR and other government agencies to create the opportunities through which South African scientists can themselves exploit their unrivalled opportunities for research".

What has been said here is also true of Antarctica, and yet the question is often asked: "Why research in Antarctica? Cannot the same be done in the country at much lower cost?" This last question has also been put to the various Antarctic Scientific Advisory Committees. It is hoped that in later issues of the *Antarktiese Bulletin* members of these committees will give a reply, though it will not be necessary in cases where results have already provided the answer.

To the first question there is no better overall answer than: "Because it, Antarctica, is there." No one continent contains what another does. Besides the materialistic point of view there is the humanistic, which does not only apply to the individual but also to the institute, the university and to the country as a whole. This has been very aptly put by Prof. Gledhill, guest speaker at the recent annual dinner of the Association: "What is the use of doing space research and why in Antarctica? To this latter portion of my question I got a reply from Doug. Torr who was ionospherist at SANAE in 1963. He replied that by being the only man there who can do the job, you know you have got to do it. You exert yourself much more than you normally would and you find that you can do things that you never could do before, and you increase your own self confidence. If in fact the people who go down there get this out of it, then I suggest the same is true perhaps of the institutions and of the universities, who by doing this have got way out into the forefront of space research. We could not have done it had we not agreed to participate in this Antarctic research."

Prof. Gledhill's address, reported in this issue, is valuable not only for its contents, but because it shows how a "no-idea" can develop into an idea, and how an idea led to a unique scientific discovery which has put South Africa into the forefront of space research.

DIE MUSEUM VIR WETENSKAP EN INDUSTRIE

IN SKINNERSTRAAT, PRETORIA

Die Antarktiese uitstalling is in hierdie gebou gehuisves en sal grootskaals uitgebrei word vir die Antarktiese week, 11 tot 14 Oktober, 1966.

ANTARKTIESE WEEK — ANTARCTIC WEEK

Op versoek van die *Scientific Council for Antarctic Research* (S.C.A.R.) wat op internasionale vlak bemoeid is met Antarktiese navorsing, word die tiende jaar van intensiewe Antarktiese navorsing hierdie jaar wêreldwyd herdenk.

In Pretoria word 'n grootskaalse uitstalling vanaf 11 tot 14 Oktober onder beskerming van die Antarktiese Vereniging gehou in die Museum vir Wetenskap en Industrie-gebou wat so pas in Skinnerstraat voltooi is. Prof. P. Stoker van die Universiteit Potchefstroom en Doug. Torr van die Witwatersrandse Universiteit sal skyfie-lesings gee.

In Johannesburg sal daar ook lesings en 'n dinee by die Universiteit Witwatersrand gehou word onder beskerming van prof. S. P. Jackson, 'n beskermheer van die Vereniging.

Busse word daar gestel om kinders van naburige dorpe in staat te stel om hierdie uitstalling by te woon.

At the request of the Scientific Council for Antarctic Research (S.C.A.R.), the tenth anniversary of intensive Antarctic research will be commemorated on a world-wide scale this year.

In Pretoria a large-scale exhibition under the auspices of the Antarctic Association has been arranged for the 11th to the 14th of October in the newly completed building of the Museum for Science and Industry in Skinner Street. Prof. P. Stoker of the University of Potchefstroom and Doug. Torr of the University of the Witwatersrand will give slide lectures.

In Johannesburg lectures will be given and a dinner held at the Witwatersrand University under the auspices of Prof. S. P. Jackson, a patron of the Association.

Transport will be arranged for school children from neighbouring towns to enable them to visit this unique exhibition.

Fourth Annual Dinner of the Antarctic Association

The 4th Annual Dinner of the South African Antarctic Association was held at the Constantia Club in Pretoria on Saturday, 4th June, 1966. The record attendance of 83 guests and members testifies to the increasing importance and esteem of the Association. Mr. Kosie Jooste, Regional Director of the S.A.B.C. and an observer on the first South African National Expedition to Antarctica in 1959, acted as Master of Ceremonies. Apologies for absence were received from Dr. Edna P. Plumstead (Rand), the representatives of Norway and the Argentine and Mr. Vic von Brunn.

In welcoming the guests the Chairman, Mr. Marten du Preez, said "This year has been designated by S.C.A.R. as the Antarctic Year to commemorate ten years of international cooperation in the Antarctic. This Association is a private body interested in Antarctic research. By inviting so many representatives of countries who signed the Antarctic Treaty we wish to pay tribute to their respective governments and those men who conceived the idea of prosecuting research under international agreement in a territory unknown, research which is basically dedicated to the peaceful interests of mankind.

We have with us Mr. and Mrs. R. Eisenberg (U.S.A.), the Honourable John Wilson and Mrs. Wilson (U.K.), Mr. and Mrs. J. R. G. van der Vennet (Belgium), Mr. and Mrs. J. W. Mayne-Wilson (Australia), Mr. and Mrs. S. Ban (Japan), Mr. G. Claudon (France), Mr. and Mrs. H. S. van der Walt, Deputy Secretary for Transport and Mr. and Mrs. C. F. G. von Hirschberg of the Department of Foreign Affairs. We are indeed honoured by your presence.

As in previous years, we are very glad to have with us the representatives of British Petroleum (Southern Africa), Mr. and Mrs. R. Kirton, Regional Director Transvaal, and Mr. and Mrs. G. Fitzgerald, head of public relations.

It is also my privilege to welcome the two patrons of our Association, Prof. S. P. Jackson, Vice-Chancellor of the University and Mrs. Jackson, and Dr. S. Meiring Naudé, President of the C.S.I.R., and Mrs. Naudé.

Dit is vir my 'n spesiale eer en voorreg om die hoof van die departement waarin ek dien, mnr. M. C. Strauss, die Posmeester-Generaal, en mev. Strauss, hartlik welkom te heet, so ook die Hoofingenieur en sy gade, mnr. en mev. D. P. J. Retief."

Besides the well-arranged dinner, the highlights of the evening were the lively and stimulated speech by Prof. J. A. Gledhill of the Department of Physics of Rhodes University, Grahamstown, and the presentation of the Antarctic Medal, donated by British Petroleum to Mr. Marten du Preez by the Regional Director of B.P., Mr. Kirton.

A vote of thanks was passed to Prof. Gledhill by Mr. D. G. Kingwill, and to Dr. and Mrs. J. J. Taljaard by Prof. Jackson for their untiring work on behalf of the Association and the editorship of the *Antarktiese Bullein*. Mrs. Taljaard replied to the last motion.

Six foreign countries were represented at the dinner. On the photo (l. to r.) Mr. G. Claudon (France), Mr. H. S. van der Walt (Deputy Secretary for Transport), Mr. J. R. G. v. d. Vennet (Belgium), Prof. S. P. Jackson (patron), Mr. S. Bau (Japan), Mr. J. W. Mayne-Wilson (Australia), Dr. S. Meiring Naudé (patron), Mr. R. Eisenberg (U.S.A.) and the Hon. John Wilson (U.K.).

Photo: B.P. (S.A.)

SITAAT: ANTARKTIKAMEDALJE

Mnr. R. Kirton, Streeksdirekteur van "British Petroleum" (Suidelike Afrika) oorhandig die Antarktiese medalje aan mnr. Marten du Preez.

Foto: B.P. (S.A.)

Die Suid-Afrikaanse Antarktiese Vereniging se Antarktikamedalje vir 1966 is toegeken aan:

MARTEN JOHANNES DU PREEZ

tans hooftegnikus by die Hoofposkantoor se radiostasie by Derdepoort naby Pretoria.

In 1960 was hy onderleier en radio-tegnikus van die Eerste Suid-Afrikaanse Nasionale Antarktiese Ekspedisie, en in 1962 was hy leier asook radio-tegnikus van die Derde Suid-Afrikaanse Nasionale Antarktiese Ekspedisie.

As ekspedisieleier het hy sy aanleg getoon deur die mate waarin hy daarin geslaag het om die samewerking van 'n groep wetenskaplikes, elk met sy belange in sy eie veld, uit te lok om die nodige bydrae te lewer in die ander noodsaaklike maar onpopulêre werksaamhede. Daarenteen was daar geen taak benede hom as leier nie. As leier het hy ook uit sy weg gegaan om 'n harmoniese gees onder die lede te behou. Dat SANAE III so 'n sukses as 'n ekspedisie was, kan feitlik geheel en al aan sy optrede as leier toegeskryf word.

In sy hoedanigheid as radio-tegnikus van beide SANAE I en SANAE III was dit nie mnr. du Preez se plig om 'n wetenskaplike program te onderneem nie. Nietemin, toe hy leier was, het hy die diverse dissiplines aangemoedig deur sy ware belangstelling, en gedurende beide ekspedisies het hy, deur die daadwerklike hulp wat hy, buite en behalwe sy eie pligte, ten alle tye verleen het, 'n navolgingswaardige voorbeeld gestel.

Sy volharding in die uitvoer van sy pligte is gedemonstreer toe hy, gedurende die eerste ekspedisie, tot diep in die winter, en dikwels alleen, gearbei het om die groot rhombus-lugdraad geïnstalleer te kry. Sy inisiatief is ook aan die dag gelê deur die ontwerp van 'n doeltreffende rhombus-antenna op 8-voet hoë paaltjies wat veel goedkoper is, en wat baie makliker en gouer opgerig kan word.

Mnr. du Preez toon 'n groot mate van belangstelling in Antarktiese sake. Nie alleen is hy 'n aktiewe lid van die Suid-Afrikaanse Antarktiese Vereniging en die Suid-Afrikaanse Antarktiese Klub nie, maar het hy ook 'n geruime tyd op die bestuur van beide gedien, en is hy tans voorsitter van albei. Boonop het min persone al meer filmvertonings oor Antarktika voor allerlei gehore gehou; en, met die uitsondering van 1962 toe hy in Antarktika was, reel hy sedert 1961 van sy huis af radio-gesprekke tussen ekspedisielede en hul naasbestaandes.

Ten slotte, staan hy koördineerdes van wetenskaplike programme nog steeds met raad en daad by as hulle na hom met hulle probleme kom.

Bedanking van M. du Preez op oorhandiging van medalje

Baie dankie vir die pragtige woorde. Ek sal dit sekerlik baie lank onthou. By hierdie groot geleentheid in my lewe wil ek my opregte dank uitspreek teenoor die S.A. Antarktiese Vereniging vir hierdie hoë verering.

As ontvanger van hierdie medalje bring dit my weer onder die diepe besef van hoe dankbaar ek teenoor die verskillende persone bly. As Christenmens moet die hand van ons Meester hierin gesien word. Dit is alleenlik deur Sy genade dat dit my beskore was om my land op hierdie wyse te kon dien. Dit was dan ook my voorreg om saam met manne na Antarktika te gegaan met moed en wilskrag. Manne wat alles veil gehad het vir die saak. Daarom wil ek hulle die eer en die dank toebring vir die onbaatsugtige ondersteuning en samewerking.

Ek mag in hierdie verband nie nalaat om die naam van Hannes la Grange, die Leier van die eerste ekspedisie te noem nie. Hy was vir ons ook 'n vader. Ons was rou. Ons het nie geweet waar die gavare lê nie, maar hy het op 'n baie, baie bekwame wyse ons gou touwys gemaak.

Vanaand wil ek nie graag iets sê as leier van die derde ekspedisie nie, maar eerder as lid van daardie ekspedisie. Ons taak van die derde ekspedisie was groot en gewigtig. 'n Eie Suid-Afrikaanse basis moes opgerig word, wat wetenskaplike navorsingswerk moes doen. Soos een man het die hele span skouer aan die wiel gesit. Wetenekaplike en nie-wetenskaplike lede moes vir 'n geruime tyd bereid wees om die baie minder aangename take van oprigting en inrigting te verrig.

(*Vervolg op Bladsy 7*)

SANAE—

KEY TO A SPACE RESEARCH PUZZLE

Prof. J. A. GLEDHILL, Rhodes University, Grahamstown

When I received a letter from the C.S.I.R. late in 1960, asking whether the Rhodes Physics Department would be interested in Antarctic research, I had no idea that it would lead us to the forefront of space research. Indeed, I doubted whether it would be worthwhile to embark on a new venture of this kind. For 20 years we had been interested in research on the ionosphere, the part of the atmosphere lying more than 50 miles above the earth's surface and we had been able to make some important contributions during that time, which had received some measure of international recognition. Why go to the Antarctic? There was, of course, an ionosphere there to study, just as there was in South Africa. But many stations had operated in Antarctica, especially during the International Geophysical Year, and there was not much in the way of startling new results from there—one or two interesting peculiarities, yes, but no indication of anything of first-rate importance.

The ionosphere is, of course, important because it reflects radio waves back to the ground instead of letting them escape into space. Thus it makes long-distance radio communication possible. It does this because it contains myriads of those tiny particles, *electrons*, which are building blocks of all matter. The electrons in the ionosphere are not all bound into atoms, as they are in most types of matter. Some of them are separated from their atoms by ultra-violet light from the sun during the daytime. During the night they recombine to form atoms again, but they do it so slowly that many are left even just before dawn the next day. It is the presence of these "free" electrons which makes the ionosphere a good reflector of wireless waves.

As we go upwards away from the earth, we find very few free electrons until we reach a height of about 60 miles, because the sun's ultraviolet light does not penetrade deeper than this. From about 60 to 80 miles we are in the E layer. Above 140 miles comes the F2 layer, the most dense of all. The electron density reaches a maximum at about 200 miles, above which it falls continually until we are outside the atmosphere, in space.

We know all this because we can explore the ionosphere by sending up radio waves and seeing how long it takes them to come back. The times are very short—a couple of thousandths of a second—but by using radar techniques we can time them accurately. The shorter radio waves penetrate further into the ionosphere before they are reflected than the longer ones do, because they need a higher concentration of electrons to turn them back. By changing the wavelength continually we can build up a picture of the way in which the electron concentration varies as we go upwards. Automatic devices are made which do this at suitable intervals, usually every 15 minutes, and record the results in film. They are called "ionosondes".

We were very fortunate in being able to borrow an ionosonde from the National Institute for Telecommunications Research (N.I.T.R.), and some other equipment too.

After the erection of the new base, Duncan got his ionosonde running and it was a great thrill when, late in May, Douglas Torr and I saw the first signals come in at Grahamstown from another special transmitter he had taken down with him. Soon regular reports of the ionospheric conditions at Sanae began to come in by Telex, and we had enough data to publish our first bulletin, for June, 1962. It was sent to interested organizations all over the world, in Britain, the U.S.A., Australia, Japan, South America, and Russia. Since then a constant flow of bulletins about the ionosphere at Sanae has followed it, thanks to the efforts of successive expeditions. Hannes la Grange, leader of SANAE I, wrote to tell us that our telexed bulletin service constituted the fastest publication of Antarctica data of which he was aware, and we still hold that record. The reliability of our system was greatly increased when we received permission for fortnightly telephone calls to the ionosphere physicist at Sanae to check up on doubtful or missing figures.

During this first, hastily-arranged year of ionosphere research at Sanae, we had time to evaluate our methods critically and to put up a well-considered five-year plan for its continuation. This was accepted by the Cabinet and the present arrangement, by which we are given practically all we had asked for, through the Department of Transport, was instituted. I would like to pay tribute to Dr. Frank Hewitt for his advice and co-operation in drawing up this programme, and to the many C.S.I.R. and Department of Transport officials who have helped to keep it running so successfully.

As soon as the five-year programme had been approved, Doug. Torr was appointed to train for the 1963 expedition.

A few weeks after Doug's appointment Duncan Baker was back. While he worked at his figures, Bernard Ezekowitz, known to all as "Zac", was training for the 1964 expedition and data continued to flow in from Doug. down at Sanae. Before we knew where we were it was time for Zac to leave and Doug. was back, while Derek Sharwood began building a new ionosonde as his training in electronics for 1965. Zac liked it so much in Antarctica that he stayed on for another year, as geomagnetician, and so we had two Rhodians in the 1965 team. This year Dave Homann is keeping the flag flying. Meanwhile Allon Poole is finishing off the new ionosonde, which he has already taken to Bouvet Island and back and which will go to Sanae at the end of this year.

Even with all this activity, we might have produced no more than another pile of data from another ionosphere station had it not been for an occurrence which, at first sight, seems quite unconnected with what has gone before. Professor Pieter Stoker went to a cosmic ray conference in Kyoto, Japan in September 1961. While he was there a paper was read by a group of Russians working under Professor Ginzburg. Pieter brought a copy of it back with him and gave it to me. It had been suspected, ever since their discovery in 1958 by Professor

Prof. J. A. Gledhill, guest speaker of the evening at the dinner of the Antarctic Association. On his right Mrs. R. Kirton, wife of the Regional Director of British Petroleum (Southern Africa), and on his left, Mrs. Dr. J. J. Taljaard, secretary of the Association, and Mr. M. C. Strauss, Postmaster-General.

Photo: B.P. (S.A.)

James van Allen, that the particles in the radiation belts surrounding the earth must approach closer to it over the South Atlantic region, than anywhere else. These particles are electrons, like those in the ionosphere, and the other electrically charged building bricks of matter, *protons*. Because they are electrically charged, both kinds of particles are trapped in the magnetic field of the earth and perform a very complicated type of motion round it. These are two radition belts, the inner one about 1,000 miles above the equator (and thus far above the F2 region) and the outer one much further out, 16,000 miles or so above the equator. It was expected that these particles would approach closest the earth in the South Atlantic region because the earth's magnetic field has a weak spot there, the so-called *South Atlantic Magnetic Anomaly*. What Ginzburg and his colleagues had discovered with their satellites was that these particles really did come in close to the earth over this region. But what was unexpected was that they came right down into the ionosphere, even below the F2 region. The place where the inner belt particles did this was just east of Rio de Janeiro. But the place where the outer belt did it was only a few hundred miles north of Sanae—in fact, about a quarter of the way from Sanae to Cape Town.

Having read of some similar work by Professor Fred Seward, of California, I wrote to him and he sent me some large maps of his satellite observations. In one of these the region of penetration by the particles, the so-called South Radiation Anomaly, was directly overhead at Sanae. *Suddenly we found ourselves in a unique position to study the effects they produced.*

One of my research students, Pete van Rooyen, and I looked into the theory carefully. We decided that the most important effects would be the emission of a reddish light (the "airglow") by the oxygen atoms in the upper air, and of ultra-violet rays by the nitrogen molecules. It also seemed possible that the bombardment would heat up the ionosphere considerably, thus decreasing the electron concentration and increasing the height of the F2 layer.

When Doug. Torr returned to Rhodes at the beginning of 1964 we thought we had enough data from Sanae to look for the effects of the bombardment. The results were discouraging. Try as we would we could not find anything that really looked like the expected changes in the ionosphere. The main trouble was that we never knew whether there was a heavy bombardment or a light one at any particular time. We would say to each other "If only we had rockets or satellites to observe the particles coming in, we would know exactly when to look for anything unusual". So we wrote to various groups of research workers who had particle counters in satellites during 1962 and 1963, asking for figures for the Sanae area. Some did not reply, others said they had nothing. But Dr. Ian McDiarmid, of the National Research Council's Physics Division in Ottawa, sent us a thick wad of figures printed by his computer from his electron on the satellite *Alouette*. And at once we made our breakthrough.

Alouette did not observe particles in the Sanae area directly, but it did do so at the other end of the line of force of the earth's magnetic field that runs through Sanae. This comes to earth again in the North Atlantic, between Newfoundland, Greenland and Iceland, the "conjugate area" to Sanae. We counted all the occasions when the satellite passed through this area. There were 77 such occasions. On 28 of these the number of electrons counted each second was obviously "high", on the remaining 49 it was low. And to our delight on every single one of the 28 occasions when it was high, we found that there was an obvious disturbance of the ionospheric layers at Sanae. Most of the disturbances looked as if they were of the type which Van Rooyen and I had predicted, showing heating of the F2 region. There was also

(*Continued on Page 8*)

TIDAL EFFECT ON A FLOATING ICE-SHELF — *gravimetric determination*

W. H. POLLAK,
Geological Survey, Pretoria

The scientific programme of the 6th South African National Antarctic Expedition, 1965, included a project for the gravimetric determination of the amount of vertical movement of a floating ice-shelf as caused by ocean tidal effect. The purpose of such studies is to establish to what extent the ice-shelf is actually a floating mass or whether it rests on a solid base at certain places.

The fact that no tidal observations along Princess Margaret Coast (19°W to 5°E) were existing made it appear necessary to start this programme during 1965. During the period of 2nd to 29th August, Derek Sharwood and myself stayed at the substation (70° 15'S, 2° 40'W), a little hut buried by nine feet of snow and located approximately 18 km. north-west of SANAE base.

Owing to the vibration of the ice-shelf it was not possible to read the gravimeter in the usual way. Therefore the position of the cross-hair was recorded at intervals of 5 seconds for a period of 10 minutes at a time, repeated bi-hourly day and night for a period of 20 days. The average eye-piece-values were converted into instrumental scale units which, when multiplied by the small dial constant, gave the required gravity values in milligal units.

Plotting of the data showed that two types of vertical motion of the ice-shelf exist, viz. a short period of oscillation which causes the gravimeter to act like a seismometer. These short period movements are believed to be mainly due to ocean waves and interference caused by the resultant vibration of the ice-shelf. The second type of movement was a long period oscillation due to the ocean tidal effect. Since the change of gravity with elevation in air at the surface of the earth is 0.3086 mgal/metre it is easy to work out the vertical movement of the ice-shelf from gravity values thus obtained, In our case, however, the instrument did not simply move up and down in air—we also had to apply a Bouguer correction, taking care of the changing thickness of the water column.

Taking all this into account an average peak to peak movement of the ice-shelf in the range of 0.70-1.65 metre (28-66 inches) was calculated. These results compare favourably with the theoretical average tidal range of 1.20 metre along Princess Martha Coast as given in the Oceanographic Atlas, 1957.

Derek Sharwood at the substation, operating the gravimeter by which the change in gravity, indirectly indicating the degree of up and down movement of the ice-shelf, was determined.

Museum for Science and Industry of South Africa

On 26th August, 1960, Dr. P. J. du Toit, F.R.S., former president of the C.S.I.R., opened the Permanent Exhibition of Modern Science in Pretoria. This Exhibition, now known as the Museum for Science and Industry of South Africa, was established under the auspices of the Pretoria Centre of the South African Association for the Advancement of Science to commemorate the Union Festival of 1960.

A few public-spirited scientists had taken the initiative in establishing this institution in the capital of South Africa, and rightly so, for nowhere on the continent of Africa is scientific research and activity more concentrated than in and around Pretoria.

The exhibits, made available by research establishments and numerous industries and covering some 30,000 sq. ft., were temporarily but somewhat poorly housed in one of the halls at the Pretoria Show Grounds. Nonetheless, the Museum has drawn some 100,000 visitors a year as well as many thousands of high-school pupils. It also successfully maintained its monthly lectures by prominent scientists in its film auditorium, thus not only creating a forum for scientists, but bringing the general public into contact with contemporary scientific concepts and technological developments.

In view of the Republic's spectacular advances in science, technology and industry, the need had been felt for some time to develop the permanent exhibition into a national museum after the style of the famous Deutsches Museum, the Palais de la Découverte, the South Kensington Science Museum, and the Chicago Museum of Science and Industry.

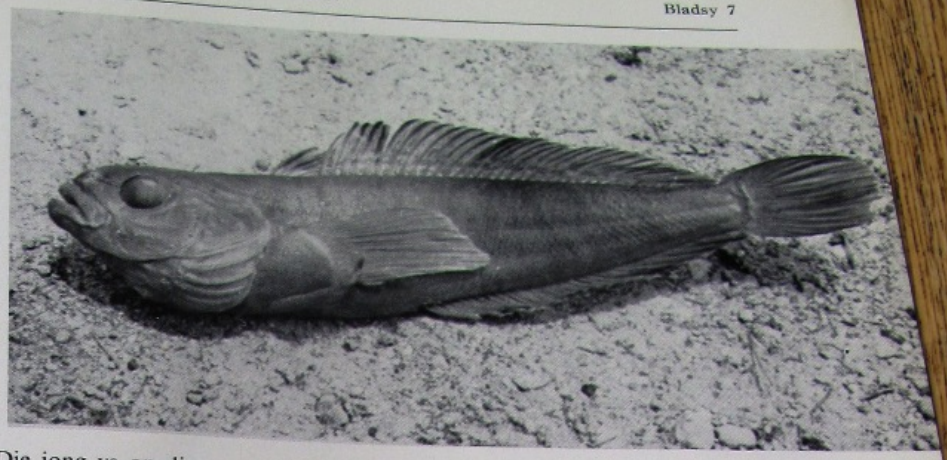
To help realise this aim, the Pretoria City Council generously donated a full erf near the centre of the city within a stone's throw of the Transvaal Muesum, to provide a permanent home for the Museum.

This magnificent gesture inspired the S.A. Association for the Advancement of Knowledge and Culture—the publishers of of *Lantern*, *Spectrum* and *Archimedes*—to pool its resources with the organisers of the Museum and thus was founded the Foundation for Education, Science and Technology.

The S.A. Association kindly donated its ground adjoining that donated by the City Council and it is on these two full erven that the Museum for Science and Industry of South Africa as well as the offices of the Foundation have been erected. Later the building is to be extended to provide further exhibition space for the Museum (see photo on first page).

Visions of the endlessness of space are conjured up by a scale models of radio telescopes and space probes a few inches high. The exhibits in the first 20,000 sq. ft. have been supplied by the Government and Semi-Government Departments. C.S.I.R., Atomic Energy Board, Department of Agricultural Technical Services, Fuel Research Institute, Department of Water Affairs, Post Office, etc., and the space has been hired by them. A small exhibit in the Museum has also been made available by the S.A. Antarctic Association.

On completion the Museum will have a restaurant and an auditorium with projection facilities. These facilities will be made available to all the different scientific associations and bodies in and around Pretoria.



Trematomus borchgrevinkii—Boulenger.

VIS AAN DIE YSBANKFRONT

Uit My Dagboek,

Dinsdag, 12 Januarie, 1960.

André van der Merwe,
SANAE I

Dinsdag het dit warmer geword. Die jong ys op die water het ontdooi. Teen die middag het Ian, die kombuisklong, my visstok kom leen. Ek was verbaas oor sy skielike vissersentoesiasme. Ek het telkemale op die reis, wanneer die boot in die ys vasgesit het, deur die klein openinge in die ysplaat probeer visvang sonder dat daar eers 'n tikkie aan die aas was. Maar nou het Ian klein vissies tussen die neus van die boot en die ysbankfront gewaar waar hulle aan krill eet wat aan die yswal vasgeys het. Hy het stukkies vleis, vis en ham in die kombuis gekry en aan die hoek gesit, maar die vissies het hulle nie daaraan gesteur nie. Toe kom iemand met die blink gedagte om 'n blink lepeltjie aan die punt van die lyn te sit. Ian het die lepeltjie oor hulle gegooi, maar nog wou die vis nie byt nie. Inteendeel, die beweging van die lepel het hulle verwilder. Toe het hy die lepel stil tussen hulle laat hang net om hulle effens te kielie, en sowaar, daar byt een. Hy het een na die ander uitgetrek. Toe hy verveeld raak, het ek oorgeneem. In 'n kits het ons dertig vissies op die dek gehad. Hulle was almal ewe groot, sowat tien duim lank, smal met klein bekkies, en wanneer jy hulle uit die water lig, was hulle so deurskynend dat jy die hele beenstelsel kon sien. Na 'n paar sekondes het hulle vaal en ondeursigtig geword. Die grootste moeite was om hulle sonder handskoene van die hoek te kry, want hulle was yskoud uit die yswater opgepik. Visse is koudbloedig en neem die temperatuur van die wateromgewing aan—en Antarktiese water is koud. Omtrent 'n halfuur het hulle op die dooie krill geaas en toe net so skielik soos hulle gekom het, verdwyn.

Hulle was almal van dieselfde soort, *Trematomus borchgrevinkii* Boulenger, en behoort aan die groot familie Nototheniidae wat algemeen en die meeste van alle vissoorte om die kus van Antarktika tot by Suid-Georgia, Macquarie-eiland en Suid-Orkney voorkom. Soos alle visse het hulle 'n lae rooiseltelling in die bloed. In teenstelling met hulle het die warmbloedige duikdiere, soos robbe, walvisse en pikkewyne, besonder hoë rooiseltellings en proporsioneel ook 'n baie groot volume bloed, wat hulle in staat stel om baie suurstof vir lang onderwaterse swem te stoor wanneer hulle bo die water kom asem skep.

Wat getal bloedselle betref, is die teenoorgestelde uiterste die een genus in die visgroep Chaenichthyidae wat *geen* rooibloedselle, om suurstof in te dra, het nie. In plaas van rooi bloed het hulle 'n melkerige of liggeel vloeistof, met 'n klompie witselle, in die are. In koue Antarktiese water is die konsentrasie van suurstof amper tweekeer so veel as in warmer seewater, met die gevolg dat die suurstof uit die seewater gewoonweg deur die kuwe van die visse in die sirkulerende vog in diffundeer en 'n hoë genoeg spanning vir die nodige metaboliese prosesse in die liggaam gee.

BEDANKING VAN M. DU PREEZ—*vervolg van Bladsy 3*

Dit was vir ons almal 'n trotse oomblik toe ons ons landsvlag vir die eerste keer by 'n eie Suid-Afrikaanse basis kon hys. Ek is baie bly vanaand dat hier teenwoordig is dr. Charles Lauterbach en mnr. Dirkie Neethling, lede van daardie ekspedisie. Graag wil ek in die afwesigheid van die ander lede van daardie ekspedisie my opregte en innige dank betuig vir die poging wat hulle almal tesame aangewend het om die onderneming 'n sukses te maak.

Aan die Department van Pos en Telegraafwese, asook aan die Departement van Vervoer, wat twee maal toestemming verleen het dat ek na Antarktika mag gaan, my innige dank. Mnr. Strauss, mnr. Retief en mnr. van der Walt, ek nooi u om deel te hê aan hierdie groot verering van my.

Dit is miskien nie alom bekend nie, alhoewel Prof. Gledhill vanaand daarna verwys het, dat radio-telefoonverbinding daar gestel is deur die Departement van Poswese, en dat die Departement van Vervoer sekere uitgawes daaraan verbonde dra nie. Maar wat ek wil noem is dat daar 'n persoon is wat seker aan al die ekspedisielede bekend is, maar wat hulle nie die voorreg gehad het om te ontmoet nie, mnr. Paul du Plessis, die ingenieur by Derdepoort Radiostasie. Namens al ons ekspedisies wil ek ons dank aan hom en sy personeel oorbring vir alles wat hulle in werking gestel het.

Dan is daar ook die uitsendings van die Suid-Afrikaanse Uitsaaikorporasie. Hier wil ek graag noem dat ons seremoniemeester, Mnr. Jooste, eintlik die vader van die gereelde program is.

Allow me to emphasize the splendid spirit of co-operation that exists between South African expeditions and those of other nations. By means of radio communication we exchange scientific information, such as weather data, glaciological and other data. On the other hand we even tried to play chess by radio with the British team at Halley Bay.

To my mind the binding factor in this respect of unselfish co-operation is the Antarctic Treaty which was signed in December, 1959. The most important stipulation in this treaty is "that Antarctica shall be used for peaceful purposes".

Graag wil ek 'n woord van dank rig aan die nie-wetenskaplike lede van die ekspedisies. Ek is bly dat Komt. Chapman dit so gestel het, want hier is dit bewys dat hulle opoffering ook hoog waardeer word. Hulle heelhartige ondersteuning aan die wetenskaplikes dra daartoe by dat Suid-Afrika se naam hoog aangeskryf sal wees op Internasionale wetenskaplike gebied.

Dis ook my plig om hier my dank te betuig aan my eggenote, wat my op so 'n wonderlike wyse onderskraag het. Baie dankie.

In conclusion I wish to express a vote of thanks to you, Mr. Kirton, for presenting this medal to me tonight. I thank you.

BROKKIES EN GEBEURE — GROWLERS AND HOWLERS

'n Gedugte hengelkompetisie woed tussen Marion en Gough. In Junie het die Marionette berig: „Die manne hier het alreeds probeer visvang maar ongelukkig was die pogings nie juis 'n sukses nie. Ons beny julle mense daar op Gough waar 'n mens omtrent drie keer per dag vars vis kan eet." Trouens onlangs het Steve Visagie van Gough berig dat hulle vang hulle dik aan kreef, blouvis, kapewers (bietjie draderig om te eet) en vyfvingers van 3 pd. in gewig. Geen wonder dat die Marionette *brand* van begeerte om na Gough te verkas nie!

Verder berig Marion van baie muise en dat dit lyk of man en muis nou letterlik saam woon in die huis. Die muise het hulle intrek in die huis geneem, waar hulle doodluiters rondstap en ook nogal lekkerbekkig is. *Vurige* pogings word aangewend om die muislus te blus.

Meimaand het storms en reën op Gough gebring. „Ons geniet nog besondere goeie weer. Aan die einde van die maand het dit begin reent maar die temperatuur bly lekker warm. Die hoogste daaglikse reënval was 71 mm. met 'n totaal van 225 mm. vir die maand. Op die 26ste het 'n kwaai storm vanuit die suidooste opgekom teen 'n windspoed van 60 m.p.u. Die see was baie rof en het die landingsplatform afgespoel. Kort daarna het die preekstoel die stof gebyt. Dit moes 'n geweldige golf gewees het aangesien die preekstoel 70 voet bo die water teen die kranse is en nou so plat soos 'n pannekoek daar uitsien."

Junie het onverwyld die voorbeeld van Mei gevolg. Baie reent en snaakse winde. „Die probleem is nie om die weerballon in die lug te kry nie, maar as dit eers daar is, kan enige ding daarmee gebeur. Wanneer die ballon in so 'n snaakse windstroming beland speel die radiosonde sommer yo-yo bo-oor die ballon en vou die windmeul daarvan sommer soos papier op, die draad ruk af en die instrument plons daar kort anderkant die kuslyn in die water. Dan moet die manne maar weer gaan mooipraat met die waterstofbom vir 'n ekstra teugie waterstof om weer die dag se pogings van meet af aan te begin."

By SANAE was daar tandmoeilikheid—omdat die medikus self die pasiënt was. Weens 'n wortelabses moes sy tand verwyder word. „Sulke tye tree die werktuigkundige as tandarts op, miskien juis omdat hy uit die aard van sy werk weet hoe om 'n tang te hanteer. By hierdie geleentheid het Henry Fulton hom meesterlik, dog nie sonder professionele teenkanting van sy kant af, van sy vreemde taak gekwyt en die tand pynloos en suksesvol verwyder."

Die son het na twee maande weer sy verskyning kort voor die einde van Julie gemaak. Die manne, belaai met waarnemings- en wetenskaplike werk, naslaan en opskrywe, het die winter geniet. Die temperatuur het af en toe kort duskant minus 50 sentigrade omgedraai en die wind so amper 90 knope gehaal.

SANAE—KEY TO A SPACE RESEARCH PUZZLE

(*Continued from Page 5*)

evidence that the electrons precipiated from the outer radiation belt came as low as 50 miles above Sanae. This was the first time that anyone had proved that electron bombardment produces such ionospheric effects, except during auroras. Our paper about it, which I read at the International Space Research Symposium in Argentina last year, was very well received and several of the experts commented that it looked as if we were on to something important.

Our research group had meanwhile been joined by another M.Sc. student, Marsha Harding. During 1965 she and Doug. Torr worked hard at our new discovery. Now that we knew what to look for the pieces of the puzzle began to fit together. They were able to show that similar ionospheric disturbances to those at Sanae occurred at other places beneath the outer radiation belt also: Campbell Island, south of New Zealand; Halley Bay, not far from Sanae; and Winnipeg, Ottawa and St. Johns in Canada. And in every case when *Alouette* observed electrons being precipitated at one of those places, one of the ionospheric disturbances was in progress. The disturbances were much less frequent at those other places, because they do not lie near the South Radiation Anomaly. But when they did occur, they were unmistakable.

Ever since the ionosphere had been studied systematically it has been observed that, while the E and F1 layers are very predictable in their behaviour, changing in a regular manner each day, the F2 layer is quite different. One day it will build up an enormous concentration of electrons about noon, the next it will have very few, perhaps reaching a maximum before 10 a.m. and then falling off again, or building up much more slowly than usual and then suddenly shooting up towards evening. One day it will have its greatest concentration of electrons at a height of 180 miles, the next at 300 miles. It varies erratically from one hour to another. Many suggestions have been put forward, but none has gained general acceptance. Could it be, we asked ourselves, that this erratic behaviour was caused by the dumping into the F2 region of electrons from the radiation belts?

This is a much more difficult question to answer, because we do not have a satellite overhead at each ionosphere station 24 hours a day to watch for incoming electrons. Nor can we afford to fire rockets at 15-minute intervals to heights of 100 miles or more to look for the bombarding electrons every time our ionosonde takes a recording. What Marsha Harding and Doug. Torr did was this. They took a lot of two-hour periods chosen at random at each of the ionosphere stations I have already mentioned, and they classified them as "disturbed" or "quiet" according to the knowledge they had gained in the preliminary study. Then they worked out, for each station, the percentage of the total time for which the ionosphere was disturbed. Then they looked up, from the *Alouette* recordings, the percentage of the total time for which the number of electrons precipitated per second at each station exceeded the limit known to produce a disturbance from the preliminary study. The results were astonishing. In every case the two figures were very close to each other. Thus there could be little doubt that electron bombardment did take place exactly often enough to account for the disturbances. We have written this up for publication and we are confident that it will prove to be the key to the puzzle of the odd behaviour of the F2 region. Had we not gone to Sanae, we would never have found it, for Sanae is the place with the most disturbances of any from which ionosphere records are available.

Marsha Harding went on to show that the electron population observed in the outer radiation belt by various satellites can be accounted for if there is a constant leakage of electrons from outer space into the belt all the way round the earth. This theory is simple to work with and seems to give better answers than more complicated ones worked out by others.

In conclusion, then, we seem to have been extremely lucky to have settled on Sanae as our base, for ionospheric work in particular.

J. G. I. & S. 0931 8/66