

SUID-AFRIKAANSE
WETENSKAPLIKE EN NYWERHEID-
NAVORSINGSRAAD

SOUTH AFRICAN
COUNCIL FOR SCIENTIFIC
AND INDUSTRIAL RESEARCH

TWAALFDE
JAARVERSLAG

TWELFTH
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PRETORIA

UNIE VAN SUID-AFRIKA

UNION OF SOUTH AFRICA



DIE WETENSKAPLIKE EN NYWERHEIDNAVORSINGSRAAD

THE COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

Posbus 395,
Pretoria.

1 April 1957.

Meneer,

Ek het die eer om aan u voor te lê die Twaalfde Jaarverslag van die Wetenskaplike en Nywerheidsnavorsingsraad. Hierdie verslag dek die tydperk vanaf 17 Augustus 1956, die datum waarop die Wet op Standaarde (Oordrag van Uitvoering) van 1956 van krag geword het, tot 31 Maart 1957 wat saamval met die einde van die Raad se boekjaar. Behalwe die terreine van navorsingswerk wat in vorige jaarverslae gedek is, bevat hierdie verslag ook gedeeltes wat handel oor die werksaamhede van die Suid-Afrikaanse Buro vir Standaarde.

'n Balansstaat en 'n staat van inkomste en uitgawe vir die boekjaar geëindig op 31 Maart 1957, gesertifiseer deur die Kontroleur en Ouditeur-generaal, word ook voorgelê.

Dienswillig die uwe,

S. M. NAUDÉ

President: Wetenskaplike en Nywerheidsnavorsingsraad

*Sy Edele Dr. A. J. R. van Rhijn,
Minister van Ekonomiese Sake,
Paulhof,
Minnaarstraat,
PRETORIA.*

*P.O. Box 395,
Pretoria.*

1st April, 1957.

Sir,

I have pleasure in presenting to you the Twelfth Annual Report of the Council for Scientific and Industrial Research. This report covers the period from the 17th August, 1956, the date on which the Standards (Transfer of Administration) Act of 1956 came into force, to 31st March, 1957, which coincides with the end of the Council's financial year. In addition to the fields of research covered in previous annual reports, this report includes sections dealing with the activities of the South African Bureau of Standards.

Balance sheets and statements of income and expenditure for the financial year ended 31st March, 1957, certified by the Controller and Auditor-General, are also presented.

I have the honour to be,

Sir,

Your obedient servant,

S. M. NAUDÉ

President: Council for Scientific and Industrial Research

*The Hon. Dr. A. J. R. van Rhijn,
Minister of Economic Affairs,
Paul Hof,
Minnaar Street,
PRETORIA.*

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Samestelling en Vergaderings van die Raad

Lede van die Raad op 31 Maart 1957 was:

Dr. S. M. Naudé	<i>President.</i>
Dr. F. J. de Villiers . .	<i>Organiserende Direkteur van Nywerheidsontwikkeling, Departement van Naturelle Sake.</i>
Dr. P. J. du Toit, F.R.S.	<i>Voorsitter van die Raad vir Wetenskaplike Navorsing in Afrika Suid van die Sahara, en gewese President van die W.N.N.R.</i>
Dr. B. Gaigher	<i>Kontroleur van Invoer en Uitvoer, en Nywerheidsadviseur van die Departement van Handel en Nywerheid.</i>
Mnr. F. G. Hill	<i>Senior Raadgewende Ingenieur, Rand Mines Ltd.</i>
Dr. H. O. Mönnig	<i>Besturende Direkteur, Agricura Laboratoria Bpk., en Voorsitter van die Raad van die Universiteit van Pretoria.</i>
Brig. J. H. Rauch	<i>Geneesheer - generaal, Unie-Verdedigingsmag.</i>
Mnr. P. E. Rousseau . . .	<i>Besturende Direkteur, S.A. Steenkool-, Olie- en Gas-korporasie Bpk.</i>
Dr. G. C. Scully	<i>Direkteur van Union Whaling Co. Ltd. en die Dundee Coal Co. Ltd.</i>
Dr. E. T. Stegmann . . .	<i>Professor in Wiskunde, Universiteit van Stellenbosch.</i>
Prof. W. G. Sutton	<i>Prinsipaal, Universiteit van die Witwatersrand.</i>
Prof. M. van den Ende . .	<i>Dekaan van die Mediese Fakulteit, Universiteit van Kaapstad.</i>
Dr. H. J. van Eck	<i>Voorsitter en Besturende Direkteur, Nywerheidsontwikkelingskorporasie.</i>
Dr. R. W. Wilcocks . . .	<i>Voormalige Rektor van die Universiteit van Stellenbosch.</i>
Dr. J. E. Worsdale	<i>Voorsitter en Besturende Direkteur, White's S.A. Portland Cement Co. Ltd.</i>
Sekretaris/Tesourier:	Mnr. A. J. Miller-Smit, B.A., M.Com.

Membership and Meetings of the Council

Membership of the Council on 31st March, 1957, was:

Dr. S. M. Naudé	<i>President.</i>
Dr. F. J. de Villiers . .	<i>Organizing Director of Industrial Development, Department of Native Affairs.</i>
Dr. P. J. du Toit, F.R.S.	<i>Chairman of the Council for Scientific Research in Africa South of the Sahara and former President of the C.S.I.R.</i>
Dr. B. Gaigher	<i>Controller of Imports and Exports and Industrial Adviser to the Department of Commerce and Industries.</i>
Mr. F. G. Hill	<i>Senior Consulting Engineer, Rand Mines Ltd.</i>
Dr. H. O. Mönnig	<i>Managing Director, Agricura Laboratoria Ltd., Chairman of the Council of the University of Pretoria.</i>
Brig. J. H. Rauch	<i>Surgeon-General, Union Defence Force.</i>
Mr. P. E. Rousseau	<i>Managing Director, S.A. Coal, Oil and Gas Corporation Ltd.</i>
Dr. G. C. Scully	<i>Director, Union Whaling Co. Ltd. and the Dundee Coal Co. Ltd.</i>
Dr. E. T. Stegmann . . .	<i>Professor in Mathematics, University of Stellenbosch.</i>
Prof. W. G. Sutton	<i>Principal, University of the Witwatersrand.</i>
Prof. M. van den Ende . .	<i>Dean of the Faculty of Medicine, University of Cape Town.</i>
Dr. H. J. van Eck	<i>Chairman and Managing Director, Industrial Development Corporation.</i>
Dr. R. W. Wilcocks . . .	<i>Former Rector of the University of Stellenbosch.</i>
Mr. J. E. Worsdale	<i>Chairman and Managing Director, White's S.A. Portland Cement Co. Ltd.</i>
Secretary/Treasurer . . .	Mr. A. J. Miller-Smit, B.A., M.Com.

Die aanstelling van dr. M. M. Loubser is in die Staatskoerant van 17 Augustus 1956 aangekondig, maar aangesien hy nie in staat was om die benoeming te aanvaar nie, is Brigadier Rauch in sy plek aangestel. Die aanstelling van proff. Sutton en van den Ende is ook in die Staatskoerant van 17 Augustus 1956 aangekondig.

Dr. E. Taberner se dienstermyn het op 4 Oktober 1956 verstryk en sy plek is gevul deur die aanstelling van dr. G. C. Scully. Dr. B. Gaigher is in Januarie 1957 aangestel.

Gedurende die verslagtydperk het die Raad een spesiale vergadering en twee gewone vergaderings gehou.

Lidmaatskap en Vergaderings van die Uitvoerende Komitee

Die lede van die Komitee was op 31 Maart 1957 as volg:

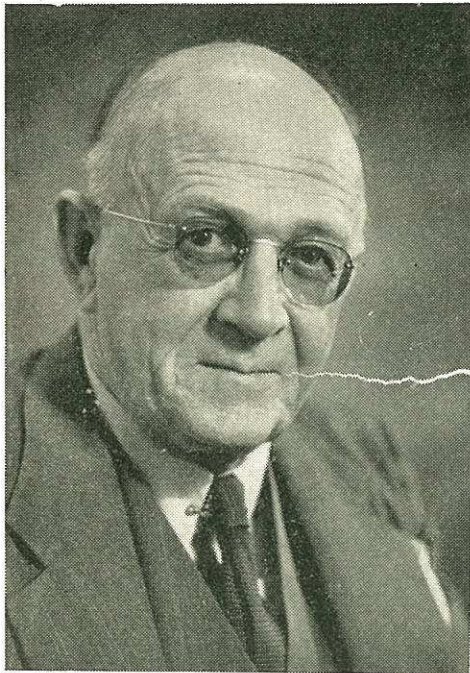
Dr. S. M. Naudé (*Voorsitter*),

Dr. F. J. de Villiers.

Dr. P. J. du Toit,

(met mnr. Worsdale, prof. H. O. Mönnig en prof. W. G. Sutton as plaasvervangende lede vir beide drs. de Villiers en du Toit.)

Die Uitvoerende Komitee het vier gewone en twee spesiale vergaderings gehou.



Dr. G. C. Scully.



Brig. J. H. Rauch.

The appointment of Dr. M. M. Loubser was gazetted on the 17th August, 1956, but as he was unable to accept, Brigadier Rauch was appointed instead. The appointment of Professors Sutton and van den Ende was also gazetted on the 17th August, 1956.

Dr. E. Taberner's term of office expired on the 4th October, 1956, and this vacancy was filled by the appointment of Dr. G. C. Scully. Dr. B. Gaigher was appointed in January, 1957.

During the period under review, the Council held one special meeting and two ordinary meetings.

Membership and Meetings of the Executive Committee

The membership of the Committee on 31st March, 1957, was:

Dr. S. M. Naudé (*Chairman*),

Dr. F. J. de Villiers,

Dr. P. J. du Toit,

(with Mr. Worsdale, Prof. H. O. Mönnig and Prof. W. G. Sutton as floating alternates to both Drs. de Villiers and du Toit).

The Executive Committee held four ordinary and two special meetings



Prof. M. van den Ende.

Navorsings-advieskomitees

Soos in vorige jare is 'n navorsings-advieskomitee aangestel vir Mediese en Tandheelkundige Navorsing, Chemiese Navorsing, Fisiese Navorsing, Bounavorsing, Personeelnavorsing, Telekommunikasienavorsing, Voedingnavorsing, Navorsing in Meganiese Ingenieurswese en Padnavorsing. Die Raad wil sy dank betuig aan die groot aantal wetenskaplikes, ingenieurs en nyweraars wat hul tyd opgeoffer het om in hierdie Nasionale Advieskomitees te dien en leiding te gee aan die werksaamhede van sy laboratoriums en institute.

Research Advisory Committees

As in past years, research advisory committees were appointed for Medical and Dental Research, Chemical Research, Physical Research, Building Research, Personnel Research, Telecommunications Research, Nutrition Research, Mechanical Engineering Research and Road Research. The Council is indebted to the large number of scientists, engineers and industrialists who gave up their time to serve on these national advisory committees and guided the activities of its laboratories and institutes.



Dr. B. Gaigher.

Algemene Oorsig

Die Wetenskap en die Regering

Die aanstelling, deur die Regering, van 'n Adviserende Raad vir Wetenskaplike Beleid, vroeg in 1957, vorm 'n nuwe mylpaal in die ontwikkeling van die wetenskap in Suid-Afrika. Soos die naam aandui, is hierdie Raad 'n permanente liggaam waardeur die Regering advies kan bekom van die knapste wetenskaplikes, oor sake van 'n wetenskaplike aard rakende regeringsbeleid. Die Wetenskaplike en Nywerheidsnavorsingsraad verwelkom hierdie nuwe ontwikkeling en beskou dit as 'n aanduiding van die Regering se erkenning van die belangrike rol wat die wetenskap in die volkslewe vervul.

Die invloed van wetenskap bly egter nie net op die persoonlike en individuele peil nie; intendeel, dit deurvloei alle aspekte van ons gemeenskaps- en nasionale bestaan, en wetgewers en bestuursliggame het reeds bevind dat die besluite wat hulle moet neem en die beleidsrigtings wat hulle moet uitvoer, in toenemende mate beïnvloed word deur die wetenskaplike faktore wat daarby betrokke is. Nie alleen is die „tegniese” staatsdepartemente hierby betrokke nie, maar ook die „administratiewe” departemente. Dus, bv. is die Departement van Arbeid ten nouste betrokke by die toenemende neiging by nyweraars vir die invoering van outomatisasie wat, op sy beurt, 'n algemene opgradering van arbeid noodsaaklik maak; terwyl die Departement van Justisie voor die moontlikheid te staan sal kom dat toekomstige ontwikkelings op die gebied van elektroënsefalografie 'n heeltemal nuwe benadering sal verg ten opsigte van misdade van geweldpleging. Soortgelyke voorbeelde kan vir elke Departement genoem word.

Regering is nie langer slegs 'n saak van regulering van die maatskaplike en ekonomiese verhoudings van die gemeenskap nie; meer en meer het die wetenskap ingedring in sake van staatsbeleid, en die persone wat ons toekomsrigtings moet bepaal, is genoodsaak om raad te soek by die wetenskaplike.

Internasionale Verhoudings in die Wetenskap

Net soos in die geval van nasionale aangeleenthede, so ook speel die wetenskap al meer en meer 'n belangriker rol op internasionale gebied, en meeste lande stel nou wetenskaplike attaché's aan om die hoofde van hul belangrike diplomatieke sendings met advies te bedien. Die W.N.N.R. is nou al vir meer as tien jaar in beide Londen en Washington verteenwoordig deur wetenskaplike skakelbeamptes wat ook optree as wetenskaplike adviseurs vir die hoofde van ons diplomatieke sendings in genoemde sentrums. In begin September 1956 het die W.N.N.R. ook 'n nuwe wetenskaplike kantoor by die Suid-Afrikaanse Ambassade in Keulen geopen, en dit sal

General Review

Science and the Government

The establishment by the Government of an Advisory Council on Scientific Policy early in 1957, marks a new phase in the development of science in South Africa. As implied by its name, this Council is a standing body through which the Government can obtain the advice of the Union's foremost scientists, on all scientific matters affecting Government policy. The Council for Scientific and Industrial Research welcomes this development and regards it as an indication of the Government's recognition of the importance of science in the life of the nation.

The impact of science does not, however, remain at the personal and individual level; on the contrary, it



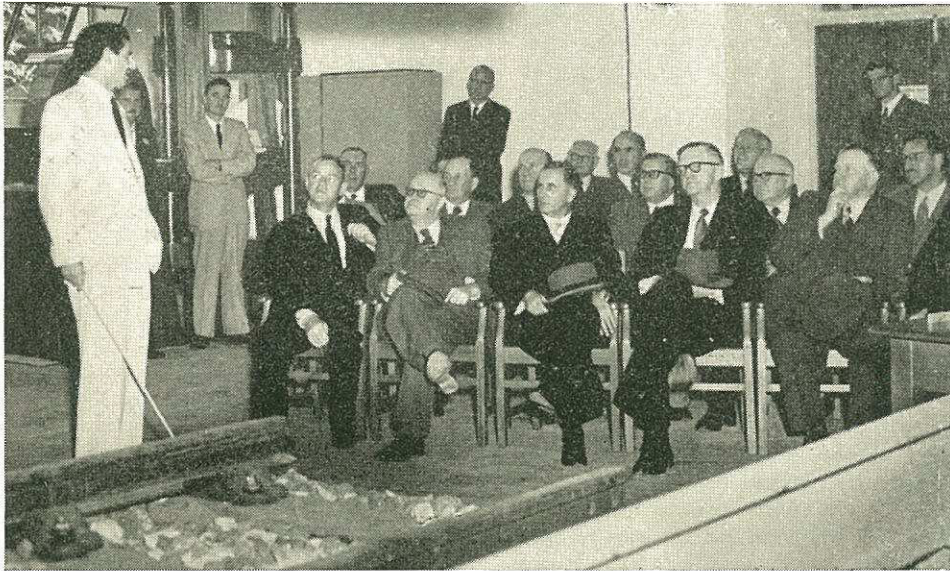
Dr. H. O. Mönnig, Chairman of the Advisory Council on Scientific Policy.

Dr. H. O. Mönnig, Voorsitter van die Adviserende Raad vir Wetenskaplike Beleid.

verantwoordelik wees vir algemene wetenskaplike skakelwerk in Sentraal Europa.

Behalwe direkte verteenwoordiging tussen lande, was internasionale samewerking waarskynlik meer effektief op die gebied van die wetenskap as op enige ander terrein. In byna enige tak van die wetenskap bestaan daar 'n internasionale organisasie wat onderlinge omgang tussen wetenskaplikes van die volkere vergemaklik en aanmoedig. Hierdie internasionale organisasies, in teenstelling met hul politieke teenhangers, werk oor die algemeen so glad en vriendskaplik saam dat hulle kwalik in die persnuus vermeld word, maar nietemin is hulle effektiewe instrumente vir internasionale samewerking. Suid-Afrika baat grootliks deur sy lidmaatskap met sowat tien van hierdie organisasies deur bemiddeling van die W.N.N.R., wat 'n aantal nasionale komitees geskep en die vereiste kantoor-

pervades all aspects of our communal and national lives, and our legislators and administrators are finding that, to an increasing extent, the decisions they have to make and the policies they are called upon to implement require an appreciation of the scientific factors involved. Not only are the "technical" departments of the Government involved in this way, but the "administrative" departments as well. Thus, for example, the Department of Labour is vitally affected by the growing tendency among industrialists to introduce automation which, in turn, calls for a general upgrading of labour, while the Department of Justice is confronted with the possibility that future developments in the field of electroencephalography may call for a totally new approach to crimes of violence. Similar examples could be quoted for every department.



Tydens 'n besoek aan die W.N.N.R. word lede van die Kabinet ingelig omtrent die spasiëring van spoorwegdwarslêers.

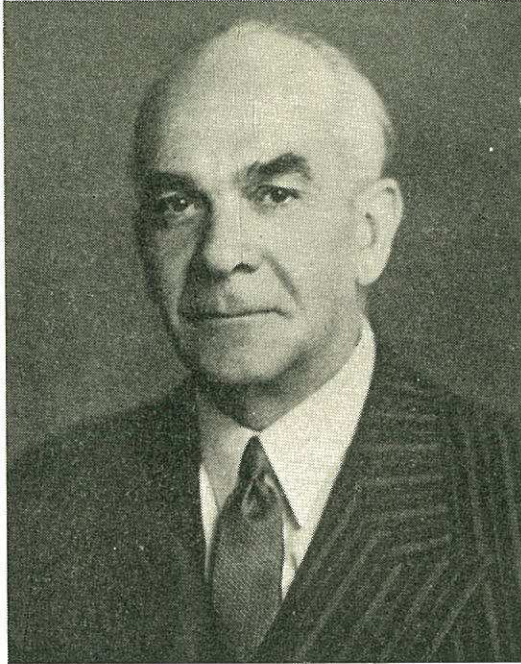
Members of the Cabinet hear about research into the spacing of railway sleepers during the course of a visit to the C.S.I.R.

personeel daarvoor verskaf het. Van besondere belang vir Suid-Afrika is die Raad vir Wetenskaplike Navorsing in Afrika Suid van die Sahara (C.S.A.) en sy politieke teenhanger, die C.C.T.A. (Kommissie vir Tegniëse Samewerking in Afrika). Gedurende die tydperk van hierdie verslag, is Suid-Afrika op 'n vergadering van die C.S.A. te Luanda, Angola, verteenwoordig deur die President van die W.N.N.R. en dr. P. J. du Toit, diensdoende voorsitter van die C.S.A., terwyl die Vise-President van die W.N.N.R. en die Direkteur van die Nasionale Bounavorsingsinstituut die C.C.T.A. se Inter-Afrikaanse Behuingskonferensie te Bakavu in die Belgiese Kongo bygewoon het.

Government is no longer merely a question of regulating the social and economic relationships of the community; more and more, has science infiltrated into questions of policy, and the men who guide our destinies are forced to seek advice from the men of science.

International Relations in Science

As in national affairs, so in the international sphere science plays an increasingly important rôle, and most countries now appoint scientific attachés to advise the heads of their important diplomatic missions. The C.S.I.R. has been represented for over ten years in both London and Washington by scientific liaison officers,



*Dr. P. J. du Toit, Voorsitter van C.S.A.
Dr. P. J. du Toit, Chairman of C.S.A.*

Die W.N.N.R. was ten nouste betrokke by die voorbereidingswerk vir die Internasionale Geofisiese Jaar wat in Julie 1957 'n aanvang neem. Die Raad verskaf die Sekretariaat vir die Suid-Afrikaanse Nasionale Komitee, terwyl twee van sy laboratoriums regstreeks deelneem in die wêreldprogram vir navorsing op die gebied van oseanografie en die studie van die ionosfeer. Die Regering dra £275,000 by tot die koste in verband met die Internasionale Geofisiese Jaar. Die meeste hiervan sal departementeel aangewend word deur inrigtings soos bv. die Weerburo, maar die Raad is behulpsaam met die besteding van die fondse wat bedoel is vir navorsing wat deur die universiteite onderneem word in verband met hierdie programme, veral ten opsigte van ionosferiese fisika, oseanografie en kosmiese strale. Die Raad verskaf egter ook grootskaalse hulp vir die program van satellietopsporing.

Behalwe hierdie georganiseerde internasionale bedrywighede op die gebied van die wetenskap, kan die Raad ook met genoegdoening melding maak van toenemende belangstelling in navorsingswerk in Suid-Afrika deur oorsese wetenskaplikes, waarvan een bewys te sien is in die toenemende aanvraag vir die Raad se publikasies. Verder is daar die aantal wetenskaplikes wat na die Unie kom om persoonlik inligting te bekom oor die werk wat hier gedoen word, en derdens is daar die aantal uitnodigings, in baie gevalle gepaard met aanbiedings van geldelike hulp met reiskoste, aan Suid-Afrikaanse wetenskap-

who also act as scientific advisers to the heads of our diplomatic missions in those centres. Early in September, 1956, a new scientific liaison office was opened by the C.S.I.R. at the South African Embassy in Cologne and will be responsible for general scientific liaison in central Europe.

Apart from direct representation between countries, international collaboration has probably been more effective in science than in any other field. In almost every branch of science there is an international union which facilitates and fosters intercourse between specialists of different nations. For the most part these international unions, unlike their political counterparts, operate so smoothly and amicably that they rarely break into the news, but they are nevertheless effective instruments of international co-operation. South Africa benefits from its membership of some ten of these unions through the agency of the C.S.I.R. which has set up a number of national committees and provides the necessary secretarial services. Of particular importance to South Africa are the Council for Scientific Research in Africa South of the Sahara (C.S.A.) and its political counterpart, C.C.T.A. ((Commission for Technical Co-operation in Africa). During the period under review, South Africa was represented at a meeting of C.S.A. held at Luanda in Angola by the President of the C.S.I.R. and Dr. P. J. du Toit, the current Chairman of C.S.A., while the Vice-President of the C.S.I.R. and the Director of the National Building Research Institute attended the C.C.T.A. Inter-African Housing Conference at Bakavu in the Belgian Congo.

The C.S.I.R. has been deeply involved in the preparations for the International Geophysical Year which commences in July, 1957. It provides a secretariat for the South African National Committee, and two of its laboratories are participating directly in the world programme for research in the fields of oceanography and the study of ionosphere. The Government has agreed to the expenditure of £275,000 on the International Geophysical Year. Most of this will be spent departmentally by institutions such as the Weather Bureau, but the Council is assisting in the allocation of the funds set aside for research undertaken by the universities in connection with the programme, particularly in the fields of ionospheric physics, oceanography and cosmic rays. The Council is, however, also providing major support for the satellite tracking programme.

Apart from these organized international activities in science, the Council is gratified to be able to report a growing interest in research in South Africa, on the part of scientists overseas, of which one indication is the steadily increasing demand for the Council's publications. Another is the number of scientists who have come to the Union to seek first-hand information on work in progress, while a third is the number of invitations, in many cases accompanied by offers of assistance with



Op die C.C.T.A.-Interafrikaanse Behuisingskonferensie, te Bukavu, antwoord mnr. E. W. Dohse, Vise-president van die W.N.N.R., op die openingsrede.

Mr. E. W. Dohse, Vice President of the C.S.I.R., replies to the opening address during the C.C.T.A. Inter-African Housing Conference at Bukavu.

likes om oorsese spesialiteitsvergaderings en konvensies toe te spreek. Selfs nog meer konkrete bewyse tot staving van hierdie neiging is die feit dat oorsese geldelike steun aangebied is vir die voortsetting van navorsingswerk wat deur die W.N.N.R. se Navorsingseenhede uitgevoer word. Van besondere betekenis is die aansienlike skenking deur die Williams Waterman Fonds vir Bestryding van Diëtiesiektes, New York, aan die W.N.N.R. se Navorsingseenheid vir Kliniese Voeding by die Universiteit van Kaapstad, en 'n skenking van \$135,000 deur die Openbare Gesondheidsdiens van die Verenigde State aan die W.N.N.R. se Amebiase-Navorsingseenheid by die Universiteit van Natal, Durban, vir besteding gedurende die volgende vyf jaar.

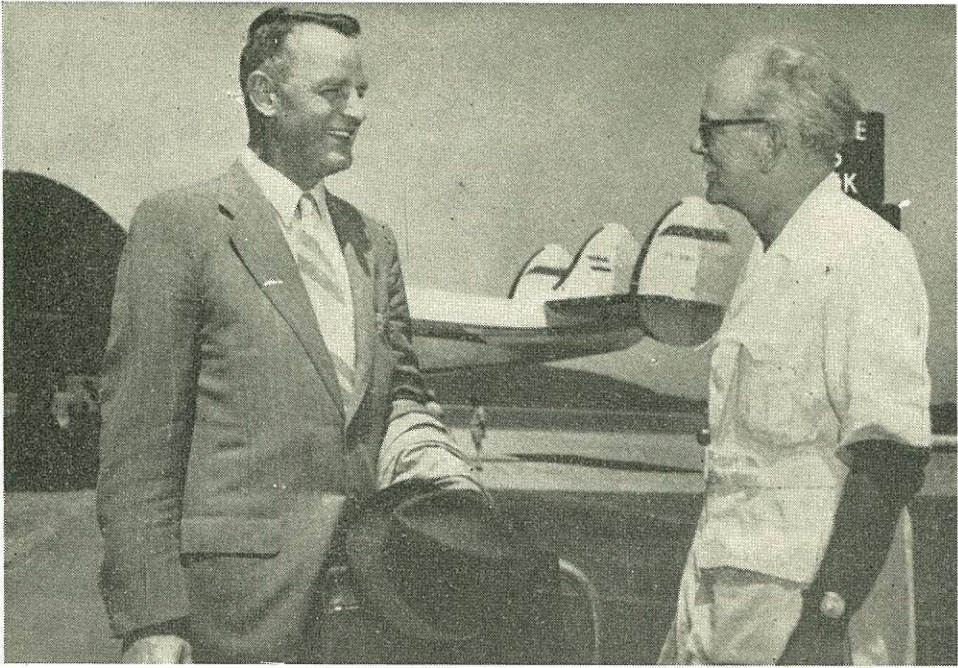
Reorganisasie van Wetenskaplike Dienste

Tot by die uitbreek van die tweede wêreldoorlog, was die wetenskaplike dienste wat in die Unie beskikbaar was nog net beperk tot 'n paar laboratoriums soos die Veeartsenykundige Laboratorium, Onderstepoort, en andere onder beheer van die Departement van Landbou, en tot 'n klein aantal onafhanklike organisasies, soos die Suid-Afrikaanse Instituut vir Mediese Navorsing. Maar as gevolg van die snelle ontwikkeling op nywerheidsgebied wat gedurende die oorlog plaasgevind het, het dit

travel costs, received by South African scientists to address overseas specialist meetings and conventions. Even more concrete evidence of this trend is the fact that overseas financial support has been offered to advance research being carried out in C.S.I.R. research units. Of particular note are a substantial grant by the Williams Waterman Fund for the Combat of Dietary Diseases, New York, made to the Clinical Nutrition Unit of the C.S.I.R. at the University of Cape Town for the study of kwashiorkor, and a grant of \$135,000 by the United States Public Health Service to be spent over the next five years by the Amoebiasis Unit of the C.S.I.R. at the University of Natal in Durban.

Reorganization of Scientific Services

Until the outbreak of the last war, scientific services available in the Union were limited to a few laboratories such as the Veterinary Research Laboratory, Onderstepoort, and others operated by the Department of Agriculture and to a small number of independent organizations such as the South African Institute for Medical Research. As a result of the rapid industrial development that took place during the war, it became obvious that these would be totally inadequate in the post-war era and



NATAL DAILY NEWS

Dr. R. Elsdon-Dew, Hoof van die Amebiase-navorsingseenheid, ontmoet dr. S. M. Naudé, President van die W.N.N.R., by sy aankoms in Durban om die vergrote navorsingsprogram van die Eenheid aan die gang te sit.

Dr. R. Elsdon-Dew, Head of the Amoebiasis Research Unit meets Dr. S. M. Naudé, President of the C.S.I.R., on his arrival in Durban to inaugurate the expanded research programme of the Unit.

duidelik geword dat hierdie organisasies heeltemal ontoereikend sal wees vir die na-oorlogse tydperk, en die destydse Regering het toe besluit om Nasionale laboratoriums in die lewe te roep vir navorsing, toetsing en industriële standaardisasie. Vir hierdie doel is twee liggame, die Suid-Afrikaanse Buro vir Standaarde en die Suid-Afrikaanse Wetenskaplike en Nywerheidsnavorsingsraad, deur 'n Wet van die Parlement in 1945 geskep. Hulle is onafhanklik van mekaar gemaak en, om ook hul administratiewe vryheid te verseker wat so noodsaaklik is vir doeltreffende uitvoering van navorsingswerk, is hulle ook substansiëel onafhanklik van die gevestigde Staatsdiens gemaak, dog elkeen direk verantwoordelik aan 'n besondere kabinetsminister en, deur hom, aan die Parlement.

Beide hierdie liggame het vir tien jaar as afsonderlike eenhede fungeer, maar met verloop van tyd het dit duidelik geword dat voordele en heelwat besparings verkry kan word indien beide liggame onder een bestuur

the Government of the day decided to set up national laboratories for research, testing and industrial standardization. For this purpose two new bodies, the South African Bureau of Standards and the South African Council for Scientific and Industrial Research, were established by Act of Parliament in 1945. They were made independent of each other and, in order to ensure the administrative freedom essential to the efficient conduct of scientific work, rendered substantially independent of the regular Civil Service, though each was made directly responsible to a particular cabinet minister and, through him, to Parliament.

Both bodies continued as separate entities for ten years but, in the course of time, it became apparent that economics and considerable advantages would result if both bodies were brought under the same management. This was effected by the Standards (Transfer of Administration) Act which became operative on 17th August, 1956. In terms of this Act the Council for Scientific and

saamgebring kan word. Hierdie oogmerk is bereik met die Wet op Standaard (Oordrag van Uitvoering) van 1956 wat op 17 Augustus 1956 in werking getree het. Kragtens hierdie Wet het die Wetenskaplike en Nywerheidsnavorsingsraad, wie se ledetal vergroot is deur die toevoeging van lede wat gekies is vir hul spesiale kennis van standaardisasie, al die magte en funksies aanvaar wat tevore uitgeoefen is deur die Raad van die Suid-Afrikaanse Buro vir Standaard, wat nou as onafhanklike liggaam afgeskaf is. Hierdie funksies en magte sluit onder meer in die beheer oor die finansies en toetslaboratoriums van die S.A.B.S., die bepaling van beleid ten opsigte van die opstel van spesifikasies en gebruikskodes, en die administrasie van die nasionale stempels en standaardmerkskemas.

Die aard van die Buro se werk is egter sodanig dat daar dikwels op kort-kenningsgewing beslissings van die Raad verlang word en, aangesien die Raad nie dikwels byeenkom nie, is besluit om 'n spesiale komitee aan te stel, soortgelyk aan die van die Nasionale Navorsingsadvieskomitees, om meeste van die Buro se sake te behartig. Aan hierdie Komitee, wat bekend is as die Standaard-Raad en elke ses weke vergader, is 'n aantal uitvoerende magte verleen.

Gedurende die tydperk waarvoor hierdie verslag handel, is sekere algemene en administratiewe dienste van die twee liggame gesentraliseer; hieronder val personeeladministrasie, rekeninge, biblioteek, instrumentewerkplaas, publisiteit en openbare verhoudinge, en vertaal-, statistiese en fotografiese dienste. Afgesien hiervan, is die bedoeling dat die nasionale laboratoriums van die Buro sal voortgaan soos in die verlede.

Verskeie van die industriële navorsingsorganisasies wat finansiël deur die Raad ondersteun word, kan nou beskou word dat hulle die vormingstydperk ontgroei het. Nie alleen het hulle vir hulself 'n uitstekende reputasie verwerf nie, maar die nywerhede wat hulle dien, het hulle reeds as bates begin beskou. Dit word aangedui deur die feit dat hulle in staat is om sowel nuwe ondersteuners te trek asook om groter finansiële bydraes van bestaande ondersteuners te ontvang. Die Raad het dus besluit om sy beleid ten opsigte van sy ondersteuning aan hierdie organisasies in hersiening te neem en vir dié doel 'n spesiale komitee benoem onder voorsitterskap van dr. F. J. de Villiers.

Die Spaarsame Gebruik van Water

Dit word algemeen erken dat die betreklike skaarste aan water in Suid-Afrika uiteindelik 'n stremmende uitwerking op die industriële en landbou-ontwikkeling van die land sal hê. Dit is, bv. beraam dat indien die huidige tempo van ontwikkeling voortduur, die aanvraag vir water uit die opvanggebied van die Vaalrivier die bestaande voorraad met sowat 143,000,000 gallon per dag sal oortref in die jaar 2000!

Dit is 'n aanduiding hoe dringend noodsaaklik dit is om die beste gebruik te maak van die beskikbare water-

Industrial Research, enlarged by the addition of members selected for their special knowledge of standardization, assumed all the powers and functions formerly exercised by the Council of the South African Bureau of Standards which was abolished as an independent body. These functions and powers include, amongst others, control of the finances and testing laboratories of the S.A.B.S., the determination of policy in regard to the preparation of specifications and codes of practice and the administration of the national hall-mark and standardization mark schemes.

The nature of the Bureau's work is such that frequent short-notice decisions from Council are required and, as the Council itself does not meet very often, it decided to appoint, along the lines of the national research advisory committees, a special committee to handle most of the affairs of the Bureau. A number of executive powers have been delegated to this committee, styled the Standards Council, which meets once every six weeks.



A technologist in the South African Bureau of Standards determining chemical damage to cotton materials by means of a fluidity test.

'n Tegnoloog in die Suid-Afrikaanse Buro vir Standaard bepaal die chemiese beskadiging van katoenmateriaal deur middel van 'n vloeibaarheidstoets.



Dr. F. J. de Villiers.

voorrade. In hierdie verband benader die Raad die vraagstuk uit drie hoofrigtings. Eerstens die voorkoming van besoedeling van bestaande bronne, tweedens navorsing op metodes vir suiwing van fabrieks-afloopwater om dit weer geskik vir gebruik te maak, en derdens metodes vir ontsouting van brakwaters wat volop voorkom in baie dele van die Unie en Suidwes-Afrika om op hierdie wyse dit bruikbaar te maak vir landbou- en nywerheidsdoeleindes.

Die Raad se verpligtings in hierdie verband is grootliks vermeerder as gevolg van die bepalings van die Waterwet van 1956, wat *onder meer* voorskryf dat strenger beheer uitgeoefen moet word op die gebruik van water vir nywerheidsdoeleindes, vir die suiwing en afvalvertering van fabrieks- en rioolwaters, en vir die voorkoming van rivierbesoedeling. Vir die administrasie van die Wet het die Raad aan die Minister van Waterwese tegniese advies en sekere dienste beskikbaar gestel deur middel van die Waternavorsingsafdeling van die Nasionale Chemiese Navorsingslaboratorium en deur die Buro vir Standaard. Die Wet bepaal dat in die toekoms geen persoon 'n fabriek mag oprig wat meer as 50,000 gallon water per dag sal gebruik sonder magtiging daartoe deur 'n permit, wat slegs uitgereik sal word na 'n ondersoek oor die beskikbare watervoorraad en verder met dien verstande dat alle nywerheidsafloop vooraf behandel moet word om te voldoen aan 'n standard soos deur die Minister voorgeskryf. Hierdie vereistes maak dit dus noodsaaklik

During the period under review certain general and administrative services of the two bodies have been centralized. These include personnel administration, accounts, library, instrument workshops, publicity and public relations, and translation, statistical and photographic services. Apart from this, it is intended that the national testing laboratories of the Bureau should continue to operate as hitherto.

Several of the industrial research associations supported financially by the Council may now be said to have come to the end of their formative periods. Not only have they earned for themselves an excellent reputation, but the industries which they serve have come to regard them as assets. This is evidenced by the fact that they are able, both to attract new members and also to command increased financial contributions from existing members. The Council has, therefore, decided to review its policy towards its support of these associations and, to this end, has set up a special committee under the chairmanship of Dr. F. J. de Villiers.

Conservation of Water

It is generally agreed that the relative scarcity of water in South Africa will eventually have a severe limiting effect on the industrial and agricultural development of the country. It has been estimated, for example, that if the present rate of development continues, the demand for water in the Vaal River basin will exceed the assured supply by some 143,000,000 gallons per day by the year 2000!

This indicates the urgent need for making the best use of all available water supplies. In this respect the Council's activities are directed along three main lines. Firstly, they are aimed at preventing the pollution of existing sources; secondly, research is being conducted into methods of treatment of effluents with the object of rendering the water suitable for re-use, and thirdly, methods are being developed for the demineralization of saline ground waters, abundant in many areas of the Union and South West Africa, with a view to rendering them usable for agricultural and industrial purposes.

The Council's commitments in this field were greatly extended as a result of the Water Act of 1956 which makes provision, *inter alia*, for the stricter control of the use of water for industrial purposes, for the purification and disposal of industrial wastes and sewage effluents, and for the prevention of pollution. For the administration of this Act, the Council has agreed that technical advice and certain services will be made available to the Minister of Water Affairs by the Water Research Division of the National Chemical Research Laboratory and by the South African Bureau of Standards. The Act provides that in future no person may establish an industrial undertaking which requires more than 50,000 gallons of water per day without a permit which will only be granted after a study of the availability of water in the area, and

dat die bestaande fasiliteite vir waternavorsing in die nabye toekoms uitgebrei sal moet word en moontlik sal daar ook 'n reeks streeklaboratoriums hiervoor opgerig moet word.

Die werksaamhede in verband met die ontsouting van brakwaters het in Januarie die stadium bereik waar voldoende gegewens van 'n proefaanleg by Welkom ingesamel is om te dien as basis vir die opstel van 'n volledige installasieplan om 3,000,000 gallon brakwater per dag te ontsout. Nadat 'n groep belanghebbende Mynmaatskappye hierdie plan sowel as alternatiewe metodes van beheer oor ondergrondse mynwaters oorweeg het, het hulle besluit om voort te gaan met die oprigting van dié installasie, wat die eerste van sy soort in die wêreld sal wees vir die ontsouting van brakwater op so 'n uitgebreide skaal. Hierdie Suid-Afrikaanse onderneming word met groot belangstelling deur oorsese inrigtings gevolg.

Chemiese Dienste

Die Raad se verantwoordelikhede op die gebied van skeikunde is van tweërlei aard: Eerstens die navorsingswerk wat die ontwikkeling van die land se natuurlike hulpbronne ten doel het, en tweedens die verskaffing van chemiese dienste van 'n spesialiteitsaard aan staatsdepartemente en die nywerheid. Gedurende die tydperk van hierdie verslag is navorsingswerk gedoen oor die samestelling en eienskappe van 'n verskeidenheid van produkte soos kleisoorte, wol, olie, seegrassie, hout, vesels en giste. Ook is heelwat basiese navorsing onderneem wat geen onmiddellike praktiese oogmerk het nie maar eerder om fundamentele gegewens te verkry wat in die toekoms vir toegepaste navorsing gebruik kan word; dit sluit in 'n ondersoek na die diffusie van gasse deur poreuse vaste liggame, en die studie van kwikamalgam, waaraan deurgaans gewerk is.

Met die instandhouding van spesialiteitsdienste is die oogmerk om deur middel van gesentraliseerde laboratoriums daardie soort geriewe te voorsien, insluitende duur aparate en spesialiteitspersoneel, wat nie deur 'n privaat konsultant verskaf kan word nie. Trouens, die Raad se vaste beleid is om geen werk te aanvaar wat buite gedoen kan word nie, hoewel hy nie noodwendig 'n bestaande diens wat hy aangevoer het, sal laat vaar wanneer soortgelyke dienste later deur private ondernemings begin word nie.

Gedurende hierdie tydperk was daar 'n geleidelike toename in die aantal kontrakte vir chemiese ondersoeke op terreine van allerlei aard. Drie groot ondersteunde navorsingsprojekte is onderneem vir algemene navorsing op die verbetering van bestaande produkte en vir die ontwikkeling van nuwe produkte vir groot nywerheids-ondernemings. 'n Baie belangrike diens wat in die laboratoriums van die S.A.B.S. onderneem is, was die toetsing van talyke artikels wat deur staatsdepartemente aangekoop is; bv. die toetsing van looddomhulsels vir kables vir die Poskantoor. Behalwe sy werk in verband met standaard-spesifikasies, het die S.A.B.S. se chemiese

also that all industrial effluents shall be treated before discharge to conform to a standard laid down by the Minister. Thus it will be necessary to expand the existing facilities for water research and investigation in the near future, and probably to establish a number of regional laboratories as well.

The work on the demineralization of brackish waters reached a stage in January when sufficient data had been obtained from the pilot plant at Welkom to provide a basis for the drawing up of detailed plans for a plant to process 3,000,000 gallons of brack water per day. After consideration of these, and alternative methods of disposal of the mine waters, a group of interested mining companies has decided to proceed with the construction of the plant, which will be the first in the world to desalt brackish water on anything approaching this scale of operations. Developments in South Africa on this project are being followed with great interest overseas.

Chemical Services

The Council's responsibilities in the field of chemistry are two-fold. In the first place, it conducts research aimed at the development of the country's natural resources. Secondly it provides a number of specialist chemical facilities for Government Departments and Industry.

During the period under review research was undertaken on the constitution and properties of a variety of products including clays, wool, oils, seaweeds, wood, fibres and yeasts. In addition, much basic research was undertaken, not with any immediate practical object in view, but rather to establish the fundamental data upon which future applied work depends. Into the latter category falls such work as the diffusion of gases through porous solids and the study of mercury amalgams which has continued throughout the year.

In maintaining the specialist services, the aim has been to provide in centralized laboratories those facilities, including expensive apparatus and specialist staff, which cannot be provided by the private consultant. Indeed, it is the Council's established policy not to accept work which can be done outside, though it will not necessarily abandon an existing service which it has pioneered if similar services are started up by private enterprise.

During the period there has been a steady increase in the number of contracts for chemical investigation at all levels. Three major fellowship contracts were for general research aimed at improving existing products and the development of new products for large industrial undertakings. A very important service undertaken in the S.A.B.S. laboratories, was the testing of numerous materials purchased by Government departments, such as for example the testing of lead sheathing for cables for the Post Office. Apart from work connected with standard specifications, the S.A.B.S. chemical laboratories

laboratoriums 'n aantal private spesifikasies opgestel vir individuele firmas, onder meer het dit ingesluit spesifikasies vir verwe, plastiek en rubber.

Fisiese Dienste

Net soos in die geval van chemiese dienste, verskaf die Raad ook navorsings- en roetine dienste in fisika. Daarby dra die Raad ook spesiaal die verantwoordelikheid vir handhawing van die fisiese meetstandaarde vir die Unie van Suid-Afrika en stel sy dienste beskikbaar vir die yking en toetsing van industriële instrumente ooreenkomstig hierdie standaarde. Hierdie dienste word verskaf deels deur die Nasionale Fisiese Navorsingslaboratorium waar die basiese standaarde gehuisves word en deels deur die Buro vir Standaarde.

Heelwat verbetering in hierdie geriewe het beskikbaar geword toe die Nasionale Fisiese Navorsingslaboratorium aan die begin van die jaar sy nuwe gebou betrek het.

Te oordeel volgens die vinnige toename in die aanvraag vir dienste van chemie-fisiese aard is daar 'n toenemende bewustheid in Suid-Afrika van die voordele van sulke tegnieke. Spektrochemiese analitiese metodes word besonder populêr en, behalwe die kontrakwerk in sowel die navorsings- as standaardlaboratoriums, het die Nasionale Fisiese Navorsingslaboratorium ook die opleiding van 'n aantal spesialistegnici vir buite-liggame onderneem. Die afdelings vir X-straal diffraksie en elektronmikroskopie het doelig gebly, terwyl die Afdeling Massaspektrometrie behulpsaam was met die ontwerp van 'n massaspektrometer wat vir 'n groot nyweraar in die Sentrale Werkplaaas gebou is.

Die Ordinansie wat deur die vier Provinsiale Administrasies aangeneem is vir eenvormige verkeersregulasies, en die aanbring van weerkaatsers op alle rytuie verpligtend gemaak het vanaf 1 Julie 1957, het skielik so 'n massa werk veroorsaak dat die Buro vir Standaarde sy toetsfasiliteite vir hierdie tipe werk moes verviervoudig. Twee fabrikante het die Buro se stempelmerk verkry vir weerkaatsers wat aan die betrokke spesifikasie voldoen.

Nog 'n stukkie wetgewing wat skielik navrae veroorsaak het, was die Radiowet, wat bepaal dat alle elektriese apparaat sodanig ontwerp moet wees dat dit geen versterings in radioutsendings kan veroorsaak nie.

Sover dit betref die suiwer navorsingsaspek, is heelwat verbeterings aangebring in die Raad se siklotron, en die eventuele krag waarvoor dit ontwerp is skyn nou binne bereik te wees. Insgelyks word goeie vordering gemaak met die opbou van fasiliteite vir navorsing in kernfisika, terwyl die opleiding van kernfisici fluks vorder.

Meganiese Ingenieurswese

Op hierdie gebied was daar gedurende die verslagtydperk 'n toenemende aanvraag deur die nywerheid vir die Raad se navorsingsdienste en standaard-laboratoriumwerk. Een groot kontrakonderneming vir die ontwerp, toetsing oor oprigting, en kalibrasie van 'n klimaatskamer ten behoeve van die Transvaalse en Oranje-Vrystaatse

drew up a number of private specifications for individual firms. These included among others specifications for paints, plastics and rubber.

Physical Services

As in chemistry, so in physics the Council provides both research and routine services. In addition, it has special responsibility for maintaining basic standards of physical measurement for the Union of South Africa and providing a service for calibrating and testing industrial instruments in terms of these standards. These services are provided partly by the National Physical Research Laboratory where the basic standards are kept, and partly by the Bureau of Standards. Considerable improvement in these facilities became possible when the National Physical Research Laboratory moved into its new building at the beginning of the year.

Judging by the rapidly increasing demands on the services provided in the field of chemical physics, there is a growing awareness in South Africa of the advantages of these techniques. Spectro-chemical methods of analysis are becoming particularly popular and, apart from work done on contract in both research and standards laboratories, the National Physical Research Laboratory undertook the training of a number of specialist technicians for outside bodies. The X-ray diffraction and electronmicroscope sections were also kept busy, while the mass spectrometry section assisted in the design of a mass spectrometer which was built in the Central Workshops for a large industrial concern.

The passing by the four provincial councils of the uniform traffic ordinance which makes the fitting of retro-reflectors compulsory on all vehicles from 1st July, 1957, precipitated such a volume of work that plans have had to be made for the Bureau of Standards to quadruple its testing facilities for this type of work. Two manufacturers have secured the Bureau's mark for retro-reflectors which comply with the relevant specifications.

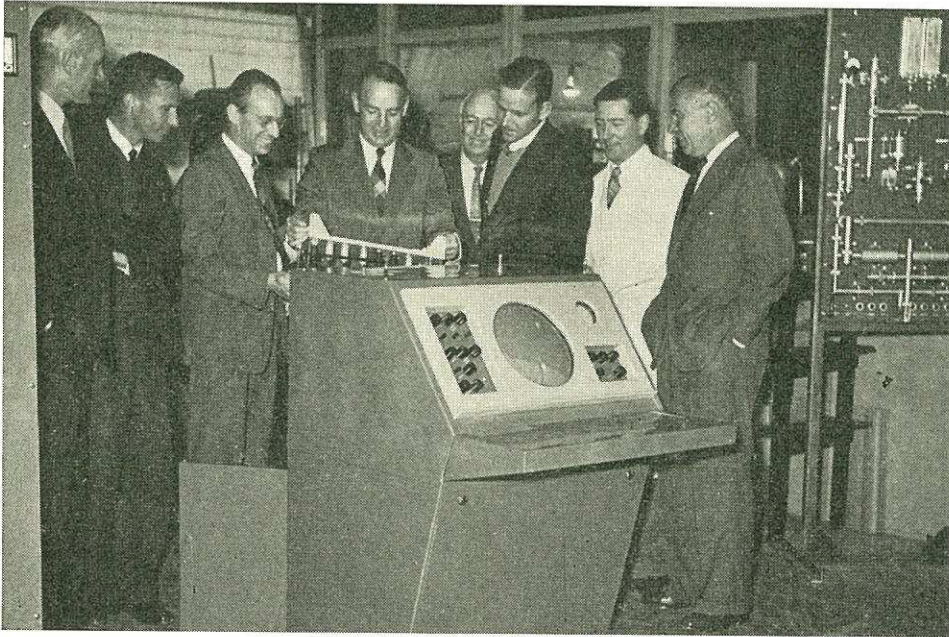
Another piece of legislation which precipitated a considerable volume of enquiries was the Radio Act which stipulates that all electrical equipment shall be so designed as to avoid interference with radio transmissions.

On the pure research side, steady improvements have been made to the Council's cyclotron and the ultimate energy for which it was designed now appears to be within reach. Concurrently, the facilities for research in nuclear physics in general are being built up steadily and the training of nuclear physicists is going on apace.

Mechanical Engineering

In this field, the period has been characterised by the growing demand by industry for the Council's services in both the research and standards laboratories.

One major contract, the design, supervision during erection, and calibration of a climatic chamber on behalf of the Transvaal and Orange Free State Chamber of



Die President van die W.N.N.R. besigtig radaruitrusting ontwikkel deur die Nasionale Telekommunikasienavorsingslaboratorium en vervaardig deur 'n Suid-Afrikaanse firma.

The President of the C.S.I.R. inspects radar equipment developed by the National Telecommunications Research Laboratory and manufactured by a South African firm.

Kamer van Mynwese, is binne 'n tydsbestek van ses jaar voltooi en oorhandig. Hierdeur is die Mynkamer se Laboratorium vir Toegepaste Fisiologie van 'n unieke instrument voorsien, deurdat dit behalwe die verskaffing van 'n plek waarin die temperatuur, vog- en lugbewegings noukeurig beheer kan word, ook die gemiddelde uitstraling vanuit al die mure gereguleer kan word.

Die voorlopige resultate van die „ontspannings”-tegniek wat ontwikkel is deur die groep navorsers wat rotsstortingsprobleme in die Witwatersrandse goudmyne ondersoek, het so belowend geblyk in die myn waarin dit uitgetoets is dat die toepassing daarvan ook na verskeie ander gebiede uitgebrei is. Hoewel hierdie tegniek nie 'n volkome oplossing bied vir die rotsstortingsprobleem nie, vorm dit tog 'n groot vooruitgang in myntegnologie.

'n Onlangse neiging oorsee was om hoogspannings-boute en moere in plaas van klinknaels of sweising te gebruik in staalstrukture, soos brugges, omdat bevind is dat dit vermoeidheidsweerstand van laste aanmerklik versterk. Toetse met plaaslik-vervaardigde moere en bonte het ewe bevredigende resultate gegee en daarby is ook nog bevind dat die spesiaal-verharde platgedrukte staalwassers wat tot hiertoe noodsaaklik beskou was onder die moer en bout, nou deur dopverharde sagte-staalwassers vervang kan word sonder inboet van sterkte en daarby ook baie goedkoper geproduseer kan word.

Mines, was brought to completion after six years' work. This has provided the Chamber's Applied Physiology Laboratory with an instrument which is unique in that in addition to providing an environment in which temperature, humidity and air movement can be accurately controlled, the mean radiation from all the walls can be regulated.

The initial results of the “de-stressing” technique, developed by the team investigating rock bursts in the Witwatersrand gold mines, have proved so promising in the mine where it was tried out that its use has been extended to several other areas. Though not a complete solution to the rock burst problem it, nevertheless, constitutes a major advance in mining technology.

A recent trend overseas has been the use in steel structures, such as bridges, of high tensile bolts and nuts in place of riveting or welding as this has been found to increase significantly the fatigue strength of the joint. Tests on locally-manufactured nuts and bolts proved them to be equally satisfactory and, in addition, it was found that the special hardened steel flat-pressed washers previously considered essential under the nut and bolt could be replaced without loss of strength by case-hardened standard mild steel washers which are far cheaper to produce.

Die fasiliteite vir nie-vernietigende toetse wat deur die Buro vir Standaard beskikbaar gestel is, vind toenemende byval by die nywerheid. Hierdie toetsingsdienste word nie alleen in die Pretoriase laboratoriums verskaf nie, maar ook by die takkantoor in Durban. Behalwe dit is daar ook 'n mobiele laboratorium beskikbaar om nie-vernietigende toetse orals in die Unie uit te voer. Skepe doen spesiaal Durban se hawe aan vir reparasies nou dat bekend is dat fasiliteite vir nie-vernietigende toetse by hierdie hawe beskikbaar is.

Telekommunikasies

Die glanspunt gedurende hierdie verslagtydperk was die kommersiële produksie van die Tellurometer. Die firma, Tellurometer (Edms.) Bpk., wat opgerig is vir die vervaardiging van hierdie instrument, het heelwat inisiatief aan die dag gelê deur die toerusting in die handel te bring kort nadat die tegniese besonderhede aan hom verstrekkend is deur die Nasionale Telekommunikasie-Navorsingslaboratorium. Die laboratorium het hulp verleen deur die instrumente op die verskillende stadiums voor produksie eers te ondersoek en te toets. Die eerste openbare demonstrasies van die Tellurometer is gedurende Januarie 1957 uitgevoer en die eerste afleverings oorsee is reeds gedoen. Dit is feitlik seker die eerste keer dat elektroniese toerusting van so 'n ingewikkelde konstruksie in hierdie land ontwikkel en vir uitvoer vervaardig is.

Dit dien ook vermelding dat die eerste werkverrigtings-toetse van die radartoestelle wat vir die Departement van Verdediging ontwikkel word, aan die beraamde werksvereistes voldoen het. Toetse om 'n volledige bevestiging hiervan te kry, sal binnekort uitgevoer word.

Bou- en Strukturele Ingenieurswerke

Aan die navorsingskant, het werk oor goedkoper huise vir blankes aanmerklik gevorder en prototiep huise wat ten behoeve van die Nasionale Behuisingskommissie gebou is, toon dat dit moontlik is om 'n 900 vk. vt. vierkamerhuis met kombuis-eetkamer vir ongeveer £1,300 te bou, uitgeslote die koste van die perseel. Navorsing op skoolgeboue en hospitale begin ook praktiese resultate te lewer. As gevolg van die navorsingswerk dusver deur die Nasionale Bounavorsingsinstituut uitgevoer, kan private argitekte besparings van 20 persent en meer bewerkstellig op skoolgeboue wat nou in die Oranje-Vrystaat gebou word, terwyl navorsingswerk op hospitaalgeboue beloftes inhou nie alleen van laer koste nie, maar ook vir doelmatiger bestuur en vermindering in die werk van die verplegingspersoneel.

Sowel die navorsingswerk as die toetsfasiliteite van die Raad word al meer en meer bekend en gevolglik is daar 'n toename in die aanvraag vir kontrakwerk en toetsing, nie alleen van die kant van die nywerheid nie, maar ook van staats- en provinsiale departemente, munisipaliteite en private konsultante. Die S.A.B.S. se pas-gestigte Afdeling vir Strukturele Toetse het reeds 'n groot verskeidenheid

The non-destructive testing facilities provided by the Bureau of Standards are proving increasingly popular with industry. This service is provided not only at the main laboratories in Pretoria, but also at the branch office in Durban. In addition, a mobile laboratory is available to carry out non-destructive testing elsewhere in the Union. Ships are being diverted to Durban for repairs now that it has become known that non-destructive testing facilities are available at this port.

Telecommunications

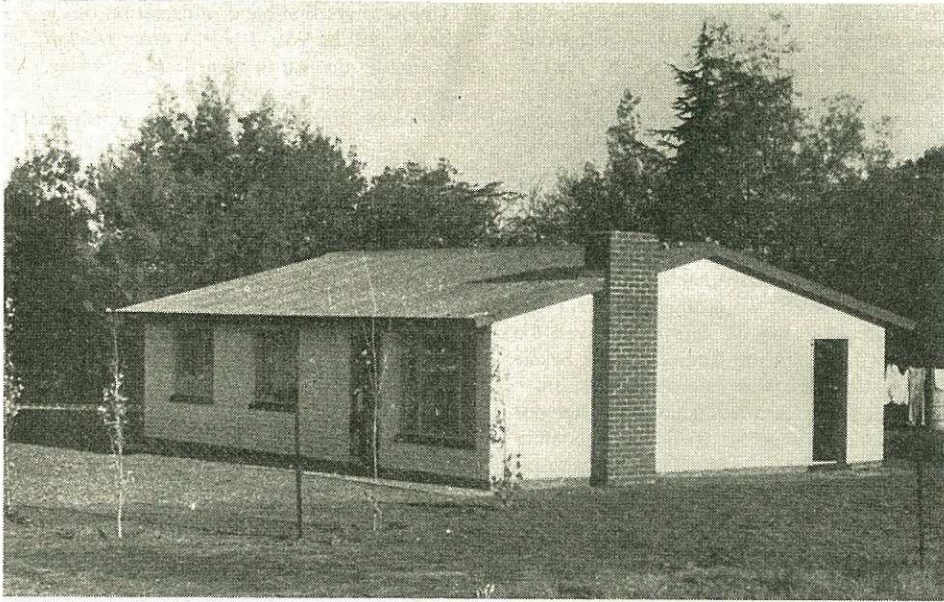
The most notable highlight during the period under review was the coming into commercial production of the Tellurometer. The firm, Tellurometer (Pty.) Ltd., established to manufacture the instrument, has shown considerable initiative in putting this equipment into production within a very short time of the technical details being made available to them by the National Telecommunications Research Laboratory. The Laboratory assisted by examining and testing pre-production instruments at various stages. The first public demonstrations of the instrument were held in January, 1957, and the first deliveries to overseas countries have already been made. This is almost certainly the first occasion on which electronic equipment approaching this complexity has been developed and manufactured in this country for export.

Also of note is the fact that preliminary performance trials of the radar equipment under development for the Department of Defence have shown that the estimated performance has been achieved. More detailed confirmatory trials will be carried out shortly.

Building and Structural Engineering

On the research side, work on low-cost European housing has made substantial progress, and prototype houses built for the National Housing Commission indicate that it will be possible to provide a 900 sq. ft. four-roomed house with kitchen-dining room for about £1,300, excluding the cost of the land. Research into schools and hospitals is also beginning to produce practical results. As a result of the research conducted thus far by the National Building Research Institute into the design of schools, private architects were able to effect savings of 20 per cent. or more on schools now being built in the Orange Free State, while research on hospitals holds promise, not only of cost reductions, but more efficient operation and reduction of work on the part of the nursing staff.

Both the research and testing facilities of the Council are becoming increasingly well-known and there has consequently been an increase in the demand for contract work and testing, not only from industry, but from government and provincial departments, municipalities, and private consultants. The newly-established Structural Testing Section of the S.A.B.S. has already undertaken a



'n Prototipe goedkoop huis vir blankes wat deur die Witbankse Munisipaliteit gebou is volgens 'n ontwerp van die Nasionale Bounavorsingsinstituut.

A prototype low-cost house for European occupation built by the Municipality of Witbank to designs drawn up by the National Building Research Institute.

van werkverrigtingstoetse op boumateriaal uitgevoer om hul strukturele eienskappe en weerstandsvermoë teen natuurelemente soos wind en reën te bepaal.

Goeie vordering is gemaak met die Modelbou-regulasies, terwyl 'n aantal spesifikasies vir boumateriaal en gebruikskodes 'n stap verder gebring is gedurende hierdie tydperk.

Voeding

Dit is 'n onderwerp waaroor Suid-Afrikaanse navorsers gedurende die afgelope paar jaar 'n benydenswaardige reputasie verwerf het onder hul oorsese kollegas. Hul pogings is op twee rigtings gekonsentreer: die rol van vetname in die dieet op hartsiektes, en die studie van kwashiorkor ten opsigte van diëte met 'n proteïentekort. Navorsingswerk oor eersgenoemde word onderneem deur die Nasionale Voedingnavorsingsinstituut, die W.N.N.R. se Navorsingseenheid vir Kliniese Voeding by die Universiteit van Kaapstad, die W.N.N.R. se Navorsingseenheid vir Menslike Biochemie en die Sir Ernest Oppenheimer Hartnavorsingseenheid by die Suid-Afrikaanse Instituut vir Mediese Navorsing. Navorsingswerk oor proteïengebrek in die dieet word onderneem deur die Navorsingseenheid vir Kliniese Voeding en die N.V.N.I.

wide variety of performance tests of building materials for their structural properties and resistance to the natural elements such as wind and rain.

Good progress has been made with the model building regulations, while a number of building material specifications and codes of practice were taken a step further during the period.

Nutrition

This is a subject in which South African research workers have, in the course of the past few years, established an enviable reputation among their colleagues overseas. Their efforts are concentrated in two main fields: the part played by dietary fat intake in degenerative heart diseases and the study of kwashiorkor in relation to protein-deficient diets. Work on the former is being done by the National Nutrition Research Institute, the C.S.I.R. Clinical Nutrition Research Unit at the University of Cape Town, the C.S.I.R. Human Biochemistry Research Unit and the Sir Ernest Oppenheimer Cardiac Research Unit at the South African Institute for Medical Research. Work on protein deficient diets is being done by the Clinical Nutrition Research Unit and the N.N.R.I. Several leading American research workers came to the

Verskeie vooraanstaande Amerikaanse navorsers het na die Unie gekom om eerstehandse inligting te bekom oor die werk wat hier gedoen word, terwyl die Wêreldgesondheidsorganisasie besondere belangstelling getoon het in alle aspekte van die werk wat tans uitgevoer word op proteïen-ondervoeding en in die ontwikkeling van voedsels van hoë proteïëngehalte, soos vismeelblom.

Nog 'n aspek van mediese navorsing waarmee goeie vordering gemaak word, is die studie in verband met die algemene rol van Vitamien A in selmetabolisme. Hierdie werk, waarin sintetiese vitamien A, gemerk met radioaktiewe C¹⁴, gebruik word, word uitgevoer deur die Voedingnavorsingseenheid aan die Universiteit van die Witwatersrand met hulp van die Radiochemiese Seksie van die Nasionale Chemiese Navorsingslaboratorium.

Die Raad se fasiliteite vir voedingnavorsing het oor die algemeen voortdurend uitgebrei, en op 21 September is 'n nuwe metabolismesaal by die Pretoriase Volkshospitaal geopen vir die Nasionale Voedingnavorsingsinstituut. Die saal is goed toegerus om balansstudies op pasiënte uit te voer, en voldoen dus aan 'n dringende behoefte. Vir die verskaffing van hierdie fasiliteite wil die Raad sy dank betuig aan Prof. J. G. A. Davel van die Pretoriase Mediese Fakulteit, die Hospitaalraad en die Transvaalse Provinsiale Administrasie. Die Raad het voortdurend die heelhartige steun van die Departement van Voeding geniet in alle aspekte van sy werk, en daarby het hierdie Departement ook nog 'n bedrag van £150,000 beskikbaar gestel vir 'n moderne navorsingsgebou ten behoeve van die Nasionale Voedingnavorsingsinstituut.

Die voedseltoetsingsfasiliteite van die Buro is voltyds besig gehou met die gereelde kontroletoetse op produkte wat in ooreenstemming met die Standaardmerkskema vervaardig word en ook in verband met die administrasie van die verpakte standaard vir plaaslik vervaardigde en ingevoerde ingemaakte vis, ingemaakte kreef en ingemaakte vleisprodukte. 'n Groot aantal vitamienbepalings is gemaak hoofsaaklik, hoewel nie uitsluitlik nie, op pluimveevoer wat onder die merkskema vervaardig word. Mikrobiologiese metodes is toegepas vir die bepaling van aminosure in voedsels en proteïen-hidrolisate.

Nywerheidsielkunde

Twee groot opnames wat deur die Nasionale Instituut vir Personeelnavorsing onderneem is, is gedurende hierdie tydperk 'n stap nader aan voltooiing gebring. Die opname oor mannekrag is in 1955 begin met die oogmerk om die peil van opvoeding en beroepsopleiding te bepaal op 'n verteenwoordigende monster van die manlike bevolking by die aanvang van hul loopbaan. Die voorlopige resultate van hierdie opname, wat elders in hierdie verslag vollediger uiteengesit word, is alles behalwe gerusstellend vir sover dit betref Suid-Afrika se toekomstige bronne van opgeleide mannekrag.

'n Belangrike projek wat deur die Instituut onderneem word is 'n reeks studies oor motivering en moraal in die nywerheid. Die meeste hiervan staan in verband met

Union to get first-hand information of the work in progress, and the World Health Organization has expressed particular interest in all aspects of current work on protein malnutrition and the development of cheap foods with high protein contents, such as fish meal flour.

Another field in which considerable progress is being made is in the study of the general role of vitamin A in cellular metabolism. This work, in which synthetic vitamin A, labelled with radioactive C¹⁴, is being used, is being done by the Nutrition Research Unit at the University of the Witwatersrand with the assistance of the Radiochemistry Section of the National Chemical Research Laboratory.

The Council's facilities for nutrition research have, in general, continued to expand. On the 21st September a new metabolism ward was opened at the Pretoria General Hospital, for the National Nutrition Research Institute. The ward is fully equipped to do balance studies on patients and thus fulfils an urgent need. The Council is indebted for this new facility to the assistance of Professor J. G. A. Davel of the Pretoria Medical School, the Hospital Authorities and the Transvaal Provincial Administration.

The Council has continued to enjoy the whole-hearted support of the Department of Nutrition in all aspects of its work. In particular, the latter has made available the sum of £150,000 for the erection of a modern research building for the National Nutrition Research Institute.

The food testing facilities of the Bureau were kept fully occupied with regular control tests carried out on commodities manufactured under the standardization mark scheme and in connection with the administration of the compulsory standards for locally-manufactured and imported canned fish, canned rock lobster and canned meat products. A large number of vitamin determinations were undertaken, mainly, but not exclusively, on poultry feeds manufactured under the mark scheme. Microbiological methods were used in the determination of amino-acids in foodstuffs and protein hydrolysates.

Industrial Psychology

Two of the major surveys being undertaken by the National Institute for Personnel Research were brought a stage nearer completion during the period. The manpower survey was started in 1955 with the object of finding the level of education and of vocational training reached by a representative sample of the male population at the start of their careers. The first results of this survey, which is discussed in detail elsewhere in this report, give little cause for optimism as far as South Africa's future resources of trained manpower are concerned.

An important project being undertaken by the Institute is a series of studies of motivation and morale in industry. Most of these represent contract work and

kontrakwerk en dui op 'n toenemende besef deur bestuursliggame van die belangrikheid van menslike verhoudings vir die doelmatigste gebruik van arbeid. Al hierdie studies het gedui op die belangrikheid van voldoende kanale van kontak tussen bestuur en werkers en op die noodsaaklikheid van sorgvuldigheid in die keuse en opleiding van werksopsigters.

Suid-Afrika het die voortou geneem met die toepassing van klassifikasietoetse vir naturellearbeid. Hierdie toetse wat aanvanklik slegs vir die mynbedryf ontwikkel is, is ewe toepaslik bevind vir die nywerheid in die algemeen en word nou selfs ook in ander dele van Afrika gebruik. Opvolggegewens wat uit Ghana en Kenia hieromtrent verkry is, dui aan dat die toetse selfs van 'n meer diskriminerende aard in daardie gebiede was as in die Unie. Intussen is aansoeke oor hierdie aangeleentheid van plekke so verafgeleë soos Nederlands Nieu-Guinea ontvang. Werk is nou aan die gang met toetse geskik vir hoër peile van naturellearbeid.

Vervoer

Navorsingswerk wat tans aan die gang is in baie van die Raad se Laboratoriums, is gemik op die verbetering van die land se vervoerstelsel. Drie laboratoriums is bv. betrokke by navorsingswerk ten behoeve van die Administrasie van die Suid-Afrikaanse Spoorweë en Hawens, 'n vierde is voltyds besig met navorsing oor konstruksie en instandhouding van paaie, terwyl 'n vyfde dienste verskaf vir die toets van brandstof en smeerolies vir binnebrandmotore.

Die Nasionale Instituut vir Padnavorsing brei steeds uit hoewel dit nog maar baie moeilik gaan om geskikte personeel te werf. Gedurende die tydperk van hierdie verslag is ondersoek ingestel na verskeie mislukte padfondasies in die omstreke van Standerton en Vereeniging, terwyl 'n studie gemaak is van die fondasietoestande vir 'n pad wat die uitsettende gronde van die Oranje-Vrystaat sal kruis. Baie van die Instituut se werk was bepaal tot 'n studie van plaaslik vervaardigde tere en bitumens met die doel om die kwaliteit daarvan te verbeter en die beste tegnieke te vind vir hul gebruik as bindstowwe in padkonstruksie.

Die laboratoriums van die S.A.B.S. is besig gehou met die toets van brandstof- en smeerolies. 'n Gereelde inspeksieskema wat op die Waterkloof-Lughawe ingestel is sal dit moontlik maak om beheer uit te oefen oor die kwaliteit van die brandstof wat vir straalvliegtuie gebruik word en sodoende seker maak van die geskiktheid van die brandstof vir hierdie duur vliegtuie.

Die Mobilisasie van Idees

Die Raad betuig sy erkentlikheid aan al diegene wat hul tyd so vryelik opgeoffer het om te dien op die talryke adviserende komitees wat leiding gegee het aan die werk van die Suid-Afrikaanse Buro vir Standaarde en die verskillende navorsingslaboratoriums en -institute.

indicate an increased awareness on the part of management of the importance of human relations in ensuring the most efficient use of labour. All these studies have pointed to the importance of adequate channels of communication between management and the workers, and to the need for care in the selection and training of supervisors.

South Africa pioneered the use of classification tests for Native labour. These tests, originally developed for the mining industry, have been found to be equally successful in industry generally and are now used in many other parts of Africa. Follow-up data obtained from Ghana and Kenya indicate that the tests have proved even more discriminative in those countries than in the Union. Meanwhile, enquiries have been received from places as far afield as Dutch New Guinea. Work is now in progress on tests suitable for higher levels of Native employment.

Transport

Work at present proceeding in many of the Council's laboratories is concerned with improving the country's transportation system. Three laboratories, for example, are involved in research for the South African Railways and Harbours Administration, a fourth is fully occupied in research into road construction and maintenance, while a fifth provides a service for the testing of fuels and lubricants for internal combustion engines.

The National Institute for Road Research, though still experiencing considerable difficulties in recruiting suitable staff, is steadily being built up. During the period, investigations were made of several road foundation failures in the Standerton and Vereeniging areas, and a study was made of the foundation conditions for a road which will traverse expansive clay soils in the Orange Free State. Much of the work of the Institute was directed towards the study of locally-produced tars and bitumens with a view to improving their qualities and the techniques for using them as binders in road construction.

The standards laboratories were kept busy testing fuels and lubricants. A regular inspection scheme instituted at the Waterkloof Air Station will make it possible to check the quality of the fuel used for jet aircraft and ensure the suitability of the fuel used for these costly aircraft.

The Mobilization of Ideas

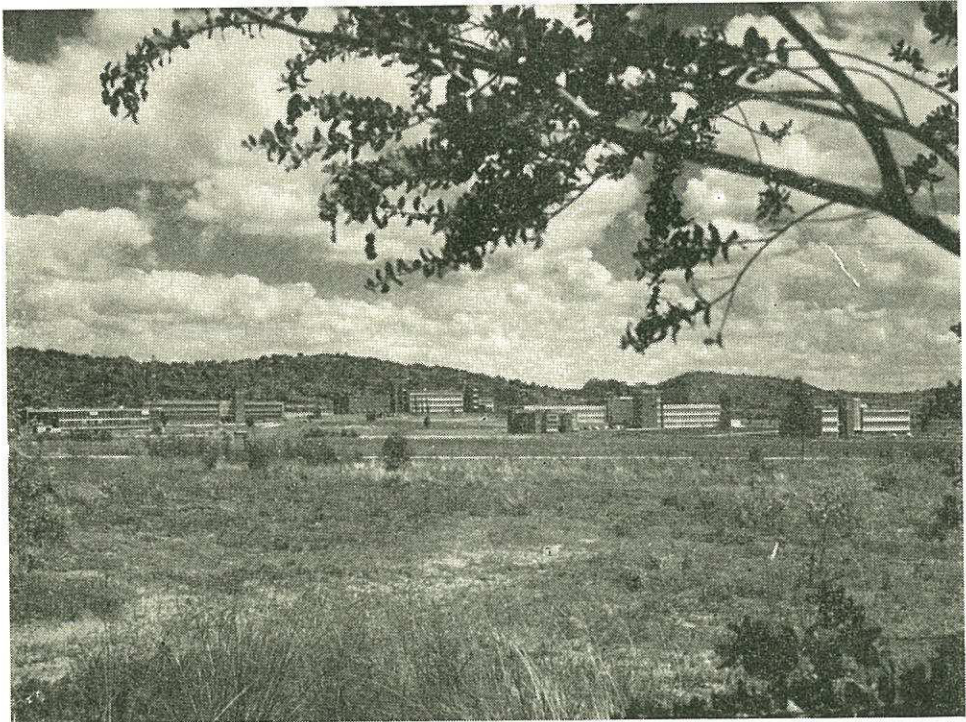
The Council expresses its indebtedness to all those who have freely given their time to serve on the numerous advisory committees which have guided the work of the South African Bureau of Standards and the various research laboratories and institutes.

'n Wetenskaplike organisasie soos die W.N.N.R. kan nie in isolasie fungeer nie. Om suksesvol te wees moet dit enersyds ten nouste saamwerk met die universiteite en andersyds moet sy werk in verband staan met die behoeftes van landsbestuur en nywerheid. Die Raad self, saamgestel soos hy is uit 'n ledegroep van vooraanstaande wetenskaplikes en ingenieurs wat uit al drie hierdie werkkringe gekies is, is 'n weerspieëling van hierdie idee, en dit is ook die geval met die spesialiteits-advieskomitees wat op dieselfde grondslag gekies is.

Die W.N.N.R. baat wel deeglik deur die werk van die manne en vroue wat op hierdie Komitees dien, maar die voordele wat hieruit ontstaan is glad nie eensydig van aard nie, want daar is geen beter middel om tred te hou met die jongste ontwikkelings nie, soos geredelik deur elke goeie wetenskaplike, administreerder en nyweraar erken sal word, as deur rigting te gee aan werk, wat in hoofsaak gemoed is met nuwe ontwikkelings. Dit beskou die Raad as 'n belangrike funksie van sy Komiteestelsel, omdat daardeur 'n werklike nasionale handeling deur sy laboratoriums verseker word, terwyl dit ook 'n saamtrepunt vir wetenskaplike idees en strewes in die Unie van Suid-Afrika verskaf.

A scientific organization such as the C.S.I.R. cannot operate in isolation. If it is to be successful, it must co-operate closely with the universities on the one hand and its work must be related to the practical needs of government and industry on the other. The Council itself, consisting as it does, of a membership of leading scientists and engineers drawn from these three walks of life, is a reflection of this idea, as are the national and specialist advisory committees chosen on the same basis.

The C.S.I.R. indeed benefits by the work of the men and women who serve on these committees, but the advantages are by no means one sided, for there is no better way of keeping up with the latest developments, as every good scientist, administrator and industrialist should do, than by guiding work concerned mainly with new developments. The Council regards this as an important function of its committee system which ensures a truly national effort on the part of the laboratories while providing a focal point of scientific thought and endeavour in the Union of South Africa.



'n Blik op die Raad se nuwe navorsingsentrum naby Pretoria.

A general view of the Council's new research centre near Pretoria.

Skakelafdeling

Hoof van die Afdeling: MNR. D. G. KINGWILL

PRETORIASE KANTOOR

Algemene Skakelwerk

Hierdie kantoer vorm die skakel tussen die Raad en sy wetenskaplike skakelkantore in Londen, Washington en Keulen, wie se werksaamhede later in hierdie verslag genoem sal word. Die Afdeling dien ook as skakel tussen Suid-Afrikaanse wetenskaplikes en internasionale wetenskaplike organisasies. Suid-Afrika se deelname aan die program van die Internasionale Geofisiese Jaar 1957-1958 het 'n omvangryke bedrywigheid tot gevolg gehad. Die program wat ontwerp is deur die Suid-Afrikaanse Nasionale Komitee wat deur die Raad benoem is, dek die vernaamste terreine wat deur die I.G.J. beoog word. 'n Volledige verslag oor hierdie program is reeds gepubliseer.

Streeksnavorsingskomitees in Durban, Port Elizabeth en Kaapstad is behulpsaam met die inskakeling van wetenskaplike probleme wat van akteuele belang is vir Natal, die Kaapse Middellande en die Westelike Kaap-provinsie. Hierdie Komitees is vrywillige organisasies, maar die Raad verskaf sekretariële kantoordienste. Die Middellandse Streekskomitee het 'n nuwe ontwikkelings-terrein betree deur 'n eie publikasie te begin onder die naam "Navorsingsnuusbrief".

Die aansporing tot samewerking op die gebied van nywerheidsnavorsing is 'n vername taak van hierdie Afdeling, en hulp word verleen aan die Raad se Komitee, onder voorsitterskap van dr. F. J. de Villiers, wat verslag moet doen oor die „subsidiëring van navorsingsorganisasies en verwante aangeleenthede”.

Daadwerklike ondersteuning is verleen aan 'n komitee op nywerheidsvervaardiging van landbouprodukte wat deur die Transvaalse Vereniging van Chemiese Fabrikante in die lewe geroep is.

Bedryfseconomie

Alle navorsingswerk van ekonomiese aard in verband met die navorsingsprojekte van die nasionale navorsingslaboratoriums is in die Bedryfseconomie-Seksie van die Skakelafdeling gesentraliseer. Twee vername navorsings-ondernemings handel oor kosteberekenings in verband met die bou en instandhouding van paaie en die bou en instandhouding van geboue. Hierdie navorsing het ten doel om 'n sistematiese kwantitatiewe ekonomiese agtergrond te skep met betrekking tot padbou- en huisbou-ondernemings in 'n poging om kostevermindering te bewerkstellig en om by te dra tot die leiding van tegniese navorsing.

Die seksie is nou verantwoordelik vir die ondersoek van die daaglikse koste van stedelike Bantoeedorpe wat die Nasionale Bounavorsingsinstituut ten behoeve van

Liaison Division

Head of the Division: MR. D. G. KINGWILL

PRETORIA OFFICE

General Liaison

This office provides a link between the Council and its scientific liaison offices in London, Washington and Cologne, the activities of which are described later in this report.

A link is also provided between South African scientists and international scientific organizations. South Africa's participation in the programme of the International Geophysical Year 1957-1958, has been a major activity. The programme which has been developed by the South African National Committee set up by the Council, embraces all the major fields included in the I.G.Y. A full report on this programme has been published.



*Mr. D. G. Kingwill, Head of the Liaison Division.
Mnr. D. G. Kingwill, Hoof van die Skakelafdeling.*



Dr. T. W. Schumann, Voorsitter van die Suid-Afrikaanse Nasionale Komitee vir die Internasionale Geofisiese Jaar.

Dr. T. W. Schumann, Chairman of the South African National Committee for the International Geophysical Year.

die Nasionale Behuigings- en Beplanningskommissie uitvoer. Hierdie werk sluit in die bepaling van die daaglikse kostes in stedelike Bantoe dorpe, met die oogmerk om 'n grondslag te vind vir die berekening van huur gelde en in watter mate dit verminder kan word.

'n Ondersoek is onderneem oor die produksiekoste van sitruskassies in medewerking met die beurshouer in die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese kragtens 'n beurs skenking deur die Lumber Millers and Shook Manufacturers' Association.

Die werk in verband met die opstelling van 'n goedere-vloei tabel van die Unie se ekonomie vir die jaar 1951-1952 is voltooi. Die oogmerk met hierdie projek was om 'n sistematiese agtergrond te skep vir 'n meer gedetailleerde ekonomiese ondersoek van bepaalde sektors van die nasionale ekonomie met betrekking tot sekere tegniese navorsingsprojekte van die Raad, en om die dekking en interne konsekwentheid van sekere beskikbare statistiese gegewens oor die Unie se ekonomiese stelsel te bestudeer.

Patente

Die Wadley-kristalbeheerde ontvangtoestel wat deur die Nasionale Telekommunikasie-Navorsingslaboratorium ontwikkel is, word tans deur 'n Britse maatskappy geproduseer, kragtens lisensie van die Raad. Bestellings vir meer as 700 ontvangtoestelle is alreeds deur Britse

Regional research committees in Durban, Port Elizabeth and Cape Town assist in establishing liaison on scientific problems of particular significance to Natal, the Cape Midlands and the Western Province. These are voluntary bodies, but offices of the Council now provide secretarial services. The Midland Regional Research Committee has broken new ground by commencing publication of its own "Research Newsletter".

The development of co-operative industrial research is an important responsibility and this office has assisted the Committee appointed by Council under the Chairmanship of Dr. F. J. de Villiers to review "The subsidization of research associations and related matters".

Active support has been provided to a committee on the industrial use of agricultural products, set up by the Transvaal Chemical Manufacturers' Association.

Industrial Economics

All investigations of an economic nature relating to the research programmes of the national research laboratories are centralized in the Industrial Economics Section. Two main fields of investigation are the costs of road construction and maintenance and building construction and maintenance costs. These investigations are intended to provide a systematic quantitative economic background to the entire fields of road and building construction with a view to reducing costs and to assisting in directing technical research.

The section is now responsible for the investigations of the National Building Research Institute into the running costs of Urban Bantu Townships sponsored by the National Housing and Planning Commission. This involves the determination of the costs of running Urban Bantu Townships with a view to providing a basis for rent calculation and to reducing these costs.

An investigation into the costs of citrus box production was undertaken in collaboration with the Wooden Packaging Research Fellowship established by the Lumber Millers' and Shook Manufacturers' Association in the National Mechanical Engineering Research Institute.

The input-output table for the Union's economy for the year 1951-1952 has also been completed. The purpose of this project was to provide a systematic background for more detailed economic studies of specific sections of the national economy in relation to certain of the Council's technical research investigations and to determine the coverage and internal consistency of certain available statistics on the Union's economic system.

Patents

Production of the Wadley Crystal-controlled Receiver developed by the Telecommunications Research Laboratory, by a British radio company under licence from the Council, is in progress. Orders for 700 receivers have already been placed by British Government Departments

Staatsdepartemente geplaas, terwyl van ander oorde ook aansienlike belangstelling getoon is in die moontlikhede van hierdie toestel.

Die gaping tussen navorsing en kommersiële toepassing is gedurende die jaar op nog 'n uitvinding van die Raad met welslae oorbrug toe 'n lisensie-ooreenkoms aangegaan is met 'n Suid-Afrikaanse onderneming vir die vervaardiging van die Tellurometer wat deur die Nasionale Telekommunikasie-navorsingslaboratorium ontwikkel is.

Samesprekings met lede van die Internasionale Groep vir Waterontsouting het maandelank geduur, en ooreenkomste word nou aangegaan met 'n vooraanstaande Britse fabrikant vir die eksploitasie van die Raad se patente op elektrodialise.

Ondervinding met hierdie uitvindings van die W.N.N.R. het bevestiging verleen vir die Raad se beleid in verband met sy patente om te dien as aansporingsmiddel vir nywerhede in die toepassing van navorsingsresultate. Deur die gesamentlike eksploitasie van patenteerbare uitvindings het die Raad uitvoering gegee aan sy opvatting van „vennootskap met die nywerheid”.

Verdedigingswetenskap

Na-oorlogse wetenskaplike ontwikkelings het 'n diepgaande invloed gehad op militêre beplannings, en dit het meer verantwoordelikheid op die wetenskaplike geplaas vir die interpretasie van die uitwerking van nuwe wetenskaplike ontwikkelings op die taktiese en strategiese militêre begrippe. Daarteenoor het dit ook groter verpligtings op die wetenskaplike geplaas om hom vertrou te maak met die probleme van verdediging. Om die skakel tussen die gewapende magte en staatsnavorsing te versterk, is 'n Adviesraad vir Verdedigingswetenskap gestig waarop senior offisiere van die Verdedigingsmag en die Raad verteenwoordig is. Hierdie Raad wat verantwoordelik is aan die Minister van Verdediging, sal onder meer die Unie in staat stel om groter voordeel te trek deur sy deelname aan die Gemeenes se Advieskomitee oor Verdedigingswetenskap.

Publisiteit, Publikasies en Openbare Verhoudings

Die Publisiteits- en Openbare Verhoudingseksie van die S.A. Buro vir Standaard is in hierdie Afdeling opgeneem. Behalwe die publikasie van die Raad se Jaarverslag en die gereelde nuusjoernale *Navorsingsoorsig* en *Standaard-bulletin*, is 'n aantal pamflette uitgebring. Die Wetenskaplike Nuusdiens is voortgesit met kort weeklikse opsommings van oorsese rapporte, terwyl persberigte oor die bedrywighede van die Raad en spesiale artikels op versoek van verskillende tegniese en industriële tydskrifte van tyd tot tyd uitgereik is.

Gedurende November was die Afdeling verantwoordelik vir die koördinerende van reëlings in verband met die besoek van die Eerste Minister en tien lede van sy Kabinet aan die nuwe navorsingsterrein ten ooste van Pretoria, asook vir die reëlings van „ope dae” op die twee daarop-

and considerable interest in the potentialities of this equipment has been shown elsewhere.

The gap between research and commercial application on another of the Council's inventions was successfully bridged during the year when a licence agreement was concluded with a South African firm for the manufacture of the Tellurometer developed by the National Telecommunications Research Laboratory.

Discussions with the members of the International Group for Water De-Salting have extended over many months and agreements are now being concluded with a leading British firm for the exploitation of the Council's electro dialysis patents.

Experience with these C.S.I.R. inventions has justified the Council's policy in relation to patents as a means of providing an incentive for industry to apply the results of new research. Through the joint exploitation of patentable inventions, the Council has given effect to its concept of “partnership with industry”.

Defence Science

Post-war scientific developments have had a profound influence on military planning. This has thrown increasing responsibility on the scientist to interpret the effects of new scientific developments on tactical and strategic military concepts. In turn it has increased the obligations of the scientists to familiarise themselves with the problems of defence. In order to strengthen the liaison between the Armed Services and Government Research, a Defence Science Advisory Council has been established on which senior officers of the Union Defence Force and the Council are represented. This Council, which reports to the Minister of Defence will, *inter alia*, enable the Union to derive greater benefit from participation in the Commonwealth Advisory Committee on Defence Science.

Publicity, Publishing and Public Relations

The Publicity and Public Relations Sections of the South African Bureau of Standards have been integrated with this Division.

In addition to the publication of the Council's annual report and regular news journals, *Research Review* and *Standards Bulletin*, a number of pamphlets were produced. The Science News Service was continued with the issue of a weekly digest of overseas reports, the release of information on the Council's activities to the Press, and the writing of special articles commissioned by various technical and industrial journals.

During November, the Division was responsible for co-ordinating arrangements for a visit by the Prime Minister and ten other members of the Cabinet to the new research centre east of Pretoria. Arrangements were



VADERLAND

Die Eerste Minister kry sy horlosie terug nadat hy die siklotron besigtig het tydens 'n besoek van die Kabinet aan die nuwe navorsingsentrum.

The Prime Minister retrieves his watch after seeing the cyclotron in the course of a visit of the Cabinet to the new research centre.

volgende dae by die Laboratoriums ten behoeve van die algemene publiek. Die Afdeling het gehelp met die uitvoerige beplanning van reisprogrammas in die Unie vir 'n aantal oorseese wetenskaplikes, en reëlings getref vir besoeke aan die laboratoriums deur plaaslike groepe wetenskaplikes, nyweraars en studente. Kort praatjies, hoofsaaklik oor fasiliteite wat die Buro vir Standaard verskaf en oor die voordele van standaardisasie, is gegee aan 'n groep van sowat 32 verbruikers-, professionele en maatskaplike organisasies.

also made for the laboratories to be "open" to the public on the two succeeding days. The Division assisted in the detailed planning of itineraries in the Union of a number of scientists from overseas, and arranged for visits to the laboratories by local groups of scientists, industrialists and students. Short talks were given to some thirty-two consumers, professional, and social organizations—mainly on the subject of the facilities of the Bureau of Standards and the benefits of standardization.

OORSESE KANTORE

Londen en Washington

Hierdie twee kantore wat noual vir meer as tien jaar funksioneer, verskaf heelwat roetinedienste soos hulpverlening aan besoekende wetenskaplikes, die beantwoording van navrae oor wetenskaplike probleme, die bywoning van en verslag doen oor konferensies, die organiseer van ruildienste vir dokumente en die verkryging van foto-afdrukke van wetenskaplike geskrifte wat nie in

OVERSEAS OFFICES

London and Washington

Both these offices which have now been operating for more than ten years, perform a number of routine services such as assisting visiting scientists, answering scientific queries, attending and reporting on conferences, the exchange of documents and obtaining photocopies of scientific papers not available in the Union. Although in themselves unspectacular, these services have proved

die Unie beskikbaar is nie. Hoewel hierdie dienste op sigself nie indrukwekkend lyk nie, het dit tog van onskatbare waarde geblyk om Suid-Afrikaanse wetenskaplikes op die hoogte te hou van die jongste verwickelinge in hul besondere gebiede. 'n Opmerklieke kenmerk van hierdie dienste is dat daar in die laaste tyd al meer en meer van hierdie dienste gebruik gemaak word deur wetenskaplikes wat nie regstreeks met die Raad verbind is nie; bv. ongeveer die helfte van die besoekers wat van die dienste van hierdie kantore gebruik gemaak het, was afkomstig van organisasies wat nie met die W.N.N.R. verbonde is nie.

Die Londense Kantoor veral het 'n spesiale taak op hom geneem in verband met die uitvindings van die W.N.N.R. Die hoof van hierdie kantoor het opgetree as intermedieër tussen die Raad en die internasionale groep wat die waterontsoutingsprojek ondersteun. Die Londense Kantoor was ook belas met die reëlings vir die demonstrasie van die Tellurometer in die Verenigde Koninkryk, en vir toesig oor die ontwikkelings met betrekking tot die vervaardiging kragtens lisensie van die Wadley-ontvangstoestel in Brittanje.

Behalwe sy funksie as Wetenskaplike Attaché by die Suid-Afrikaanse Ambassade in Washington, is die hoof van die Washingtonse Kantoor ook in soortgelyke hoedanigheid geakkrediteer by die Unie se Hoë Kommissaris in Kanada.

Beide kantore was besonder bedrywig op die gebied van kernkrag-ontwikkeling. Die hoof van die Londense kantoor het die opening van die Calder Hall-kragstasie bygewoon, terwyl die hoof van die Washingtonse Kantoor lid was van die Suid-Afrikaanse Afvaardiging na die voorbereidingsvergaderings van die Internasionale Atoomkragagentskap.

Keulen

Hierdie kantoor het eers op 11 September 1956 tot stand gekom. Die behoefte aan nouer wetenskaplike kontak tussen Suid-Afrika en die Vasteland, veral met Wes-Duitsland, is al vir geruime tyd gevoel, en dit was duidelik dat so 'n kontak nie doeltreffend vanuit Londen bewerkstellig kon word nie. Die doel van hierdie kantoor sal aanvanklik eers wees om wetenskaplike verhoudings te bevorder tussen die Unie aan die een kant, en Oostenryk, Switserland en die drie Benelux-lande tesame met die Wes-Duitse Federasie aan die ander kant.

Net soos met die ander kantore, tree die hoof van die Duitse Kantoor ook op as wetenskaplike adviseur vir die Suid-Afrikaanse Gesant. In hierdie geval is dit ook gerieflik gevind om die kantoor in die Ambassade self te vestig.

Gedurende die paar maande sedert die kantoor in werking is, is 'n patroon ontwikkel soortgelyk aan die van die ander kantore, met nadruk veral op wetenskaplike navrae, hulp aan besoekers en verkryging van wetenskaplike verslae.

Reëlings vir wedersydse verskaffing van rapporte en ander wetenskaplike dokumente beloop besonder lonend

invaluable in keeping South African scientists up to date with the latest developments in their fields. A notable feature is that, in recent years, these services have been used to an increasing extent by scientists not directly connected with the Council—approximately half the visitors assisted by the two offices, for example, were from non-C.S.I.R. organizations.

A special task has been undertaken by the London Office in connection with the development of C.S.I.R. inventions. The Head of the Office continued to act as intermediary between the Council and the international group sponsoring the water demineralization project. The London Office was also involved in arrangements for demonstrating the Tellurometer in the United Kingdom and in following up developments arising from the manufacture under licence of the Wadley receiver in Britain.

In addition to acting as Scientific Attaché to the South African Ambassador in Washington, the Head of the Washington Office has been accredited in a similar capacity to the Union's High Commissioner in Canada.

Both offices have been more active in the atomic energy field. The Head of the London Office attended the opening of the Calder Hall Power Station while the Head of the Washington Office was a member of the South African Delegation at the preparatory meetings at the International Atomic Energy Agency.

Cologne

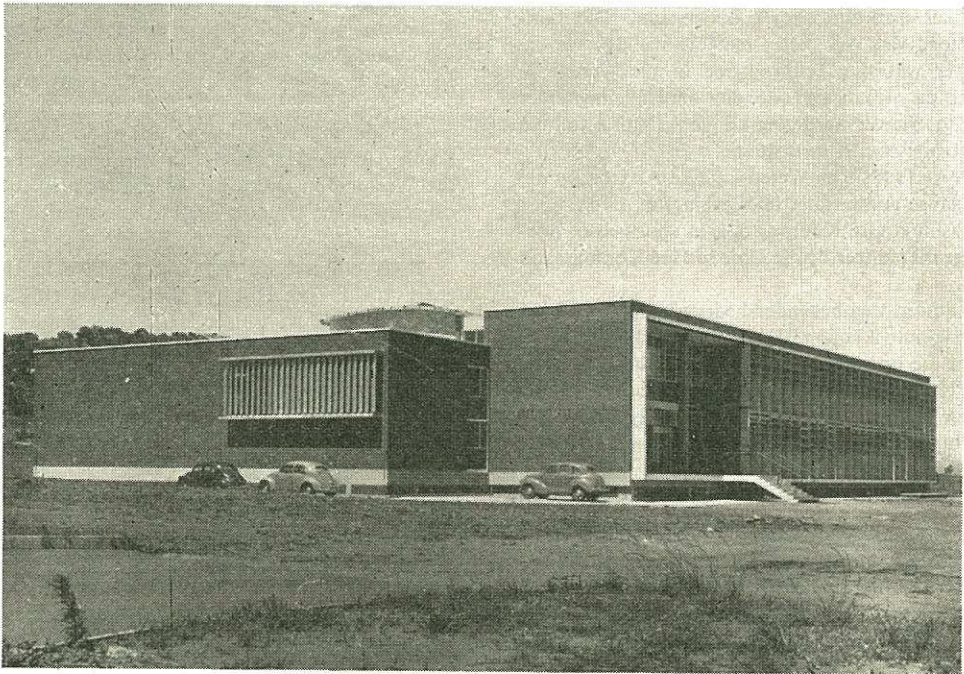
This office opened for the first time on the 11th of September, 1956. The need for closer scientific contact between South Africa and the Continent, particularly Western Germany, has been apparent for some time, and it was obvious that this could not be done efficiently from London. Initially the function of the office will be to promote scientific relations between the Union and Austria, Switzerland, and the three Benelux countries in addition to the West German Federation.

As with the other offices the head of the German Office acts as scientific adviser to the South African Ambassador. In this case it has also been found convenient for the Office to be housed in the Embassy itself.

In the few months that the Office has been operating, a similar pattern to the other offices has developed, with emphasis on scientific enquiries, assistance to visitors and the obtaining of scientific reports. Arrangements for the exchange of reports and other scientific documents promise to be particularly rewarding as Europe has not, as far as South Africa is concerned, been tapped to any great extent in the past. The Head of the Office has spent much of his time attending conferences and visiting

te wees aangesien Europa, vir sover dit Suid-Afrika betref, nog nie in 'n groot mate in die verlede getap is nie. Die hoof van die kantoor kon tot dusver hoofsaaklik nog net konferensies bywoon en wetenskaplike inrigtings besoek om sodoende die nodige kontakte op te bou. Net soos die Londense kantoor, skyn dit of die Duitse kantoor ook in toenemende mate belas sal wees met die werwing van spesialiteitspersoneel vir die Raad se laboratoriums in Pretoria.

scientific institutions in order to build up the necessary contacts. Like the London Office, it appears that the German Office will be occupied to an increasing extent with the recruitment of specialist staff for the Council's laboratories in Pretoria.



Die nuwe Biblioteekgebou.

The new Library Building.

Biblioteek- en Inligtingsafdeling

Hoof van die Afdeling: MEJ. HAZEL MEWS

Die vernaamste gebeurtenis gedurende die tydperk was die verhuising van die Hoofbiblioteek na sy nuwe gebou wat sentraal geleë is op die W.N.N.R. se bouterrein by Brummeria. 'n Ander belangrike ontwikkeling was die besluit om die biblioteke van die W.N.N.R. en die S.A. Buro vir Standaarde te amalgameer, behalwe wat betref die publikasies oor standaardspesifikasies wat onder beheer van die Buro sal bly. Gevolglik, toe die Hoofbiblioteek die gebou in Visagiestraat ontruim het, het die Buro vir Standaarde dit betrek. Tesame met sekere boeke en tydskrifte wat agtergelaat is vir gebruik deur die Nasionale Chemiese Navorsingslaboratorium vorm hierdie versameling dus nou die Visagiestraatse Takbiblioteek van die W.N.N.R. en sal as sulks dierse doen tot tyd en wyl die res van die laboratoriums ook na die nuwe terrein verhuis het.

Library and Information Division

Head of the Division: MISS HAZEL MEWS

The most important event during the period was the removal of the main Library to its new building in a central position on the C.S.I.R.'s site at Brummeria. Another important development was the decision to amalgamate the library of the South African Bureau of Standards with the C.S.I.R. Library, except for the collections of standard specifications, which remain with the Bureau. Following this decision, when the main Library moved out of the Visagie Street premises, the South African Bureau of Standards Library moved in. Together with certain books and journals left behind in Visagie Street for the use of the National Chemical Research Laboratory, this collection now forms the Visagie Street Branch of the C.S.I.R. Library and will be kept there until the remaining laboratories move out to the new site.



Terwyl die President, dr. S. M. Naudé, toekyk, toon mej. Hazel Mews, Hoof van die Biblioteek en Inligtingsafdeling, aan die Verenigde State se Ambassadeur, mnr. H. A. Byroade, 'n registerkaart van die versameling atoomkragverslae wat deur die Verenigde State se Atoomkragkommissie aan die W.N.N.R. geskenk is.

Miss Hazel Mews, Head of the Library and Information Division, shows the United States Ambassador, Mr. H. A. Byroade, an index card from the Library, of Atomic Energy reports donated to the C.S.I.R. by the U.S. Atomic Energy Commission while the President, Dr. S. M. Naudé, looks on.



Die hoofleeskamer van die nwe Biblioteekgebou.

The main reading room in the new Library Building.

Die Afdeling het nou genoegsame ruimte tot sy beskikking om informele onderrig en geleenthede vir praktiese ondervinding te verskaf aan persone in beheer van nywerheidsbiblioteke in Suid-Afrika. Twee firmas het tot dusver van hierdie geleenthede gebruik gemaak.

BIBLIOTEEKSEKSIE

Boekvoorbereiding-subseksie

Dit bly nog maar 'n probleem om voldoende opgeleide personeel vir hierdie seksie te werf, alhoewel die toestand enigsins verbeter het as gevolg van die oorplasing van 'n assistente uit die Inligtingseksie om tydelik behulpsaam te wees met die baie drukke werksaamhede in verband met katalogisering en klassifisering. Hierdie seksie het al die boekbestellings vir die W.N.N.R., die Biblioteek en die vier takbiblioteke gehanteer. Op 31 Maart 1957 het die getal ingebinde dele (uitgesonderd pamflette) in die biblioteek 'n totaal van 25,421 bereik, waarvan 2,335 ontvang is gedurende die tydperk 17 Augustus 1956 tot 31 Maart 1957, of gemiddeld iets meer as 290 per maand. Gedurende hierdie agtmaande-tydperk het die biblioteekpersoneel 1,611 publikasies geklassifiseer en 1,245 gekatalogiseer, terwyl 302 ander publikasies by die bestaande kaarte gevoeg is.

The Division now has more space to give informal instruction and practical experience to people in charge of industrial libraries in South Africa. Two firms took advantage of this facility.

LIBRARY SECTION

Processing Sub-section

The difficulty of getting trained staff for this section remains as great as ever, but the position was somewhat eased by the transfer of one assistant from the Information Section to give temporary help to the very busy classification and cataloguing staff.

This section handled all the book-orders for the C.S.I.R., for the Library and for the branch libraries. On 31st March, 1957, the stock of bound volumes (excluding pamphlets) in the Library totalled 25,421, of which 2,335 were received during the period 17th August, 1956, to 31st March, 1957, an average of over 290 per month. During this eight months' period the Library staff classified 1,611 and catalogued 1,245 publications, while 302 other publications were added to existing cards.

Uitleenseksie (insluitende Takke)

Die aantal publikasies wat gedurende die afgelope agt maande uitgeleen is, beloop 22,214. Hierdie syfers sluit die uitreikings deur die Takbiblioteke in. Daar is in geheel 2,721 aanmaningsbriewe aan lesers gestuur vir terug-sending van die publikasies wat op bruikleen aan hulle verskaf is.

Twee lyste is gedurende die jaar opgestel van tydskrifte waarvan die Biblioteek duplikate besit, en hierdie lyste is gestuur aan 125 biblioteke en soortgelyke inrigtings, en as gevolg van versoeke wat hieromtrent van die biblioteke ontvang is, is 310 tydskrifte aan hulle verskaf vir aanvulling van hul stelle. Die Biblioteek het ook 'n besending van ongeveer 800 los nommers van tydskrifreëse van die United States Book Exchange ontvang wat baie gehelp het om leemtes in die W.N.N.R. se versamelings aan te vul. Die Biblioteek was ook so gelukkig om 'n ou stel *Proceedings of the Institution of Civil Engineers* vanaf 1865 tot 1914/15 as 'n geskenk van die Steel and Engineering Industries Federation of South Africa te ontvang.

INLIGTINGSEKSIE

Navrae vir Inligting

Gedurende die tydperk het die Inligtingseksie 352 navrae oor inligting behandel, en baie hiervan het lang bibliografiese ondersoeke vereis. In die geval van navrae wat die Afdeling nie afdoende kan beantwoord nie, word sulke navrae direk na die betrokke laboratoriums gestuur vir beantwoording. Die volgende paar voorbeelde toon die aard en verskeidenheid van onderwerpe waarvoor navrae gedoen is gedurende die betrokke tydperk: sintetiese harse; beskerming van gesaaides teen rybeskading; bosbou- en houtnywerheid; bestryding van veld- en bosbrande; filtrering van brandstof; gloeigasverligting; preservering van eiers; ekonomiese aspekte van kernkrag; vakkundige opleiding; outomatiese beheerstelsels en die sementnywerheid; parathion; toerusting vir drukluighantering; vervaardiging van grammofoonplate; veselglas-versterkte plastiek; installasie-ontwerp; ontwerp vir en toerusting van 'n konfytfabriek; ontwerp van flokkuleerders; filtrasie van water in swembaddens; patentregte; kernkrag en die siviele ingenieur; waarde-bepaling van navorsingswerk; dieldrien; werke van Sir Isaac Newton; vakuumbeton; pirofillietafsettings in Suid-Afrika; produksie van titaantetrachloried; estrogene.

Fotografiese Afdrukke

Gedurende die tydperk het die Inligtingseksie 453 versoeke ontvang vir enkel fotografiese afdrukke van artikels uit wetenskaplike tydskrifte. Hierdie afdrukke word plaaslik gemaak, of anders aangevra deur die W.N.N.R. se wetenskaplike Skakelkantore in Londen en Washington in gevalle waar die tydskrif nie in Suid-Afrika beskikbaar is nie.

Lending Services (including Branches)

The number of publications issued on loan totalled 22,214 for the past 8 months. These figures include the issues from the branch libraries. Reminder notices to borrowers for the return of publications sent to them on loan totalled 2,721.

Two lists of duplicate journals were drawn up during the year and sent to 125 libraries and similar institutions. As a result of requests received from these libraries, 310 items were given to them to help fill gaps in their sets of periodicals. The Library also received a consignment of about 800 parts of journals from the United States Book Exchange, which greatly helped in filling gaps in the C.S.I.R.'s own collections. It was also grateful to receive a back set of the *Proceedings of the Institution of Civil Engineers* running from 1865 to 1914/15 from the Steel and Engineering Industries Federation of South Africa.

INFORMATION SECTION

Enquiries for Information

During the period, the Information Section dealt with 352 enquiries for information, many of them entailing long bibliographical searches. In addition to giving detailed bibliographical replies to enquiries, the section transmitted on to the laboratories, questions which could not satisfactorily be answered in the Library and Information Division. The following are a few of the subjects about which enquiries were received during this period: synthetic resins; frost protection of crops; forestry and the wood industry; control of veld and forest fires; fuel filtration; fluorescent lighting; preservation of eggs; the economic aspects of atomic power; technical education; automatic control systems and the cement industry; parathion; pneumatic handling equipment; manufacture of gramophone records; glass fibre reinforced plastics; plant design; layout and equipment for a jam factory; design of flocculators; filtration of water in swimming baths; patent rights; nuclear energy and the civil engineer; evaluation of research; dieldrin; the work of Sir Isaac Newton; vacuum concrete; pyrophyllite deposits in South Africa; production of titanium tetrachloride; oestrogens.

Photographic Copies

During the period, the Information Section received 453 requests for single photographic copies of articles in scientific journals. These copies were made locally, or requested through the C.S.I.R.'s London and Washington Scientific Liaison Offices, in the case of those journals not available in South Africa.

Katalogus van Tydskrifte in die Unie

Die rekordkaartjies vir die wetenskaplike, tegniese en mediese afdelings van die *Catalogue of Union Periodicals* ('n lys van Unie-tydskrifte in besit van Suid-Afrikaanse biblioteke) word deur hierdie seksie op datum gehou, terwyl voortgegaan word met die herrangskikking van die kaartjies in alfabetiese volgorde. Gedurende die verslagtydperk is 167 navrae van buite-organisasies ontvang in verband met tydskrifte wat nie in die gedrukte boekdele van die katalogus voorkom nie. Navrae is ook gereeld van die W.N.N.R. personeel ontvang.

Vertalings

Daar is voortgegaan met die opstel van Suid-Afrika se stel van die Gemenebes se Indeks van Vertalings ('n kaartjiesregister van wetenskaplike artikels waarvan vertalings gemaak is deur inrigtings in die Gemenebes). Gedurende die verslagtydperk is 212 nuwe kaartjies bygevoeg. Namens ondersoekers is daar dikwels om hulp aangeklop by sowel die Gemenebes se Indeks as by die W.N.N.R. se Rooster van Vertalers ('n naamlys van persone wat gewillig is om vertalingswerk uit verskillende Europese tale te doen.)

Herdrukke

Die Inligtingseksie is tans besig met die opstel van 'n register van herdrukke van artikels wat deur personeellede en beurshouers van die W.N.N.R. geskryf is. Behalwe die byvoeging van nuwe herdrukke, word 'n groot aantal onaangetekende herdrukke wat reeds in besit van die Biblioteek is nou ook op die register aangebring. Gedurende die verslagtydperk is 1,060 nuwe kaartjies by die lys gevoeg, en ook is aandag gegee aan navrae vir herdrukke van artikels wat deur personeellede van die W.N.N.R. geskryf is.

Afdeling se eie Publikasies

Die redaksie- en tikwerk vir die 1956-uitgawe van die *Register van huidige Wetenskaplike navorsing aan Suid-Afrikaanse universiteite* is voortgesit en die wasvelle word nou afgerol en sal binnekort gereed wees. Die 1956-uitgawe bevat besonderhede oor 534 navorsingsprojekte. *W.N.N.R. Inligting*, die Afdeling se maandelikse publikasie van nuwe byvoegings, het gereeld verskyn en het gemiddeld 150 byvoegings per uitgawe bevat.

Catalogue of Union Periodicals

The record cards of the science, technology and medical sections of the *Catalogue of Union Periodicals* (a list of South African library holdings of periodicals) are being kept up to date by this section, and work was continued on the rearrangement of the cards in an alphabetical sequence; 167 enquiries from outside organizations regarding holdings not recorded in the printed volumes were received during this period; enquiries from staff members were also regularly dealt with.

Translations

Work on South Africa's copy of the Commonwealth Index of Translations (a card index of scientific articles of which translations have been made in institutions in the Commonwealth) was continued; 212 new cards were filed during the period under review. The Commonwealth Index and the C.S.I.R. Panel of Translators (a list of names of persons who have indicated they are willing to do translation work from various European languages) were frequently consulted during this period on behalf of enquirers.

Reprints

The Information Section is building up an index of reprints of articles by members of the C.S.I.R. staff and C.S.I.R. award-holders. This work includes the indexing of many reprints already in the collection but not previously recorded. During this period 1,060 record cards were added to the index. Requests for reprints of articles by C.S.I.R. staff members were also dealt with.

Division's Own Publications

The editing and typing of the 1956 volume of the *Register of current scientific research at South African universities* was continued. The running off of this volume is now in progress and should be completed shortly. The 1956 volume includes particulars of 534 research projects.

C.S.I.R. Information, the Division's monthly bulletin of accessions, was duly issued each month, approximately 150 entries being included in each issue.

Sentrale Werkplaas

Bestuurder: J. van der STAAY

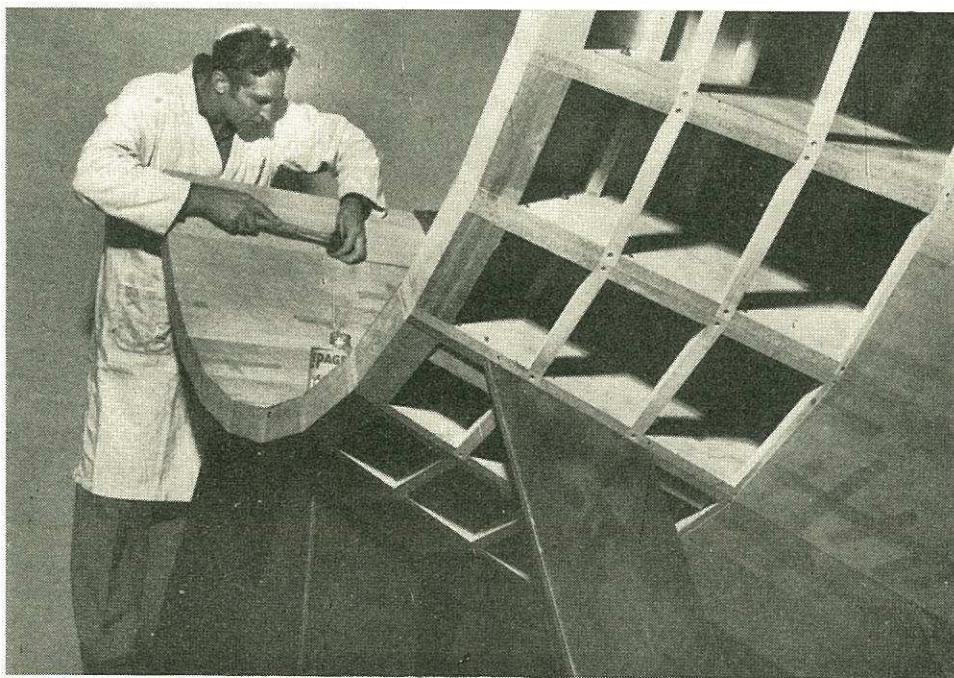
Op 'n vergadering van die Raad is besluit om al die werksinkels van die W.N.N.R. onder een sentrale beheer te plaas. Hierdie besluit het tot gevolg gehad dat die Suid-Afrikaanse Buro vir Standaarde, Nasionale Chemiese Navorsingslaboratorium en die Nasionale Bounavorsings-instituut se werksinkels nou deel vorm van die Sentrale Werkplaas van die W.N.N.R. Dit is nou reeds duidelik dat 'n baie meer doeltreffende gebruik van personeel en toerusting gemaak kan word.

Central Workshops

Manager: J. VAN DER STAAY

Council at one of its meetings decided that all the workshops of the C.S.I.R. should be centralized under one management.

As a result of this decision, the workshops of the South African Bureau of Standards, the National Chemical Research Laboratory and the National Building Research Institute now form part of the C.S.I.R.'s Central Workshops. Even at this stage it can confidently be said that by this arrangement much more



Die houtmondstuk van 'n nuwe windtonnel wat in die Sentrale Werkplaas gemaak word.

The wooden mouthpiece of a new wind tunnel under construction in the Central Workshops.

'n Ontwerpfabdeling is opgerig met die doel om dienste te kan lewer aan afdelings of institute wat nie oor 'n eie ontwerpfabdeling beskik nie.

'n Begin is gemaak met die vervaardiging van die groot aantal spesiale ontwerpte meubels wat benodig word in die nuwe geboue wat vir die verskillende Institute opgerig is of nog word. 'n Voorlopige beraming dui daarop dat dit 'n aansienlike besparing op boukoste sal beteken.

efficient use can be made of both personnel and equipment.

A design section has been started with the object of rendering services to divisions or institutes that have no design section of their own.

A start has been made with the construction of a large number of specially designed articles of furniture required in the buildings of the various Institutes that are completed or still under construction. A preliminary

Die opleiding van vakleerlinge in die instrument-makery word met welslae voortgesit.

Die totale personeel van die Sentrale Werkplaas bestaan uit 74 blankes en 13 naturelle.

Toerusting ter waarde van £4,664 is hierdie jaar vir die Sentrale Werkplaas aangekoop, terwyl die totale kapitale waarde van instrumente en apparaat wat deur die Sentrale Werkplaas vervaardig is, £12,897 bedra.

Onder die belangrikste instrumente wat vir die Raad se laboratorium vervaardig is, is 'n verskeidenheid van siklotron onderdele, 'n galvanometerversterker vir noukeurige temperatuurmetings, 'n newelkamer vir die meet van ysvormende kerne in die atmosfeer, 'n drukmeter om deur middel van klankgolwe die gekraakte gebied in mynskagte te bepaal, 'n vloeistofmanometer vir lugmeganika, 'n lugverhitter vir die studie van verbrandings-eienskappe van verpoeierde steenkool, 'n groefmasjien vir die sny van groewe in sferiese metaal-enkelkristalle, waterverkoelde skyfbrander vir ondersoek van vlamspoed van gasvormige lugmengsels, 'n horisontale balans om lugvloeispoed in vervoerpype te meet, 'n akoestiese kamer vir die ontwikkeling van skerp ossilograaf-afsitpuls in rotswande, 'n sondistilleerapparaat om brakwater geskik te maak vir huishoudelike gebruik, 'n respirometer vir studies oor suiwering van rioolvuil en metings van kool-suurgasse; 'n grypbak om modder uit riviere en mere te haal, 'n riffelmasjien vir riffeling van plastiese materiaal, 'n intervalklok wat met konstante tussenpose 'n akoestiese teken gee om werksproduksie vas te stel, 'n Benkelman-staaf vir bepaling van elastiese en permanente defleksie van padoppervlaktes onder druk van swaar voertuie, 'n visko-elastiese apparaat vir bepaling van die visko-elastiese eienskappe van bindstowwe onder verskillende toestande van temperatuur en frekwensies; 'n permeabiliteitsapparaat om die deurdringbaarheid van padoppervlaktes te toets, 'n termostatiesbeheerde waterbad vir navorsingswerk op magou, 'n menger van voedsel-monsters vir analise; 'n gliserienbad vir kleurontwikkeling in chromografiese buise, 'n permeameter om waterdeurdring in onversadigde grondmonsters te meet, 'n draagbare komparator om krimpafmetingsveranderings in beton te meet, en 'n konstante-temperatuurbad met 'n spesiale roerinrigting om die wateropname van sement-soorte te bestudeer.

estimate shows that this will mean a great saving on building costs.

The training of apprentices in the instrument shop is successfully being continued.

The staff of the Central Workshops consists of 74 Europeans and 13 Non-Europeans.

During the year capital equipment was purchased to an amount of £4,664, whilst instruments and apparatus to the capital value of £12,897 were constructed.

Among the most important instruments constructed for the different laboratories are a number of cyclotron parts; a galvanometer amplifier for accurate temperature readings; a fog chamber for the measuring of ice-forming nuclei in the atmosphere; a pressure pick-up for detecting the fracture zones in mine shafts, with the aid of sound waves; a liquid manometer for aerodynamics; an air heater for studying the burning characteristics of pulverized coal; a grooving machine for cutting grooves in metal spheres for the study of single crystals; a water-cooled flame burner for the determination of the laminar adiabatic flame speeds of gaseous fuel/air mixtures; a horizontal balance for measuring air flow speeds in conveyor tubes; an acoustic hammer for developing sharp oscillograph pulses when hammered against rock walls; a solar still to distil brackish water for domestic use; a respirometer for studying the purification of sewage, and measuring carbonic acid gas; an "Eckman" grab for taking samples from soft muddy river beds and lakes; a corrugating machine for corrugating plastic materials; an interval timer which gives an acoustic signal at constant intervals to make possible the scoring of work output within each interval; a "Benkelman" beam for the determination of the elasticity and permanent deflection of road surfaces under the load of heavy vehicles; a visco-elasticity measuring apparatus for testing the visco-elasticity qualities of various bituminous samples at different temperatures and frequencies; a permeability test apparatus for measuring the permeability of road surfaces; a thermostatic controlled waterbath for testing Magou (kaffir beer); a mixer for blending samples of food for analysis; a glycerine bath for colour developing in chromographic tubes; a permeameter for measuring the water permeability of unsaturated soil samples; a portable comparator for measuring the dimensional changes in concrete due to drying shrinkage; and a constant-temperature bath with a special stirring arrangement for studying the hydration process in different kinds of cement.

Die Suid-Afrikaanse Buro vir Standaarde

Direkteur: DR. A. W. LATEGAN

Die vorige Raad van die Suid-Afrikaanse Buro vir Standaarde is ingevolge die Wet op Standaarde (Oordraging van Uitvoering) op 17 Augustus 1956 opgehef. Op sy eerste vergadering daarna het die vergrote Wetenskaplike en Nywerheidsnavorsingsraad besluit om die Standaarderaad opnuut in te stel as 'n hulpliggaam waaraan sekere uitvoerende magte wat voorheen uitgeoefen is deur die Raad van die Suid-Afrikaanse Buro vir Standaarde, gedelegeer is. Die lede van hierdie heringestelde Raad was op 31 Maart 1957 soos volg:

Dr. S. M. Naudé,
Dr. V. Bosman,
Dr. F. J. de Villiers,
Mnr. E. W. Dohse,
Mnr. G. S. J. Kuschke,
Mnr. D. Lion-Cachet
Dr. H. O. Mönnig,
Brig. Dr. J. H. Rauch,
Prof. W. G. Sutton.

In November 1956 het mnr. James Ritchie as Direkteur van die Buro vir Standaarde bedank om na die nywerheid terug te keer. Mnr. Ritchie was by die ontstaan van die Buro aan die begin van 1946 as Direkteur aangestel, toe daar met standaardiseringswerk in Suid-Afrika op voltydse basis begin is met 'n personeel wat uit homself en die Sekretaris van die Buro vir Standaarde bestaan het. 'n Paar maande later het die personeel tot nege aangegroei en het die werk reeds in twee laboratoriums 'n aanvang geneem. Dat die Buro vir Standaarde tans uit 35 laboratoriums bestaan en 'n personeel van 360 in diens het, is op sigself die hoogste lof wat aan mnr. Ritchie se bekwaamheid en daadkrag toegeswaai kan word. Suid-Afrika is trouens op internasionale standaardiseringskonferensies gelukkig gewens met sy standaardiseringsorganisasie as een van die modernste en vooruitstrewendste van die wêreld. Dr. A. W. Lategan wat mnr. Ritchie opgevolg het, was voorheen Direkteur van die Nasionale Voedingnavorsingsinstituut.

Vroeg in 1956 is daar besluit om die verskillende afdelings van die Buro in vier Departemente te groepeer, nl. (1) die **Departement Analitiese en Industriële Chemie** met onderafdelings Hout, Leer en Skoeisel, Metallurgie, Analitiese Skeikunde, Spektrochemie, Rots-, en Kleiprodukte, Rubber en Plastika, Brandstowwe en smeerolies, Bitumens, Verf, Papier, en die Afdeling Tekstiel en Klerasie; (2) die **Departement Biologiese Wetenskappe en Materiaal** met onderafdelings Entomologie, Voedsel, Inspeksie van Voedsel en Voer, Mikrobiologie, Mikologie,

The South African Bureau of Standards

Director: DR. A. W. LATEGAN

The former Council of the South African Bureau of Standards was abolished in terms of the Standards (Transfer of Administration) Act on 17th August, 1956. At its first meeting thereafter, the enlarged Council for Scientific and Industrial Research decided to reconstitute the Standards Council as a subsidiary body to which certain executive powers, formerly exercised by the Council of the South African Bureau of Standards were delegated. Membership of this reconstituted Council as at 31st March, 1957, was as follows:

Dr. S. M. Naudé,
Dr. V. Bosman,
Dr. F. J. de Villiers,
Mr. E. W. Dohse,
Mr. G. S. J. Kuschke,
Mr. D. Lion-Cachet,
Dr. H. O. Mönnig,
Brig. Dr. J. H. Rauch, and
Prof. W. G. Sutton.

In November, 1956, Mr. James Ritchie relinquished the post of Director of the Bureau of Standards to return to industry. Mr. Ritchie was appointed Director of the Bureau at its inception at the beginning of 1946, when the work of standardization in South Africa on a full-time basis was begun with a staff consisting of himself and the Secretary of the Bureau of Standards. A few months later the staff had increased to nine, and work had started in two laboratories. That the Bureau of Standards now comprises 35 laboratories served by a staff of 360 is in itself the finest tribute that can be paid to Mr. Ritchie's ability and energy. South Africa has, in fact, been complimented at international standardization conferences on having one of the most modern and progressive standardization organizations in the world. Dr. A. W. Lategan who succeeded Mr. Ritchie was formerly Director of the National Nutrition Research Institute.

Early in 1956, it was decided to re-group the sections of the Bureau into four Departments, namely, (1) the **Analytical and Industrial Chemistry Department** which comprises the Timber, Leather and Footwear, Metallurgy, Analytical Chemistry, Spectrochemistry, Rock and Clay Products, Rubber and Plastics, Fuel and Lubricants, Bitumens, Paints and Paper Sections and the Textile and Clothing Division; (2) the **Biological Sciences and Materials Department**, comprising the Entomology, Foods, Feeds and Food Inspectorate, Microbiology, Mycology, Pharmaceutical Products and Vitaminology



Dr. A. W. Lategan.

Farmaseutiese Produkte en Vitaminologie; (3) die **Departement Werktuigkundige en Siviele Ingenieurswese** met onderafdelings Werktuigkundige Laboratorium, Metrologie, Verpakking, Modelbouregulasies, Spesifikasies en Gebruikskodes vir Boumateriaal en Struktuurtoetswerk; en (4) die **Departement Fisika en Elektrotegniek**, met onderafdelings Fotometrie, Nie-vernietigende Toetswerk, Algemene Fisika, Vlamvastheid, Elektronika, Elektriese Toestelle, Bedradingstoebehore, Kabels, Meters en Instrumente, Batterie en Droëselles, Hoogspannings- en Elektriese Masjiene.

Dit het geblyk dat hierdie hergroepering goed werk en tot groter doeltreffendheid gelei het.

DEPARTEMENT VAN BIOLOGIESE WETENSKAPPE EN MATERIAAL

Die werk wat hierdie departement verrig, voorsien bepaald in 'n behoefte. Elke onderafdeling speel 'n integrerende rol deur hulpverlening aan die nywerheid, die handel en die verbruiker met die ondersoek van duisende monsters ingemaakte produkte wat plaaslik geproduseer

Sections; (3) the **Mechanical and Civil Engineering Department**, comprising the Mechanical Laboratory, Metrology, Packaging, Model Building Regulations, Building Materials Specifications and Codes of Practice and Structural Testing Sections, and (4) the **Physics and Electrical Engineering Department** which includes the Photometry, Non-destructive Testing, General Physics, Flameproof, Electronics, Electrical Appliances, Wiring Accessories, Cables, Meters and Instruments, Batteries and Dry Cells, High Voltage and Electrical Machine Sections.

This regrouping has been found to work well and has made for greater efficiency.

BIOLOGICAL SCIENCES AND MATERIALS DEPARTMENT

The work done by this Department fills an undoubted need, each section playing an integral part in assisting industry, commerce and the consumer by the examination of thousands of samples of locally produced or imported canned products; of mineral waters; and of a wide range of food and feed products. Further work carried out is the bacteriological examination of egg pulp, the biological evaluation of insecticides, fungicides and moth-proofing processes; the assaying of vitamin and amino-acid content of numerous products and the assessment of the potency, purity and standard of composition of drugs and pharmaceutical products, all of which play their part in the development of South African industry.

Entomology

Various tests were conducted on treated samples of the overcoating and worsted whipcord used for police uniforms and the socks and khaki pullovers used by the Army, to determine their susceptibility to attack by clothes moth larvae. These samples were taken from new batches of clothing materials available for inspection. Moth-proofed samples of materials submitted by local manufacturers were also tested.

At the request of an overseas firm, tests were carried out on paper strips impregnated with a volatile insecticide intended to prevent damage by the larvae of the common clothes moth at certain larval stages.

Control tests were carried out on insecticides manufactured under the standardization mark scheme and, at the request of municipalities and government departments, knockdown and residual tests were performed on household insecticides, using bed-bugs and flies as test insects. The biological evaluation of a new type of flypaper consisting of small paper discs impregnated with insecticide was carried out. A test was also done on behalf of an overseas insecticide manufacturing firm on an electric bulb fumigator for household use.

of ingevoer word; van bruisdranke; en van 'n groot reeks voedsel- en voerprodukte. Verdere werk wat uitgevoer is, is die bakteriologiese ondersoek van eierpulp, die biologiese waardebeoordeling van insektemiddels en swammiddels en motvrymakingsprosesse; die essaiëring van die vitamien- en aminosuurgehalte van talle produkte en die vasstelling van die sterkte, suiwerheid en samestellingstandaard van verdowingsmiddels en farmaseutiese produkte wat almal 'n rol in die ontwikkeling van die Suid-Afrikaanse nywerheid speel.

Entomologie

Allerlei toetse is uitgevoer op behandelde monsters van die wolstof vir oorjasse en kamgaringsweepkoord wat vir polisie-uniforms gebruik word en die sokkies en kakietruie wat in die leër gebruik word, om hul aantastbaarheid deur die larwes van die kleremot te bepaal. Hierdie monsters is uit nuwe produksielotte kledingstowwe geneem wat vir inspeksie beskikbaar gestel is. Ook is motvrygemaakte monsters materiaal wat deur plaaslike fabrikante vir ondersoek ingestuur is, getoets.

Op versoek van 'n oorsese firma is toetse uitgevoer op papierstrokies met 'n vlugtige insektemiddel geïmpregneer, wat bestem is om beskadiging deur die larwes van die gewone kleremot in sekere larwestadiums, te verhoed.

Kontroletoepte is uitgevoer op insektemiddels wat kragtens die standaardmerkskema vervaardig word; uitklop- en nawerkingstoepte, waarby weeluse en vlieë as proefinsekte gebruik is, is op huishoudelike insektemiddels uitgevoer.

Verder is 'n biologiese ondersoek vir die beoordeling van 'n nuwe soort vlieëpapier wat uit klein papierskyfies met 'n insektemiddel geïmpregneer bestaan, uitgevoer. Namens 'n oorsese fabrikant van insektemiddels is ook 'n toets op 'n elektriese berokingsgloeilamp vir huishoudelike gebruik uitgevoer.

Vordering is met die gebruikskode vir die veilige gebruik van huishoudelike insektemiddels en landboumiddels gemaak.

Die onderafdeling het van die Departement van Landbou en 'n plaaslike meulenaar graanmonsters vir X-straalondersoek ontvang teneinde moontlike besmetting deur graaninsekte vas te stel.

Voedsel, Voer- en Voedselinspeksie

Gereelde kontroletoepte is uitgevoer op die handelsware wat kragtens die standaardmerkskema vervaardig word en nuwe permitte is aan fabrikante van ingemaakte stokvisprodukte, ingemaakte pynappel en bruisdranke, uitgereik.

Handelsartikels wat reeds die merk dra, is o.a. roomys, tamatiesous en tamatiesap, ingemaakte vrugte en groente,

Progress was made with the code of practice for the safe use of household insecticides and agricultural remedies.

Grain samples were received by the Section from the Department of Agriculture and a local miller for X-ray examination in order to detect possible infestation by grain insects.

Foods, Feeds and Food Inspectorate

Regular control tests were carried out on commodities manufactured under the standardization mark scheme and new permits for the use of the mark were issued to manufacturers of canned hake products, canned pineapple and mineral waters.

Commodities already bearing the mark include ice-cream, tomato sauce and tomato juice, canned fruits and vegetables, canned jams, jellies and marmalades, canned meats and poultry feeds.

Standard specifications for canned fish, quick-frozen fish and canned rock lobster were completed. Satisfactory



Mr. T. Bedford, Assistant Director of the South African Bureau of Standards.

Mnr. T. Bedford, Assistent-direkteur van die Suid-Afrikaanse Buro vir Standaarde.

ingemaakte konfynt, jellie en marmelade, ingemaakte vleis, en hoendervoer.

Standaardspesifikasies vir ingemaakte vis, snelbevore vis en ingemaakte kreef is voltooi. Die gereedmaking van die in baie opsigte gewysigde spesifikasies vir ingemaakte vrugte, groente, ingemaakte appel-, kweper- en pynappelsap, en vir konfynt, jellie en marmelade vir publikasie het goed gevorder.

'n Aanvang is gemaak met die aanvoerwerk aan 'n spesifikasie vir deursigtige vleisverpakkings waaronder die normale reeks kleinhandelspakkies, soos spek, polonie, worsies, ens., wat in winkels en kafees vars verkoop word.

Op versoek van die Departement van Handel en Nywerheid word 'n spesifikasie vir handelsukrose opgestel.

In die onderhawige tydperk het die toepassing van die verpligte standaardspesifikasies vir plaaslik vervaardigde en ingevoerde ingemaakte vis, kreef en vleisprodukte glad verloop, sowel ten opsigte van plaaslike vervaardigde as van ingevoerde verpakkings.

Die monsters wat vir ontleding aan die onderafdeling gestuur is, het 'n groot verskeidenheid produkte, van kafferbier tot die vulstowwe wat by die vervaardiging van vleisprodukte gebruik word, gedek.

Mikrobiologie

Die werk wat die onderafdeling verrig het, het merendeels betrekking op die opsporing, isolering en uitkenning van mikro-organismes waardeur die gehalte van die verskillende gepreserveerde voedsel- en dranksoorte wat in die Unie en Suidwes-Afrika geproduseer, gebruik en uitgevoer word, of wat in ons land vir uitvoer geproduseer word. In die tydperk waarop hierdie verslag betrekking het, het die onderafdeling 13,903 monsterblikke ingemaakte vleis, 13,364 monsterblikke ingemaakte vis, 664 monsterblikke ingemaakte vrugte en konfynt, 2,112 bottels bruisdrank en 54 monsters roomys mikrobiologies ondersoek. Verder het fabrikante wat kragtens die standaardmerkskema produseer en ander private firmas talle monsters ingestuur, waaronder eetbare gelatien, lym, mielieblom, tamatiesap en houtpulpbord.

Volgens 'n ooreenkoms met die Eierbeheerraad het die onderafdeling 247 monsters eierpulp vir Salmonella-organismes getoets. Hierdie werk het gedien as 'n opname om die opbou van 'n belowende bedryf te help bevorder. 'n Groot organisasie het 'n reeks grondmonsters ingestuur waarvan die mikrogehalte vasgestel moes word.

Die produksie van media vorm 'n belangrike deel van die onderafdeling se werk en in die betrokke tydperk is in die geheel 1,533 liter van 35 verskillende soorte media berei.

Die versameling mikro-organismes is met 28 kulture en anti-sera aangevul wat van verskillende oorsese en Suid-Afrikaanse organisasies verkry is.

Bykans honderd bakteriestamme en skimmels is onder Suid-Afrikaanse inrigtings versprei, waaronder onderaf-

progress was made with the task of preparing the extensively revised specifications for canned fruits, vegetables, canned apple, quince and pineapple juice, and jams, jellies and marmalades, for publication.

Initial work was started on a specification for open pack meats comprising the normal range of "small goods" such as bacon, polonies, sausages, etc., sold fresh in shops and cafés.

At the request of the Department of Commerce and Industries a specification for commercial sucrose, is being prepared.

During the period in question the administration of the compulsory standards for locally manufactured and imported canned fish, rock lobster and canned meat products proceeded smoothly in respect of both locally manufactured and imported packs.

Samples sent to the Section for analysis covered a wide field ranging from kaffir beer to fillers used in the manufacture of meat products.

Microbiology

Most of the work done by the Section was related to the detection, isolation and identification of micro-organisms which might affect the quality of the various preserved foods and beverages produced and used in and imported into the Union and South West Africa, or produced in this country for export. During the period under review the Section examined microbiologically 13,903 sample cans of canned meat, 13,364 sample cans of canned fish, 664 sample cans of canned fruits and jams, 2,112 bottles of mineral waters and 54 samples of ice cream. In addition, manufacturers producing under the standardization mark scheme and other private firms submitted numerous samples which included edible gelatine, glue, cornflour, tomato juice and wood pulp board.

By arrangement with the Egg Control Board, 247 samples of export egg pulp were tested for Salmonella organisms. This work was in the nature of a survey to assist in building up a promising industry. A long series of soil samples submitted by a large organization was determined for microbial content.

The production of media forms an important part of the Section's work and, during the period, about 35 different kinds of media totalling 1,533 litres were prepared.

As additions to the stock culture collection, 28 cultures and anti-sera were obtained from various overseas and South African organizations.

Close on a hundred strains of bacteria and moulds were distributed to institutions in South Africa, including



Ingemaakte vleisprodukte word deur die Mikrobiologiese Laboratorium getoets vir bakteriebesmetting.

Testing canned meat products for bacterial soundness in the Microbiological Laboratory.

delings van die Landboudepartement, Veeartsenyavorsing, Universiteitsdepartemente, kaasfabrieke, melkerye en ander private ondernemings. In oorleg met die Suiwelnavorsingsafdeling is planne opgestel om kaas- en botterfabrieke van 'n reeks suurkulture te voorsien om die probleem van bakteriofage uit die weg te ruim.

Daar was 'n aansienlike, toenemende vraag na die stamme wat in die Buro gebruik word. Die bakterieë word tans feitlik almal in stand gehou in die vorm van vriesdroë preparate en daar word getrag om dieselfde arbeidsbesparende metode in verband met die Buro se versameling swamme te volg.

Mikologie

Gereelde toetse is uitgevoer om weerstand teen swamaantasting te toets op 500 monsters katoenseildoek wat deur fabrikante aan verskillende behandelings onderwerp was.

Eierlaaie wat vir eieruitvoer gebruik word en filtreerdoek vir gebruik by die ontginning van uranium, is getoets om hul weerstand teen swamaantasting te bepaal.

'n Grondopname is namens 'n fabrikant van landbouchemikalieë uitgevoer met die oog op die bepaling van die swambevolking van grondmonsters nie alleen uit verskillende omgewings geneem nie, maar wat ook verskillende bewerkings ondergaan het.

Grondmonsters van padoppervlakke geneem wat met

sections of the Agricultural Department, Veterinary Research, University Departments, cheese factories, dairies and other private concerns. In consultation with the Dairy Research Division, plans were formulated for the supply to cheese and butter factories of a series of starters to overcome the bacteriophage problem.

There was a considerable and increasing demand for strains used in the Bureau. Practically all the bacteria are now maintained as freeze-dried preparations and efforts are being made to use the same labour-saving device for the mycological collection which is also held.

Mycology

Regular tests were performed to determine resistance to fungal attack on 500 samples of cotton duck which had been subjected to various treatments by manufacturers.

Egg trays used in the export of eggs and filter cloth used in the extraction of uranium were tested to determine their resistance to attack by fungi.

A soil survey was carried out on behalf of a manufacturer of agricultural chemicals, for the purpose of determining the fungal population of soil samples taken, not only from different localities, but which had also undergone various cultivation practices.

Soil samples taken from road surfaces treated with a

'n patente padbindmiddel behandel is, is ondersoek om die vatbaarheid vir swamaantasting daarvan te bepaal en monsters van besemkoring is ondersoek om die oorsaak van die verslegting van die stingels te bepaal.

Daar is 'n begin gemaak met die werk aan die Buro se versameling swamme om hulle betekenis in die aantasting van wol, katoen en leer en as moontlike bronne van antibiotiese stowwe, vas te stel.

Farmaseutiese Produkte

Die belangrikste kenmerk van die onderafdeling se werksaamhede gedurende die onderhawige tydperk was dat die hoeveelheid toetswerk vir private en amptelike organisasies uitgevoer, in so 'n mate toegeneem het dat dit nie altyd moontlik was om al die werk onder die bestaande omstandighede te doen nie.

Talle van die versoeke het uitgegaan van groot verbruikersliggame soos die provinsiale besture, wetenskaplike organisasies soos die Nasionale Voedingsnavorsingsinstituut, en fabrikante van farmaseutiese produkte wat die kwaliteit van hul produkte bepaal wou hê. Sowat 42 besendings farmaseutiese produkte is namens die Unieraad vir Tenders en Leweransies ondersoek en getoets. Beoordeel volgens die aantal aanvrae om sy dienste ontvang, wil dit voorkom of hierdie afdeling in 'n wesenlike behoefte aan gespesialiseerde toetswerk voorsien.

Toetse is uitgevoer op 'n groot verskeidenheid farmaseutiese produkte soos bv. sulfoenamiedtablette, multivitamiestrope, streptomisien en dehidrostreptomisien vir inspuiting, penisilliensalf en verdowingsmiddels.

Die bepaling van vitamienne in mineraalmengsels ter aanvulling van veevoer en die bepaling van die toksisiteit van insektmiddels is met welslae uitgevoer.

Spesifikasies vir dekstrose, dekstrose-plus-natriumchloried vir inspuiting, oplossing van natriumchloried, meervoudige oplossings van natriumchloried en meervoudige oplossings van natriumlaktaat vir parenterale gebruik is voltooi.

Heelwat tyd en arbeid is by die uitvoering van sekere biologiese toetse bespaar. By die essaïering van protamiensinkinsulien is dit bv. bereik deur groter gebruikmaking van meganiese toestelle en 'n noukeurige studie van metode en organisasie.

Vitaminologie

Die onderafdeling het hom hoofsaaklik besig gehou met die bepaling van dié vitamienne wat volgens mikrobiologiese metodes bepaal kan word. Hieronder ressorteer die vitamienne van groep B, soos bv. riboflavin, pantotheensuur, nikotiensuur en B-12. Vitamienne van Groep A en C word skeikundig bepaal. Sowat 70 persent van die onderafdeling se tyd is bestee aan kontroletoetswerk op pluimveevoer wat kragtens die standaardmerkskema vervaardig word en die res aan toetse vir private firmas en groot organisasies soos bv. die Unieraad vir Tenders en

proprietary road binder were tested to ascertain their susceptibility to fungal attack, and samples of broom corn were examined to determine the cause of deterioration of the stalks.

Work was started on the Bureau's collection of fungi to ascertain their significance as attackers of wool, cotton and leather and as possible producers of antibiotic substances.

Pharmaceutical Products

The outstanding feature of the Section's activities during the period under review was that the amount of testing carried out for private, as well as official organizations, increased to such an extent that it was not always possible to handle all the work under existing conditions.

Many of the requests originated from large consumer bodies like the provincial authorities, from scientific organizations like the National Nutrition Research Institute and from pharmaceutical manufacturers wishing to ascertain the quality of their products. Some 42 consignments of pharmaceutical products were inspected and tested for the Union Tender Board and Supplies Office. Judging by the demand for its services it would appear that this Section meets a definite need for specialized testing.

Tests were carried out on a wide range of pharmaceutical products such as sulphonamide tablets, multivitamin syrups, streptomycin and dihydrostreptomycin for injection, penicillin ointment, and anaesthetics.

The determination of vitamins in animal feed supplements and the determination of the toxicity of insecticides were successfully undertaken.

Specifications for dextrose and dextrose sodium chloride injections and for sodium chloride, compound sodium chloride and compound sodium lactate solutions for parenteral administration were completed.

Considerable reductions in the time and labour required for certain biological tests were effected. In the assaying of protamine zinc insulin, for example, this was accomplished by making increased use of mechanical devices and by a careful study of method and organization.

Vitaminology

The Section was chiefly occupied with the determination of those vitamins which can be determined by microbiological methods. These include B-group vitamins such as riboflavin, pantothenic acid, nicotinic acid and B-12. Vitamins of the A and C group are determined chemically.

About 70 per cent. of the Section's time was spent on the control testing of poultry feeds manufactured under the standardization mark scheme and the remainder on tests for private firms and large organizations such as the

Leweransies. Die toetse vir laasgenoemde liggaam het o.m. die bepaling van vitamien in farmaseutiese produkte ingesluit.

Munisipale brouers van kafferbier het monsters gestuur waarvan die vitamiengehalte bepaal moes word.

Nog 'n aspek van die werk wat verrig is, was die mikrobiologiese bepaling van aminosure in voedselsoorte, en allerlei soorte voedsel en hidrolisate is met die oog hierop ontleed. Gedurende die onderhawige tydperk het die onderafdeling 'n toetsmetode toegepas om die biologiese waarde van visproteïene met mikrobiologiese hulpmiddels vas te stel. Hierdie metode wat oorsee op katoenproteïene toegepas is het goeie resultate opgelewer, daar dit makliker, geriefliker en meer ekonomies is as die lastige, duur metode waarby rotte gebruik word. Hoewel die metode nog in 'n eksperimentele stadium is, is die onderafdeling oortuig dat dit van groot waarde by die opstel van 'n spesifikasie vir vismeel sal blyk wanneer die eerste moeilikhede eers uit die weg geruim is.

DEPARTEMENT ANALITIESE EN INDUSTRIËLE CHEMIE

Die werksaamhede van hierdie departement dek 'n uitgebreide reeks handelsartikels geproduseer op steeds toenemende skaal deur Suid-Afrika se nywerhede, oud sowel as nuut, waaraan hy waardevolle diens kan lewer.

Hout

Verlede jaar het die Bosboudepartement op voorstel van Sy Edele die Minister van Ekonomiese Sake aansoek gedoen om toestemming om die standaardmerk te gebruik op die bouhout en kisplankies wat in die Staatsaagmeule in verskeie dele van die land geleë, gesaag word. Die voorlopige inspeksies in verband met aanbring van die merk, is reeds uitgevoer. Daar word gemeen dat die gradering van die hout en kontrole van die saag en droging daarvan ooreenkomstig spesifikasies veel sou kon bydra om Suid-Afrikaanse dennehout vir sekere gebruike in die boubedryf gewild te maak.

Die spesifikasie vir houtstole vir gereedskap is tot in die finale stadium deurgevoer. Daar is ook vordering gemaak met die woordelys van houtterme en omskrywings. Sowat 450 terme word in die lys opgeneem.

Aanname-inspeksies van vloerblokkies wat namens die Suid-Afrikaanse Spoorweë uitgevoer is, het toegeneem en daar is namens die Unieraad vir Tenders en Leweransies 'n begin gemaak met die toets van verfkwaste wat ingevolge lopende kontrakte gelewer is.

Vir die Transvaalse Provinsiale Administrasie is, in die onderhawige tydperk, meubels ter waarde van £80,000 ondersoek.

Union Tender Board and Supplies Office. Tests for the latter included the determination of vitamins in pharmaceutical products.

Municipal brewers of kaffir beer submitted samples for the purpose of ascertaining their vitamin content.

A further aspect of the work done was the microbiological determination of amino-acids in foodstuffs, various foodstuffs and protein hydrolyzates being analysed for this purpose.

During the period in question the Section was engaged on implementing a test method for ascertaining the biological value of fish proteins by microbiological means. This method, which has been tried out overseas on cotton proteins, gave excellent results, being easier, more convenient and more economic than the cumbersome, expensive method which entails the use of rats. Although the method is still in an experimental stage, the Section is confident that when the initial difficulties have been overcome, it will prove valuable in the drawing up of a specification for fish meal.

ANALYTICAL AND INDUSTRIAL CHEMISTRY DEPARTMENT

The activities of this Department cover a wide range of the commodities that are produced on a constantly increasing scale by South Africa's industries, both old and new, to which it is able to render valuable service.

Timber

At the suggestion of the Honourable the Minister of Economic Affairs last year, the Department of Forestry applied for permission to use the standardization mark on the structural timber and box shooks sawn at eight of the state sawmills situated in various parts of the country. The preliminary inspections relevant to the application of the mark have already been carried out. It is felt that the grading of the timber and the control of its cutting and seasoning in accordance with specifications would do much to popularize South African pine for certain uses as structural timber.

The specification for wooden tool handles was brought to its final stages. Progress was also made on the code for timber terms and definitions. The code will include some 450 terms.

Acceptance inspections on floor blocks, carried out on behalf of the South African Railways, showed an increase and tests have begun on paint brushes, supplied under current contracts, on behalf of the Union Tender Board and Supplies Office.

Furniture to the value of £80,000 was inspected for the Transvaal Provincial Administration during the period reviewed.

Leer en Skoeisel

Hoewel skoeisel wat kragtens die standaardmerkskema geproduseer word, meestal aan die vereistes van die verskillende staatsdepartemente voldoen en die onderafdeling hom vir 'n groot deel besig hou met kontroletoetse en die ondersoek van dié skoeisel, word verbeterings in die gehaltespesifikasies waarvolgens die verskillende skoeiseltipes gemaak word, gedurig oorweeg.

Planne vir draagtoetse t.o.v. skoene word voorberei om die nodige gegewens te verkry vir verwesenliking van hierdie verbeterings, en hulle sal binnekort uitgevoer word.

Die algemene werksaamhede van die onderafdeling het heelwat uitgebrei en die toenemende aantal aansoeke van fabrikante om toetse toon dat sy bedrywighede nog verder uitgebrei behoort te word—om bv. ook die leer-goederebedryf te dek. Namate die onderafdeling sy toets-toerusting vir spesiale doeleindes van oorsee ontvang en in gebruik neem, neem die vraag na sy dienste toe.

Aanname-inspeksies is namens die Unieraad vir Tenders en Leweransies en die Krygsproduksiekantoor uitgevoer. Die skoeisel aldus ondersoek verteenwoordig feitlik die hele tipereeks wat die Staatsmag nodig het.

Die toepassing van die verpligte spesifikasie vir buite-sool leer het blykbaar, nou dat die nodige personeel hul pligte aanvaar het, op dreef gekom.

Leather and Footwear

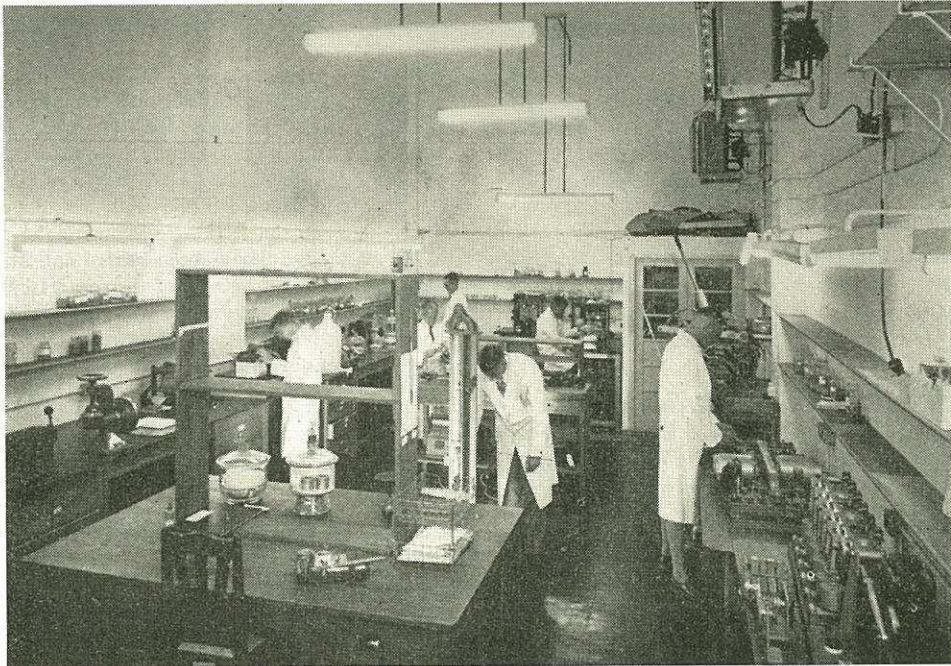
While most of the requirements of the various state departments are covered by footwear produced under the standardization mark scheme, and control testing and inspection of such footwear are among the major activities of the Section, improvements to the quality specifications, to which the different types of footwear are made, are constantly under consideration.

In order to obtain the necessary data for bringing about these improvements, wearer trials have been planned and will shortly be put into operation.

The general activities of the Section showed considerable expansion, the increasing number of requests for tests from manufacturers indicating that its scope should be still further widened to include, for example, the leather goods industry. As the Section's specialized testing equipment is received from overseas and put into operation, the demand for its services grows.

Acceptance inspections were carried out on behalf of the Union Tender Board and Supplies Office and the Defence Production Office, the footwear inspected covering practically the whole range of types required by the Services.

The administration of the compulsory specification for outer sole leather can be said to have got into its stride now that the necessary personnel have assumed duty.



Laboratorium vir die fisiese ondersoek van leer by die Leerafdeling se nuwe perseel in Andriesstraat, Pretoria.

Laboratory for the physical testing of leather at the Leather Section's new premises in Andries Street, Pretoria.

Metallurgie

Toetse van allerlei aard is namens kliënte uitgevoer. Talle versoeke om ondersoek en analise van vlekvrystaal is ontvang terwyl daar vir die olienwyerheid toetse uitgevoer is om die oorsake vas te stel van die swigting van buise van vlekvrystaal, en vir 'n private firma om vas te stel waarom 'n vrugtesapverkoeler gekorrodeer het. Talle toetse is uitgevoer op koolstofstaalprodukte soos kleinratte vir motorvoertuie en busse en penne vir rusperbandtrekkers. 'n Eksentriese nok van gietyster is namens die weefnyerheid ondersoek.

Onder ander monsters wat die onderafdeling vir chemiese of metallografiese ontleding ontvang het, was daar verskeie tipes koper en koperlegerings, asmede monsters van elektrodes vir die vervaardiging van buise vir elektriese geleiers en geskutmetaal- en bronssoorte. Van die drukkernyerheid is 'n versoek ontvang om drukkermetaal te ondersoek. Verder is allerlei beskermingslae van metaal getoets en die dikte van die laag op 'n aantal elektrolities oorgetrekte artikels bepaal.

Die talle toetse en inspeksies wat vir staatsdepartemente uitgevoer is, omvat ook die toetswerk namens die Poskantoor op loodmantels vir kables en die ondersoek van duisende knope en kentekens vir die Krygsproduksiekantoor.

Die onderafdeling het heelwat van sy tyd bestee aan kontroletoepte op artikels wat kragtens die standaardmerkskema vervaardig is.

Analitiese Chemie

Die onderhawige tydperk is gekenmerk deur 'n groter vraag na die onderafdeling se toetsdiens.

Onder die talle monsters wat vir toetsing ingestuur is, was daar middels vir uitstoming wat die Krygsproduksiekantoor nodig het om masjienonderdele en vliegtuie skoon te maak.

Allerlei toetse is op porselein, klei, sand en kwarts uitgevoer en muur- en badkamerteëls van 'n vooraanstaande fabrikant is geanaliseer. Monsters distikstofoksiedgas is van 'n groot organisasie ontvang om getoets te word vir voldoening aan die vereistes van die Britse Farmakopee.

Van belang vir die plaaslike nywerheid was die vergelykende olie-freonstabiliteitstoetse uitgevoer op monsters geëmaljeerde koperdraad wat in die Unie geproduseer word, om hul geskiktheid vir gebruik in plaas van ingevoerde draad van dieselfde tipe te bewys.

Geëmaljeerde stowe is getoets om hul weerstandsvermoë teen sure en afskuring te bepaal. Beoordelings-toetse en toetse om die verjellingsvermoë van gelatien te toets is vir 'n fabrikant van dessertjellie uitgevoer.

'n Fabrikant van onderdruk gebluste kalk vir bouwerk—die enigste firma in die Suidelike Halfrond wat hierdie bepaalde proses gebruik—het monsters ingestuur om volgens die spesifikasie te toets.

Verder is daar 'n groot verskeidenheid produkte getoets, waaronder rubberdoppe vir hidrouliese remstelsels,

Metallurgy

Tests carried out on behalf of clients were of a varied nature. Many requests were received for the examination and analysis of stainless steels, while tests were undertaken for the oil industry to determine the reasons for failure of stainless steel tubing, and for a private firm to ascertain the reasons for corrosion of a fruit juice cooler. Numerous tests were conducted on carbon steel products such as pinions for motor vehicles and bushes and pins for caterpillar tractors. A cast iron eccentric cam was examined on behalf of the weaving industry.

Among the samples received by the Section for chemical analysis or metallographic examination were various types of copper and copper alloys, including electrodes for the manufacture of electric conduit, and gun-metals and bronzes. A request received from the printing industry was for the examination of printers' metal. In addition, various metallic protective coatings were tested and the thickness of the coating on a number of electro-plated articles was determined.

Included in the many tests and inspections performed for government departments, was the testing of lead sheathing for cables for the Post Office and the inspection of thousands of buttons and badges for the Defence Production Office.

The control testing of articles manufactured under the standardization mark scheme occupied much of the Section's time.

Analytical Chemistry

An increased demand for the Section's testing services was a feature of the period reviewed.

Among the many samples submitted for test, were steam cleaning compounds required by the Defence Production Office for the cleaning of machine parts and aircraft.

Various tests were performed on china clay, sand and quartz, as well as chemical analyses of wall and bathroom tiles, manufactured by a leading manufacturer. Samples of nitrous oxide gas were received from a large organization for compliance testing against British Pharmacopoeia requirements.

Of interest to local industry were the comparative oil-freon thermal stability tests done on samples of enamelled copper wire produced in the Union, for the purpose of proving their suitability for replacing imported wire of the same type.

Tests were performed on enamelled stoves to determine their ability to withstand acids and abrasion. Rating tests and tests to determine the jelly strength of gelatine were conducted for a manufacturer of dessert jellies.

A manufacturer of pressure-hydrated lime for building—the only firm in the Southern Hemisphere to use this particular process—submitted samples for test against specification.

Further products tested covered a wide range and

tandheelkundige gips, harse, petrol, bitumineuse aluminiumverf, asynsuur, vuurvaste baksteen, bruisdrank en allerlei ander.

Spektrochemie

Die grootste deel van die werk wat onder uitstralingspektrografie ressorteer, het uit die ontleding van drukkersmetaal, witmetaal, sagte soldeersel en lood vir kabelmantele vir kontroletoetsdoeleindes bestaan. Spektrografiese standaarde is gemaak wat die verskillende legerings in elk van hierdie produkte dek, met die gevolg dat ontledings onder heel kort kennisgewing uitgevoer kan word.

Ook is toetse op 'n groot verskeidenheid monsters soos tin, lood, koperdraad, grafiet, aluminiumgietsblokke, bismutkarbonaat en bewysstukke vir die S.A. Kriminele Buro uitgevoer.

Werk in die onderafdeling Absorpsiespektrografie het hoofsaaklik bestaan uit fotometeraflesings vir ander onderafdelings van die Buro, wat die informasie vir hulle eie ontledings nodig gehad het.

Infrarooi absorptometriese metodes is by die kontroletoetse op pentachloorfenoloplossing vir houtverduursaming aangewend. Ontledings met infrarooi strale is ook op insektemiddels, swamdoders en onkruidodders uitgevoer en volgens dieselfde metodes is identifiserings-toetse op sekere terapeutiese stowwe soos fenobarbital, fenetoïen en sulfamiddels aangewend.

Die S.A. Kriminele Buro het dikwels van die onderafdeling se dienste gebruik gemaak.

included rubber cups for hydraulic brake systems, dental plaster, resins, petrol, bituminous aluminium paint, acetic acid, refractory brick, mineral water and a variety of others.

Spectrochemistry

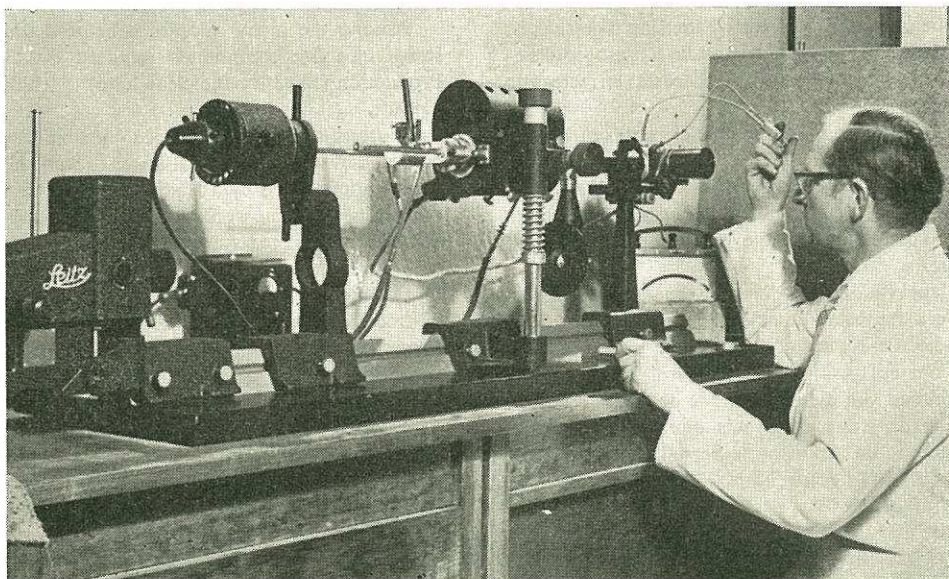
The bulk of the work falling under the category of emission spectrography consisted of analyses of printers' metals, white metals, soft solders and lead for cable sheathing for purposes of control testing. Spectrographic standards have been made up covering the various alloys in each of these products, with the result that analyses can be carried out at very short notice.

Further tests were conducted on a wide variety of samples such as tin, lead, copper wire, graphite, aluminium ingots, bismuth carbonate, and exhibits for the Criminal Bureau.

Work in the Absorption Spectrography Section consisted largely of photometer readings for other sections of the Bureau, where such readings were needed for their own analyses.

Infra-red absorptometric methods were employed in the control testing of pentachlorophenol solution for wood preservation. Infra-red analyses were also carried out on insecticides, fungicides and weed killers, and identification tests by the same methods were performed on therapeutic substances such as phenobarbitone, phenetoin and sulph drugs.

The Criminal Bureau made frequent use of the Section's services.



Die mikroskoop waarmee die gedrag van keramiese materiaal by verwarming ondersoek word.

The heating microscope which discloses the behaviour of ceramic materials.

Rots- en Kleiprodukte

Die basiese eienskappe van die tandheelkundige gips wat in Suid-Afrikaanse militêre hospitale gebruik word, is met die oog op die opstel van spesifikasies ondersoek. Daar word gehoop om die tekortkomings wat by die gebruik van 'n paar gipssoorte van oorsese oorsprong ondervind word, te verhelp.

Daar is 'n begin gemaak met werk aan die ontwerp en konstruksie van verskeie vuurvaste toetsapparate en die werk word voortgesit. Onder andere is daar apparate om lineêre uitsetting, slytweerstand, lugdeurdringbaarheid en warmtegeleidingsvermoë te toets.

Die onderafdeling het sy tyd gedeeltelik bestee aan toetswerk namens fabrikante op vuurvaste artikels vir voldoening aan spesifikasies en aan omvattende vergelykende toetswerk op vuurvaste materiaal vir die Suid-Afrikaanse Spoorwegadministrasie.

Toetse in verband met die riolietlawasoorte wat gebruik word by die vervaardiging van ligte perlietoeslag, is voortgesit.

Rubber en Plastika

Weens 'n groter hoeveelheid toetswerk deur die Buro in verband met die inspeksie van draad en kables namens die Departement van Pos-en-telegraafswese uitgevoer, was die onderafdeling heelwat besiger. Bestellings vir 1957 bedra 8½ miljoen jaart in vergelyking met 3½ miljoen jaart in 1956. Die toetswerk op inspeksiemonsters in verband met hierdie bestellings is in samewerking met die Afdeling Elektrotegniese Ingenieurswese uitgevoer.

Rubber

Allerlei toetswerk is uitgevoer met die oog op die opstel van standaardspesifikasies vir gomlastiekstewels en grondstowwe vir die versool van buitebande. Albei spesifikasies is reeds in die finale stadium en vir die verbruiker sal albei van belang wees.

Versoeke om die opstel van private spesifikasies vir laboratoriumproppe en slange van rubber en proppe vir entstofflessies, is ontvang. Nog ander word, in samewerking met die Tekstielfdeling, opgestel vir reënjas-materiaal.

Nuwe toetsfasiliteite is vir rubberslange, V-bande en rubbermatrasse opgestel wat hulle deel tot die ontwikkeling van standaardspesifikasies vir hierdie handelsartikels sal bydra.

Toetse is aangevra vir 'n uitgebreide reeks materiaal-soorte waaronder artikels van gevormde eboniet, vervoerbande, kables, gomlastiekstewels, rubbersole en -hakke en geregenereerde rubber.

Plastika

Private spesifikasies is opgestel vir tafeldoek en gordyne van polivinielchloried. Hierdie materiaal word al hoe meer gewild vir gebruik in groot inrigtings soos regeringshostels en liefdadigheidsinrigtings. Werk aan soortgelyke spesifikasies vir dik polivinielchloried-

Rock and Clay Products

The basic properties of the dental plaster used in South African military hospitals were investigated for the purpose of drafting specifications. It is hoped to remedy the deficiencies experienced in the use of one or two dental plasters of overseas origin.

Work on the design and construction of several refractory test apparatuses was begun and is in progress. They include apparatuses for testing linear expansion, abrasion resistance, permeability to air, and thermal conductivity.

Part of the Section's time was spent on the testing of refractories against specification for manufacturers, and on the comprehensive comparative testing of refractories for the South African Railways Administration.

Tests continued in connection with the ryolithic lavas used in the manufacture of perlite lightweight aggregates.

Rubber and Plastics

As a result of increased test work on the insulated wires and cables inspected by the Bureau on behalf of the Department of Posts and Telegraphs, the Section's activities were considerably stepped up. The orders for 1957 amount to 8½ million yards as compared with 3½ million yards in 1956. The testing of inspection samples in connection with these orders was handled in conjunction with the Electrical Engineering Division.

Rubber

Test work of a varied nature was carried out to assist in the preparation of standard specifications for gum boots and materials for reconditioning tyres. Both specifications have reached their final stages and both will be important to the consumer.

Requests were received for the preparation of private specifications for rubber laboratory stoppers and tubing and vaccine stoppers. Others, covering rain coat material, are being drawn up in collaboration with the Textile Division.

New testing facilities were established for rubber hose, V-belts and rubber mattresses and will play a part in the development of standard specifications for these commodities.

Requests for tests covered a wide range of materials including ebonite moulded materials, conveyor belts, cables, gum boots, rubber soles and heels, and reclaimed rubber.

Plastics

Private specifications for polyvinylchloride (P.V.C.) table cloths and curtains were prepared. These materials are becoming increasingly popular for use in large establishments such as government hostels and welfare institutions. Work progressed on similar specifications for

gordyne vir hospitaalgebruik, gelamelleerde tafelblaaie, linoleumvloerbedekking en gevormde tafelfereedskap is voortgesit.

Standaardspesifikasiewerk is op polivinielchloried-vloerteëls en -tuinslange toegespits.

Brandstof en Smeerolie

Op versoek van die Suid-Afrikaanse Lugmag het die onderafdeling 'n skema van gereelde inspeksie by die Waterklooflugstasie ingestel om die gehalte van die brandstof te kontroleer wat vir gebruik in straalvliegtuie afgelewer word. Hierdie kontroleringskema wat nie veel kos nie, sal die geskiktheid van die brandstof vir hierdie duur soort vliegtuig gelewer, verseker.

'n Memorandum is vir die Departement van Handel en Nywerheid opgestel oor die gebruik en distribusie van sekere petroleumprodukte met inbegrip van nuwe petrol-grade, hidrouliese remvloeistowwe en spesiale enjinsmeer-olies.

Spesifikasiewerk is beperk tot die voltooiing van 'n spesifikasie vir swaardiensolies en die uitvoering van ontwikkelingswerk en toetse vir die spesifikasie vir smeermiddels vir draadkabels.

Vordering is gemaak met die uitwerking van 'n toets-tydtafel vir die Caterpillar-motor vir olie-onderzoek. Die resultate was belowend en hulle word nou gekorrigeer met toetsresultate wat vir dieselfde olië in oorsese laboratoriums verkry is.

Die toets van ghries is aangepak en spesiale aandag is bestee aan werkverrigtingstoetse en oksidasietoetse op lithiumghries. Hierdie toetse is van belang by die opstel van deeglike werkverrigtingspesifikasies vir hierdie produkte.

Talle versoeke is ontvang om produkte soos gebruikte olie, roeswende materiaal, besoedelde brandstowwe en defekte enjinonderdele te ondersoek. Laasgenoemde onderdele is ingestuur in gevalle waar defektering aan verkeerde smering toegeskryf is.

Kontroletoeetswerk op olie, ghries en remvloeistowwe wat kragtens die standaardmerkskema geproduseer is, het sy normale gang gegaan.

Verf

Nege private spesifikasies vir verskillende verfsorte is deur hierdie onderafdeling vir die Suid-Afrikaanse Seemag opgestel. Die opstel daarvan is aangevra om die aankoop van geskikte verf vir onderhoudswerk in Simonstad moontlik te maak, en hulle dek die grootste persentasie van die seemag se behoeftes op hierdie gebied.

Nog ander spesifikasiewerk wat vir private firmas voltooi is, het 'n kode omvat vir die skoonmaak, ontroesting en verf van 'n Baileybrug en 'n spesifikasie vir verf met 'n hoë sinkgehalte.

Roetinetoeetswerk het in aanmerklike mate toegeneem. Twee-en-neëntig monsters wat 767 toetse vereis het, is alleen in verband met kontrakwerk geneem. Talryke toetse is volgens private spesifikasies en met die oog op die opstel van standaardspesifikasies gedoen. Van altesame

thick P.V.C. curtains for use in hospitals, laminated table tops, linoleum flooring and moulded table ware. Work on standard specifications was concentrated on P.V.C. floor tiles and hose.

Fuels and Lubricants

A regular inspection scheme by the Section was instituted at Waterkloof Air Station at the request of the South African Air Force, to check the quality of fuel delivered for the use of jet aircraft. This inexpensive control scheme will ensure the suitability of the fuel supplied to this costly type of aircraft.

A memorandum on the use and distribution of certain petroleum products, including new grades of petrol, hydraulic brake fluids and special engine lubricants, was prepared for the Department of Commerce and Industries.

Specification work was confined to the completion of the standard for heavy duty oils and the carrying out of development work and tests for the standard for wire rope dressings.

Progress was made on developing a test schedule for the Caterpillar oil test engine. Results have been promising and correlations are being made with test results on the same oils, obtained in overseas laboratories.

Grease testing was undertaken, particular emphasis being laid on performance testing as well as on oxidation tests on lithium grease. These tests are of importance in the preparation of sound performance standards for these products.

Many requests were received for tests on products such as used oils, rust preventive materials, contaminated fuels and defective engine parts, the latter being submitted for examination in cases where failure has been ascribed to faulty lubrication.

Control testing of oil, grease and brake fluids manufactured under the standardization mark scheme proceeded normally.

Paints

Nine private specifications for various types of paint were prepared by the Section for the South African Naval Forces. Their preparation was requested to enable the purchase of suitable paints to be made for maintenance work at Simonstown, and they cover the greater percentage of the Navy's requirements in this sphere.

Further specification work completed on behalf of private firms included a code for the cleaning, de-rusting and painting of a Bailey Bridge and a specification for zinc rich paint.

There was a marked increase in routine test work. Ninety-two samples involving 767 tests were taken in connection with contract work alone. Numerous tests were carried out against private specifications and for the development of standard specifications. Of a total

1,289 monsters, waarop 2,475 toetse uitgevoer is, is 131 (wat 764 toetse vereis het) deur private firmas ingestuur.

Kontroletoepte op produkte wat kragtens die standaardmerkskema vervaardig is, het o.a. sinkchrompigmente, distempers, grondverf met 'n meniebasis en olyfgroen vermommingsmalje omvat.

Bitumens

Inspeksies van dakke bedek met vilt- en mastiksoorte het gewens verskaf, wat vir die verdere ontwikkeling van die standaardspesifikasies vir hierdie produkte, waardevol sal wees. Dit het ook die noodsaaklikheid vir toepaslike gebruikskodes vir die aanwending van hierdie materiale beklemtoon, want selfs goeie materiale bederwe vinnig as hulle sleg aangewend word.

Die gebruikskodes vir die waterdigting van geboue—veral die afdeling wat die waterdigting van plat dakke behandel—sal in 'n reeds lank gevoelde behoefte in die bouwyerheid voorsien.

Die inspeksie en toets van asfaltmastiek het getoon hoe beperk die voorrade verkrygbare mineraaltoeslae is, en die noodsaaklikheid vir die hersiening van die bestaande standaardspesifikasies beklemtoon. Hierdie werk is reeds aan die gang. Standaardspesifikasies vir kreesoot en kreesootmengsels is voltooi, en behoort veel by te dra om die voorradetoestand van hierdie handelsartikels op redelike voet te plaas. Die spesifikasie vir termoplastiese vloerteëls en 'n gebruikskode vir die lê van die teëls is ook voltooi.

Toetswerk vir spesifikasiedoeleindes is op monsters van voegdigtings vir elektriese toestelle en lasmengsels vir waterbehoudende strukture uitgevoer.

Versoeke om toetse het 'n groot verskeidenheid produkte gedek soos bv. bitumiese emulsies vir die lê van teerblaaie by lughawes vir die Departement van Verdediging, kleefmiddels vir die lê van houtblokkies vir vloere, en sand en vloeibitumen vir die fondament van olietanks.

Heelwat werk is verrig in verband met die toetsing van die duursaamheid en doeltreffendheid van bitumiese lae vir opgaardamme wat deur die Departement van Waterwese gebou word.

TEKSTIEL- EN KLERASIEAFDELING

Daar was 'n skerp styging in die hoeveelheid werk deur die Tekstiel- en Klerasieafdeling uitgevoer, hoofsaaklik ten opsigte van die jaartlengte wat ondersoek en getoets is—ongeveer 5,000,000 jaars vir die jaar—amper 'n verdubbeling van die syfer vir 1955. Dit is hoofsaaklik toe te skryf aan die feit dat inspeksies namens die Suid-Afrikaanse Spoorwegadministrasie uitgevoer is, alhoewel die hoeveelheid werk wat vir ander Staatsdepartemente en grootskaalse aankopers gedoen is, ook heelwat groter was.

Behalwe katoen- en wolstukgoedere soos kaliko, dril, denim, ruwe- en behandelde katoenseildoek, handdoekgoed, kamgaringstof, wolflennie en materiaal vir oorjasse, is aansienlike hoeveelhede ander artikels, nl. truië, sokkies, kouse, onderklere, hennep en katoenafval vir die

of 1,289 samples on which 2,475 tests were done, 131 (involving 764 tests) were sent in by private firms.

Control testing of products manufactured under the standardization mark scheme included zinc chrome pigments, distempers, red lead primers and olive green camouflage enamel.

Bitumens

Inspections of laid-up roofs, comprising felts and mastics, afforded information that will be valuable in the further development of standards for these products. It also emphasized the need for relevant codes of practice for the application of these materials, as even good materials will deteriorate rapidly if badly applied.

The code of practice for the waterproofing of buildings—particularly the section relating to the waterproofing of flat roofs—will fill a long-felt need in the building industry.

The inspection and testing of mastic asphalt revealed the limitations in the supply of available mineral aggregates and disclosed the need for a revision of the existing standards. This work is under way. Standards for creosotes and creosote mixtures were completed and should do much to rationalize the supply position for these commodities. The specification for thermoplastic tiles and a code of practice for the laying of the tiles were also completed.

Test work for specification purposes was carried out on samples of electrical joint sealing compounds and jointing compounds for water retaining structures.

Requests for tests covered a wide field of products such as bituminous emulsions for laying tarmac at aerodromes for the Department of Defence, adhesives for the laying of wood block flooring, and sand cut-back foundations for oil storage tanks. Extensive work was done on testing the durability and efficacy of bituminous coatings for storage dams under construction by the Department of Water Affairs.

TEXTILE AND CLOTHING DIVISION

There was a sharp rise in the volume of work dealt with by the Textile and Clothing Division, the main increase taking place in the yardage inspected and tested; this reached an annual rate of approximately 5,000,000 yards—almost double the figure for 1955 and was largely due to the introduction of inspections carried out on behalf of the South African Railways Administration, although the amount of work done for government departments and large-scale purchasers was also substantially greater.

In addition to cotton and wool piece goods, such as calico, drill, denim, loomstate and processed cotton duck, towelling, worsted materials, woollen flannel and overcoating material, quantities of other articles were inspected and tested, namely, jerseys, socks, stockings, undergarments, hemp twine, and cotton waste, for the Departments of Defence, Prisons, Health, Education and

Departemente van Verdediging, Gevangenis, Volks-
gesondheid, Onderwys, Landbou en die Suid-Afrikaanse
Polisie ook geïnspekteer en getoets. Produkte is ook vir
die Provinsiale Administrasies en die Transvaalse en
Vrystaatse Kamer van Mynwese getoets.

In vergelyking met vorige jare is al hoe meer analitiese
werk vir die Departement van Doeane en Aksyns gedoen.
Dit kan aan die toenemende oorsese gebruik van vesel-
mengsels toegeskryf word. Ontledings is ook vir die
Speurdiens van die S.A. Polisie uitgevoer.

Heelwat monsters tekstielgoedere is deur die inspek-
teurs van die Departement van Handel en Nywerheid
gemeem om die aanbring van merke wat die wolgehalte
aantoon, te kontroleer, en aan die Buro gestuur vir ont-
leding.

Spesifikasiewerk is goed gehandhaaf. Vooruitgang is
gemaak met standaardspesifikasies vir produkte soos
katoentyk, veerdigte kussings, geel stoffappe, katoen-
sokkies en -kouse, kamgaringdasmateriaal en behandelde
katoenseildoek vir motorseile, terwyl 'n aantal private
spesifikasies vir Staatsdepartemente en groot aankoop-
organisasies opgestel is. Private spesifikasies vir die sny,
maak en afwerk van hemde en uniforms vir ontvangs-
dames by die lughawes is ook opgestel.

Groot hoeveelhede monsters is vir plaaslike vervaar-
digers, handelaars en invoerders ontleed en getoets.



*Monsters materiaal word in die Tekstiellaboratorium
vir ligegtheid getoets.*

*Samples of material are tested for colour fastness to
light in the Textile Laboratory.*

Agriculture and the South African Police. Products
were also tested for the provincial administrations and
the Transvaal and Orange Free State Chamber of Mines.

Compared with previous years, an increased volume
of analytical work was done for the Department of
Customs and Excise. This can be attributed to the
growing use of fibre blends overseas. Many analyses were
also performed for the Criminal Investigation Depart-
ment of the South African Police.

Numerous articles were taken by inspectors of the
Department of Commerce and Industries in respect of
the wool-content marking of textile goods and were sub-
mitted to the Bureau for analysis.

Specification work was well maintained, progress
being made with standard specifications, while a large
number of private specifications were prepared for
government departments and large purchasing organiza-
tions, for such products as cotton ticking, featherproof
pillows, yellow dusters, cotton socks and stockings,
worsted tie cloth and processed duck for car dust-covers.
Private specifications were also drawn up for the cut,
make and trim of shirts, and for uniforms for airport
receptionists.

Large numbers of samples were analysed and tested
for local manufacturers, merchants and importers.

PHYSICS AND ELECTRICAL ENGINEERING DEPARTMENT

Increased activity was the keynote of the period under
review.

A noticeable development was that the interest shown
in standardization and testing, which has formerly been
confined to consumer articles, showed a trend towards
heavy equipment. This could be readily observed in
the work of both Divisions.

Non-destructive Testing

The methods and use of this form of testing have
become so widely accepted that more attention will have
to be given to achieving agreement on certain standard
procedures for testing and for the interpretation of re-
sults. This work is in hand and the preparation of two
standards is in progress.

The Section was extremely active, the industrial X-ray,
magnetic and ultrasonic testing requirement of the
mining and sugar industries and the large industrial
concerns such as SASOL, ISCOR, VECOR, making full
use of its facilities. Work was also done for the Depart-
ment of Defence.

Its acceptance testing services were also utilized by
the Rhodesians, tests on steel structures being carried
out for firms in both Northern and Southern Rhodesia.

A visit was also paid to Rhodesia for the purpose
of conducting tests at a cement factory. At the request

DIE DEPARTEMENT FISIKA EN ELEKTROTEGNIK

Toenemende aktiwiteit was die hoofkenmerk van die onderhawige tydvak.

'n Opvallende ontwikkeling is dat die belang in standaardisering en toetswerk wat vroeër tot verbruiksartikels beperk was, tans na swaar toerusting oorslaan. Dit was goed merkbaar in die werk van albei die Afdelings.

Nie-vernietigende Toetse

Die gebruik van hierdie soort toetsmetode het al so algemeen ingang gevind dat meer aandag aan die bereiking van ooreenstemming omtrent sekere standaardtoetsprosedures en interpretasie van resultate gegee moet word. Hierdie werk is reeds aangepak en die voorbereiding van twee standaardspesifikasies is aan die gang.

Die Afdeling was uiters bedrywig. Die myn- en suikernywerhede en groot bedrywe soos SASOL, YSKOR en VECOR het volle gebruik gemaak van die Afdeling se fasiliteite vir die toets van X-straal-, magnetiese en ultrasone vereistes. Werk is ook vir die Departement van Verdediging uitgevoer.

Ook die Rhodesiërs het van sy aannametoetsdienste gebruik gemaak. Toetse op staalstrukture vir firmas in Noord- sowel as Suid-Rhodesië is uitgevoer.

'n Besoek is ook aan Rhodesië afgelei met die doel om toetse by 'n sementfabriek uit te voer. Op versoek van die Federasie regering sal daar in Mei weer 'n besoek aan dié gebied gebring word.

Noudat bekend geword het dat nie-vernietigende toetsfasiliteite by Durban beskikbaar is, word skepe na hierdie hawe afgelei. 'n Ingenieur wat aan 'n vooraanstaande Britse skeepvaartfirma behoort en wat uitgestuur is om toesig te hou oor die reparasiewerk aan 'n skip se masjinerie, het die tegnisi van die Buro se kantoor op Durban gelukkig met die voortrefflikheid van die radiografiese werk deur hulle uitgevoer.

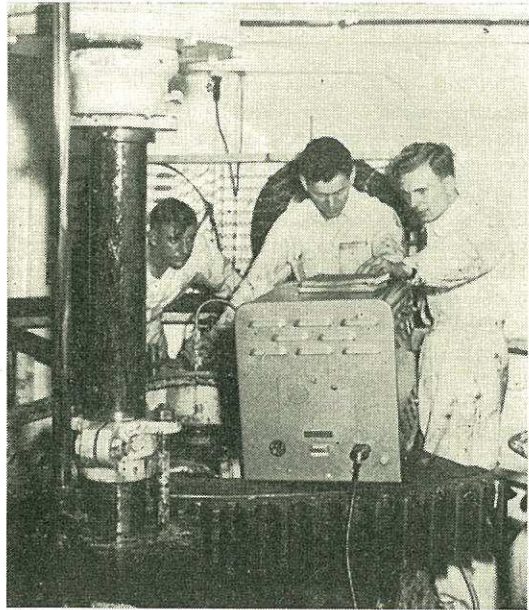
Vlamdigte en Wesenlike Veiligheid

Dit is duidelik dat baie werk gedoen sal moet word voordat die verbruikers van vlamdigte en wesenlik veilige elektriese masjinerie die implikasies en vereistes van die masjiene wat in gevaarlike omgewings gebruik word, volkome sal verstaan. Spesifikasies wat baie tot die bereiking van hierdie doel sal bydra, word opgestel en sal binnekort vir kommentaar omgestuur word.

Gedurende die onderhawige tydvak was daar 'n merkwaardige styging in die belangstelling vir die onderwerp van vlamdigte en wesenlik veilige masjinerie. Die Hoofinspekteur van mynmasjinerie verwys nou vervaardigers en invoerders direk na die Buro vir die toets van hulle uitrusting voordat hy sy finale toestemming gee vir die gebruik daarvan in gasryke myne. Die Departement van Arbeid lê nou lewendige belangstelling vir hierdie saak aan die dag en hospitale maak toenemende gebruik van die

of the Federation Government a further visit will be paid in May.

Ships are being diverted to Durban for repairs now that it has become known that non-destructive testing facilities are available at this port. An engineer belonging to a prominent British shipping firm and sent out to supervise repairs to a ship's machinery, complimented the technical staff of the Bureau's Durban Office on the excellence of the radiographic work carried out by them.



Ultrasonic examination of gears of rudder stock in a whaler in dry dock at Durban.

Ultrasoniese ondersoek van dryfratte van die roerkoning van 'n walvisvaarder in die Durbanse droogdok.

Flameproof and Intrinsic Safety

It has become very clear that much work will have to be done before users of flameproof and intrinsically safe electrical machinery fully understand the implications and requirements of the machines to be used in hazardous atmospheres. Specifications that will greatly assist in furthering this end are in course of preparation and will shortly be circulated.

During the period reviewed there was a phenomenal rise in the interest shown in the subject of flameproof and intrinsically safe machinery. The Chief Inspector of mining machinery now refers all manufacturers and importers directly to the Bureau for the testing of their equipment before he gives his final permission for its use in fiery mines. The Department of Labour is also displaying a keen interest in the matter, and hospitals

afdeling se fasiliteite om veiligheid in operasiesale te verseker.

Elektronika

By die gereelde yking van audiometers het baie duidelik geblyk dat daar behoefte aan 'n nasionale standaard vir die stelling van hierdie instrumente bestaan, maar aangesien internasionale aanbevelings waarskynlik binnekort die lig sal sien, is geen verdere stappe gedoen nie. Ondertussen word 'n opname gedoen om 'n noukeuriger beeld van die toestand in Suid-Afrika te verkry.

Die Afdeling het hom verder besig gehou met projektors vir skoolgebruik van tyd tot tyd te toets; nuttige gebruik is van die ondervinding wat gedurende die afgelope drie jaar in verband hiermee opgedoen is, gemaak by die opstel van 'n hersiene spesifikasie vir hierdie artikels. Oorsese fabrikante het groot belangstelling in hierdie werk aan die dag gelê en was baie bereidwillig om saam te werk deur projektors aan Suid-Afrika te lewer wat aan die vereiste standaard voldoen. Nieuwe samewerking met die Filmdiensafdeling van die Departement van Onderwys, is ook gehandhaaf.

Die inwerkingtrekking van die anti-steuringsregulasies kragtens die Radiowet het 'n stroom navrae deur fabrikante van elektriese toestelle en groothandelaars uitgelok. Groot moeite is ondervind om prysopgawes vir geskikte toetsvoerusting te verkry en tot nog toe is nog niks aangeskaf nie. Hierdie moeilikheid is toe te skrywe aan die feit dat die hele aangeleentheid op die oomblik internasionale aandag geniet en dat nog geen ooreenkoms in verband met aanneemlike toetsmetodes bereik is nie.

Werk i.v.m. basiese spesifikasies waarop verdere standaardspesifikasies vir gebruik in Suid-Afrika se klein maar groeiende elektronikanywerheid gegrond sal wees, is nog aan die gang.

Fotometrie

Toetswerk op verskeie lampsoorte wat in Suid-Afrika vervaardig is, het hierdie Afdeling voltyds besig gehou. Die hoeveelheid werk het gestadig toegeneem en dui daarop dat dit miskien wenslik sal wees om spesifikasies vir ander lampsoorte as die algemene dienstipes wat reeds deur spesifikasies gedek word, in te voer.

'n Permanente installasie vir die toets van skakelbordlampe vir die Departement van Pos-en-telegraafwese is tans gebou. Die Departement maak gebruik van hierdie diens as 'n middel om die gehalte van die lampe wat kragtens tenders gelever word, te kontroleer.

Soortgelyke toetse is ook vir die Suid-Afrikaanse Spoorwegadministrasie gedoen, en vir sommige van hulle vereistes was uitbreiding van huidige toerusting nodig.

Die publikasie van wysigings van verskeie provinsiale ordonnansies, wat die aanbring van trukaatsers vanaf 1 Julie 1957 verpligtend maak, het so baie werk veroorsaak dat reëlins tans getref word om die toerusting so uit te brei dat sy toetsvermoë verviervoudig word. Goeie korre-

are making increasing use of the Section's facilities for ensuring safety in operating theatres.

Electronics

Regular calibrations of audiometers were carried out. The need for a national standard for the adjustment of these instruments has become very clear but, because international recommendations may be issued in the near future, the matter has been left in abeyance. In the interim, a survey is being made in order to assess the position in South Africa more accurately.

The periodical testing of projectors for school use was a further activity, the experience gained during the past three years being put to good use in the preparation of a revised specification for these articles. Overseas manufacturers have shown great interest in this work and have been very co-operative, showing keenness to supply South Africa with projectors made to the required standard. Close co-operation has also been maintained with the Film Services Section of the Department of Education.

The coming into force of the anti-interference regulations of the Radio Act precipitated a considerable volume of enquiries from manufacturers and wholesalers of electrical appliances. Great difficulties have been experienced in getting quotations for suitable test equipment and as yet none has been acquired. This difficulty can be ascribed to the fact that the whole question is receiving critical attention on an international level, no final agreements having as yet been reached on acceptable test procedures.

Work continued on basic specifications on which further standard specifications applicable to South Africa's small but growing electronics industry will be based.

Photometry

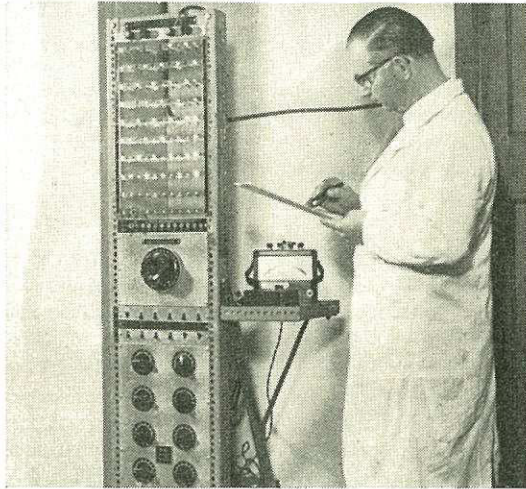
Test work on several brands of lamps manufactured in South Africa proved to be a full-time activity for this Section. The volume of work increased steadily and the indications are that it may be desirable to introduce specifications for lamps other than the general service types at present dealt with.

A permanent installation has now been built for testing switchboard lamps for the Department of Posts and Telegraphs which makes use of this service as a means of checking the quality of lamps delivered against tenders. Similar tests were also done for the South African Railways Administration, and for some of their requirements, extensions and additions to present equipment were necessary.

The publication of the amendments to the various provincial ordinances, making the fitting of retro-reflectors compulsory as from 1st July, 1957, precipitated such a volume of work that plans are now in hand for extensions to the equipment to quadruple its testing

lasie tussen die Buro se toetsresultate en die van Teddington op dieselfde truukaatsers is verkry. Ons het dus rede om aan te neem dat die plaaslike toetsresultate so goed is as wat verwag kan word op 'n gebied waarin noukeurige metings geweldig moeilik verkrygbaar is.

Minstens twee Suid-Afrikaanse vervaardigers het daarin geslaag om truukaatserslense te maak wat aan die Buro se spesifikasies voldoen. Hierdie produkte sal waarskynlik aanstaande jaar in die handel verkrygbaar wees. Suid-Afrika kan trots wees op die feit dat sekere van



Met hierdie masjien wat deur die Instrumente-afdeling van die S.A.B.S. ontwerp en gebou is, kan telefoon- en skakelbordaanslyslampe getoets word in minder as die helfte van die tyd wat vroër daardeur in beslag geneem is.

Designed and built by the Instrument Section of the S.A.B.S., this machine more than halves the time for testing telephone and switchboard indicator lamps.

die monsters wat getoets is, baie beter as dergelike oorsese produkte is. Sonder die toetsfasiliteite wat deur die Suid-Afrikaanse Buro vir Standaarde verskaf word, sou vooruitgang in die ontwikkeling van hierdie truukaatsers ernstig belemmer gewees het.

Die afdeling berei nou sekere wysigings vir die spesifikasie vir truukaatsers voor, en is besig met die opstel van 'n gebruikskode vir straatverligting waarin oor die hele land groot belangstelling getoon word.

AFDELING ELEKTRIESE INGENIEURSWESE

Van spesiale belang is die hulp wat deur nywerhede verleen is i.v.m. die standaardisering van toerusting soos transformators en motore. Standaardisering sal 'n vereenvoudiging in die primêre nywerhede meebring en sal vervaardigers van porseleinartikels en -isolators in staat stel om die reeks isolators, wat onder die bestaande omstandighede vervaardig moet word, te verklein.

capacity. Good correlation was obtained between the Bureau's test results and those of Teddington on the same reflectors. There is thus reason to believe that the local test results are as good as can be expected in a field in which accurate measurements are notoriously difficult to achieve.

At least two South African manufacturers have succeeded in making reflector lenses which comply with the Bureau's specification and the coming year should see these on the market. South Africa may be proud of the fact that certain of the samples tested were far superior to many overseas equivalents. Without the testing facilities provided by the South African Bureau of Standards, progress on the development of these reflectors would have been severely hampered.

The Section is at present preparing certain amendments to the specification for retro-reflectors and is engaged in the preparation of a code of practice for street lighting in which a great deal of national interest is being displayed.

ELECTRICAL ENGINEERING DIVISION

A point of particular interest was the support received from industry for the standardization of equipment such as transformers and motors. Standardization will bring about simplification in the feeder industries and will enable manufacturers of ceramics and insulators to reduce the range of insulators that have to be produced under present conditions.

A considerable amount of work was done for the International Electrotechnical Commission in connection with the formulation of its recommendations, particularly valuable work being done on the international electro-technical vocabulary, on which the Afrikaans Vocabulary is based.

Electrical Appliances

Work in connection with the testing of domestic electrical appliances showed a steady increase. A permit to use the standardization mark on his product was granted to a manufacturer of domestic electric irons, while two further permits were issued to manufacturers of immersion heaters for use on electric water heaters. The number of permits to use the mark now granted to manufacturers of domestic electrical appliances totals 23. A considerable amount of control testing under the mark scheme is thus involved and the major part of the Section's time was taken up by routine inspection and testing.

The specification for oven thermostats for electric stoves was completed and progress made with the revision of the specifications for water heaters and for electric stoves and hotplates. Of particular interest in the latter specification was the work done to establish a suitable clause for proving the baking qualities of the ovens. This matter will be further pursued, even when the revised specification has been published.

'n Aansienlike hoeveelheid werk is vir die Internasionale Elektrotegniese Kommissie gedoen i.v.m. die formulering van sy aanbevelings. Besonder waardevolle werk word ook i.v.m. die internasionale elektrotegniese woordelys, waarop die Afrikaanse Woordelys gebaseer is, gedoen.

Elektriese Toestelle

Die werk in verband met die toets van elektriese toestelle vir huishoudelike gebruik het gestadig toegeneem. 'n Permit om die standaardmerk op sy produk aan te bring, is aan 'n fabrikant vir huishoudelike elektriese strykysters verleen, terwyl nog twee perмите aan fabrikante van dampelverwarmers vir gebruik aan elektriese waterverwarmers uitgereik is. Op die oomblik is daar in die geheel 23 perмите om die merk aan te bring, aan fabrikante van elektriese toestelle vir huishoudelike gebruik uitgereik. Dit bring heelwat kontroletoetswerk kragtens die merkskema mee en die grootste deel van die Afdeling se werk is deur roetine-inspeksies en toetse in beslag geneem.

Die spesifikasie vir oondtermostate vir elektriese stowe is voltooi en vordering is gemaak met die hersiening van die spesifikasie vir waterverwarmers en dié vir elektriese stowe en verwarmingsplate. Die werk i.v.m. laasgenoemde spesifikasie om 'n geskikte klousule op te stel om die bakvermoë van die oond te bepaal, is van besondere belang. Hierdie aangeleentheid sal nog verdere aandag geniet, selfs wanneer die hersiene spesifikasie reeds uitgegee is.

Bedradingshulpstukke

'n Permit om die standaardmerk te gebruik is aan twee fabrikante van muurskakelaars, een fabrikant van skakelaarbuskontakdose en een fabrikant van toestelleiers uitgereik. Talryke toetse is uitgevoer vir ander fabrikante van hierdie produkte wat aansoek om toestemming tot die gebruik van die merk wil doen. Dit is bemoedigend om die vooruitgang op hierdie belangrike gebied waar te neem. Daar word al hoe meer bedradingshulpstukke volgens die Buro vir Standaarde se spesifikasie vervaardig en volkome voldoening aan die Bedradingsregulasies sal binnekort moontlik wees.

In sy hoedanigheid van lid van die Komitee vir Veiligheidsmaatreëls het die Buro vir Standaarde 'n begin gemaak met 'n ondersoek na die aangeleentheid van aarding vir veiligheid aangesien dit die Bedradingsregulasies raak. Toetse is uitgevoer op bestanddele wat nie deur spesifikasies gedek word nie, om vas te stel of hulle aan die vereistes van die Goedkeuringskomitee van die Vereniging van Munisipale Ondernemings voldoen.

Kabels

As gevolg van die oorsese reis van die hoof van die Afdeling is besluit om die bestek van die spesifikasie vir kabels met 'n isolering van gevulkaniseerde rubber vir gebruik onder middelmatige spanning, wat op die oom-

Wiring Accessories

Permits to use the standardization mark were granted to two manufacturers of wall switches, one manufacturer of switch socket-outlets and one manufacturer of apparatus conductors. Numerous tests were carried out for other manufacturers of these products wishing to apply for use of the mark. It is encouraging to note the progress made in this important sphere. More and more wiring accessories are being made to the Bureau of Standards specification and complete compliance with the Wiring Regulations will soon be possible.

In its capacity as member of the Safety Precautions Committee, the Bureau of Standards initiated investigations into the question of earthing for safety, as this affects the Wiring Regulations. Tests were carried out on components not covered by specifications against the requirements of the Approvals Committee of the Association of Municipal Undertakings.

Cables

As a consequence of the overseas visit paid by the head of the Division, it was decided to extend the scope of the specification for medium voltage vulcanized rubber insulated cables, at present under revision, to include cables made from the latest types of synthetic rubbers.

The specification for P.V.C. insulated cables was completed. It is a matter for gratification that large sections of this specification were taken over and included in the recommendations of the Commonwealth Standards Conference.

The fact-finding committee appointed to investigate the troubles experienced with 11 Kv paper insulated cables in South Africa recommended that, when the specification for these cables is revised, two types of 11 Kv cable should be included, one based on the present type and the other with additional core insulation. Here again the Commonwealth Standards Conference followed the Bureau of Standards' lead in its recommendation.

Tests and inspections on an increasing scale were carried out for the Department of Posts and Telegraphs, occupying a great deal of the Section's time and necessitating the acquisition of additional testing equipment.

Meters and Instruments

Numerous commercial grade energy meters were calibrated for various local authorities and other large consumers of electric power. Precision grade instruments were calibrated for private firms and for other departments of the Bureau.

In addition to this routine work, an investigation of the electrical resistivity of arc furnace electrode material was conducted at the request of a large private firm. A series of tests was done for which specialized apparatus and measuring techniques had to be devised, and very satisfactory results were obtained.

blik hersien word, so uit te brei dat dit ook kables wat van die jongste tipes kunsmatige rubber gemaak is, insluit.

Die spesifikasie vir kables met 'n PVC-isolering is voltooi. Dit is 'n verheugende feit dat groot stukke van hierdie spesifikasie deur die Standaardekonferensie van die Gemeenebes oorgeneem is en deel van hul aanbevelings vorm.

Die feiteversamelingskomitee wat aangestel is om die moeilikheid wat in Suid-Afrika i.v.m. 11-Kv-kables met papierisolering ondervind word, te ondersoek, het aanbeveel dat by die hersiening van die spesifikasie vir hierdie soort kables, twee tipes 11-Kv-kables ingesluit behoort te word, een gebaseer op die huidige tipe en die ander met addisionele aard-isolering. Ook in hierdie opsig het die Standaardekonferensie van die Gemeenebes by hul aanbevelings die Buro vir Standaard se voorbeeld gevolg.

Al hoe meer toetse en inspeksies is vir die Departement van Pos-en-telegraafwese uitgevoer; hierdie werk het 'n groot deel van die afdeling se tyd in beslag geneem en die aanskaffing van bykomstige toetstoerusting nodig gemaak.

Meters en Instrumente

'n Groot aantal energiemeters van die handelsgraad is vir verskillende plaaslike besture en ander groot verbruikers van elektriese krag geëyk. Presisie-instrumente is vir privaat firmas en ander afdelings van die Buro geëyk.

Buiten en behalwe hierdie roetinewerk is op versoek van 'n groot private firma die soortlike weerstand van die elektrodemateriaal van vlamhoogoonde ondersoek. 'n Reeks toetse is uitgevoer waarvoor spesiale apparate en meetmetodes ontwerp moes word, en baie bevredigende resultate is verkry.

Batterye en Droë Selle

'n Voorlopige ondersoek in verband met 'n spesifikasie vir batterye vir motorfietsse en bromponies is uitgevoer en 'n konsep spesifikasie is tans opgestel. Aangesien daar geen konsep van die Internasionale Elektrotegniese Kommissie beskikbaar was nie, is hierdie spesifikasie op Amerikaanse gebruik en op die hersiene Suid-Afrikaanse spesifikasie vir motorvoertuigbatterye gebaseer. Die toetse kom noukeurig met normale gebruik ooreen en is ontwerp om die beste resultate te verkry wat met betroubaarheid en noukeurigheid verenigbaar is. Verdere ontwikkelingswerk met hierdie doel voor oë is aan die gang.

Die hersiene spesifikasie vir loodsurbatterye vir motorvoertuie is voltooi.

Roetinekontroletoetswerk op produkte kragtens die standaardmerkskema vervaardig, is voortgesit, en daaruit het geblyk dat die hoë kwaliteit van hierdie produkte gehandhaaf is.

Toetse is op 'n groot aantal tipes primêre batterye uitgevoer en planne is gemaak om semi-outomatiese panele vir hierdie toetse te bou.

Batteries and Dry Cells

Preliminary investigations in connection with a specification for motor cycle and motor scooter batteries were carried out and a draft specification has now been prepared. As no draft was available from the International Electrotechnical Commission, this specification is based on American practice and on the revised South African standard for motor vehicle batteries. The tests conform closely to normal usage and are designed to obtain the speediest possible results compatible with reliability and accuracy. Further development work for this purpose is under way.

The revised specification for lead acid batteries for motor vehicles was completed.

Routine control testing of products manufactured under the standardization mark scheme continued and it should be noted that the high quality of these products was maintained.

Tests were done on many different types of primary batteries and plans have been made to build semi-automatic panels for these tests.

High Voltage Laboratory

Increased use of the testing facilities of this laboratory was a feature of the period reviewed, the types of equipment and material tested (including cable end boxes, bushings and cables), covering a very wide range.

As a result of the many requests received from transformer manufacturers for impulse tests on their products, the testing equipment was enlarged in order to expedite these tests and to enable them to be carried out on a production basis. Other requests for tests received indicate that impulse tests will have to be extended to include current and potential transformers. A further development of the Section's activities was the witnessing of transformer tests at manufacturers' own works on behalf of customers, at the latter's request.

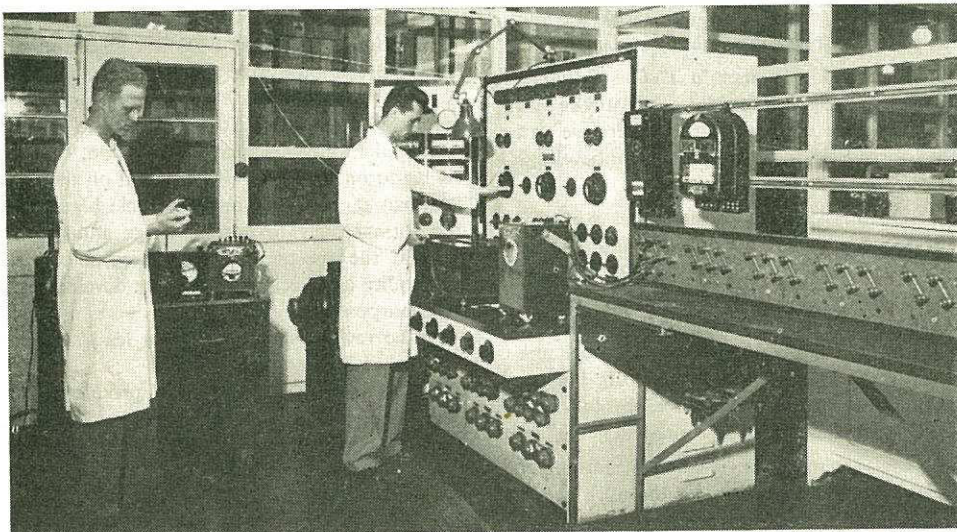
Work continued on the inspection of telephone insulators for the Department of Posts and Telegraphs and on the routine and type testing of locally manufactured power insulators and bushings and lightning arresters.

Electrical Machines

Progress was made with the revision of the specifications for miniature circuit breakers for domestic installation and for the protection of electric motors, and it has become clear that their scope will have to be widened to cover miniature circuit breakers having ratings and rupturing capacities much higher than those covered by the existing specifications.

Control testing was carried out on miniature circuit breakers manufactured under the standardization mark scheme and tests were also conducted on behalf of manufacturers for development purposes.

It has become obvious that the short-circuit facilities at present available will have to be extended to cater for



Kalibrering van 'n driefasige elektrisiteitsmeter.

Calibration of a three-phase meter.

Hoogspanningslaboratorium

Die onderhawige tydperk is gekenmerk deur toenemende gebruik van die toetsfasiliteite van hierdie laboratorium, waarin 'n baie groot verskeidenheid toerusting en materiale (met inbegrip van kabelentkassies, busse en kables) getoets is.

As gevolg van die groot aantal versoeke van transformatorfabrikante ontvang om stootspanningstoetse op hul produkte te doen, is die toetstoerusting uitgebrei ten einde hierdie soort toetse gouer te kan doen en hulle op 'n produksiebasis te kan uitvoer. Ander versoeke om toetse uit te voer, dui daarop dat stootspanningstoetswerk so uitgebrei sal moet word dat dit ook stroom- en spanningstransformators omvat. Nog 'n ontwikkeling van die afdeling se werksaamhede was die waarneming van transformatorstoetse in fabrikante se eie fabriekse namens klante.

Die afdeling het nog steeds voortgegaan met die inspeksie van telefoonisolators vir die Departement van Pos-en-telegraafweese en met die roetine- en tipetoetsing van plaaslik vervaardigde kragisolators en busse en bliksemafleiers.

Elektriese Masjiene

Die hersiening van die spesifikasies vir miniatuurstroomverbrekers vir huishoudelike installasies en vir die beskerming van elektriese motore het goed gevorder, en dit het duidelik geblyk dat hul bestek uitgebrei sal moet word sodat dit ook miniatuurstroomverbrekers omvat wat 'n ontwerp- en verbrekingsvermoë het wat baie hoër is as dié deur die bestaande spesifikasie gedek.

the larger circuit breakers being manufactured in this country and for establishing the overcurrent factors of current transformers also being produced locally. A survey of the probable requirements for the next few years is being made before a decision is made on the ultimate capacity of the new test station.

A start was made on the standardization of distribution transformers and induction motors.

MECHANICAL AND CIVIL ENGINEERING DEPARTMENT

An increased demand for the services of both Divisions was very noticeable. These demands applied not only to the standardizing aspect of the work but also to the laboratory facilities and inspection services offered by the two Divisions, of which government departments, provincial administrations, local authorities and large-scale purchasers make full use.

The trend in industry to use more testing and measuring equipment has resulted in wider utilization of the mechanical engineering laboratories for calibrating purposes. During the period under review the desire of industrialists to ensure accuracy and the proper functioning of their own equipment was, in fact, most marked.

An increasing number of requests were received for the inspection service offered by the Department, whereby the Bureau certifies acceptance of goods at manufacturers' premises on behalf of large-scale buyers.

Kontroletoepte is uitgevoer op miniatuurstroomverbrekers ooreenkomstig die standaardmerkskema vervaardig en ook is toetse namens fabrikante gedoen vir uitbreidingsdoeleindes.

Dit het duidelik geblyk dat die kortsluitingsfasiliteite wat op die oomblik beskikbaar is, uitgebrei sal moet word om ook voorsiening vir die groter stroomverbrekers wat hier te lande vervaardig word, te maak en om die oorstroomfaktore van plaaslik vervaardigde stroomtransformators te bepaal. 'n Opname van die waarskynlike vereistes vir die volgende paar jaar word gedoen alvorens oor die uiteindelige kapasiteit van die nuwe toetsstasie beslis word.

'n Begin is met die standaardisering van distribusie-transformators en induksiemotore gemaak.

DEPARTEMENT VAN WERKTUIGKUNDIGE EN SIVIELE INGENIEURSWESE

Daar was 'n opmerklieke toename in die aanvraag om die dienste van albei hierdie afdelings. Hierdie aanvraag het nie alleen in verband gestaan met die standaardiseringsaspek van die werk nie, maar ook met die laboratoriumfasiliteite en inspeksiedienste wat deur die twee Afdelings gebied word en waarvan ten volle deur Staatsdepartemente, Provinsiale Administrasies, plaaslike besture en grootskaalse aankopers gebruik gemaak word.

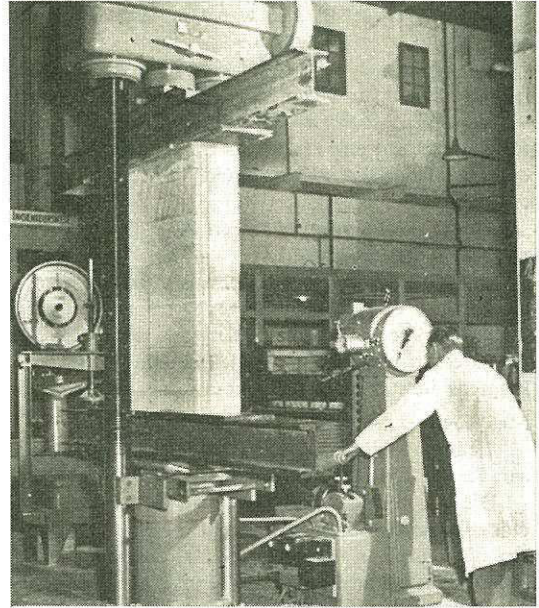
Die neiging in die nywerheid om meer gebruik te maak van toets- en meetinstrumente het daartoe gelei dat op groter skaal gebruik gemaak word van die werktuigkundige laboratoriums vir kalibreerdoeleindes. Gedurende die onderhawige tydvak het nyweraars 'n opmerklieke begeerte getoon om noukeurigheid en behoorlike werkverrigting van hulle eie toerusting te verseker.

Al hoe meer versoeke om inspeksiedienste, wat deur die Departement aangebied word, is ontvang, waarby die Buro, names grootskaalse aankopers, die aanname van goedere by die fabriek sertifiseer.

Werktuigkundige Laboratorium

Gedurende die onderhawige tydvak het die Werktuigkundige Laboratorium 282 toetsverslae uitgereik. Baie van hulle het toetse van nasionale belang gedek. Die werk het 'n groot verskeidenheid getoon, en het ook onwaarskynlike ingenieursweseprojekte soos bv. polvyne vir dameskoene en masjiene vir die maak van koffie ingesluit.

Die laboratorium se hulp is dikwels ingeroep om vergelykingstoetse op produkte gedek deur tenders vir organisasies soos die Suid-Afrikaanse Spoorwegadministrasie, Yskor, die Suid-Afrikaanse Polisie en die Departement van Publieke Werke, uit te voer. Die uitvoering van sulke toetse vorm 'n daadwerklike bydrae tot die volkshuishouding omdat daar gewoonlik heelwat staatsgeld met sulke tenders gemoed is. Onder die goedere wat op hierdie manier getoets is, was daar druklugboormasjiene, omheiningsmateriaal, skuurlinne en kantoormeubels. Soortgelyke toetse is op kleiner skaal vir individuele



A wallette of blocks built without mortar is tested for compressive strength in the S.A.B.S. Civil Engineering Laboratory.

'n Muurtjie van blokke sonder mortel gebou, word in die S.A.B.S. se Siviele Ingenieurswese Laboratorium vir druksterkte getoets.

Mechanical Laboratory

During the period reviewed the Mechanical Laboratory issued 282 test reports, many of them covering tests of national importance. The work showed great variety including tests on such unlikely engineering projects as heels for ladies shoes and coffee-making machines.

On many occasions the Laboratory was called upon to perform comparative tests on products in respect of tenders for organizations such as the South African Railways Administration, Iscor, the South African Police and the Public Works Department. As these tenders usually involve considerable sums of public money the conducting of such tests constitute a very definite contribution to the national economy. Articles tested in this manner included pneumatic drilling machines, fencing material, emery cloth and office furniture. Similar tests were performed on a smaller scale for individuals, on spanners, reinforcing steel and gear wheels.

The tests carried out on behalf of heavy industry included vibration tests of machinery at plants producing uranium and processing asbestos.

persone op skroefsleutels, wapeningstaal en kamratte uitgevoer.

Die toetse wat vir die swaar nywerheid uitgevoer is, het triloetse op masjinerie by ondernemings wat uraan vervaardig en asbes verwerk ingesluit. Ook swawelsuurtenks is getoets en verskeie toetse is uitgevoer om die oktaan- of setaangetal van brandstof vir motorvoertuie te bepaal.

Verder is 43 toetsmasjiene en 28 drukmeters vir die nywerheid opnuut geëyk.

Die gebruiklike kontroletoetse is uitgevoer op sweis-elektrodes, elektriese waterverwarmers, waterkrane, pyphulpstukke van smeebare gietyster, elektriese geleierbuisse, elektriese kables en telefoondraadmateriale wat kragtens die standaardmerkskema vervaardig is.

Metrologie

Gedurende die onderhawige tydvak is 122 toetsverslae aan vervaardigers en staatsdepartemente uitgereik.

Die verskillende tipes werk wat gedoen word, is 'n duidelike bewys dat die nywerheid van die belangrikheid van die yking van toerusting en die toets van afmetings bewus word. Die belangrikste toetse wat uitgevoer is, omvat o.a. die kontrolering van gewone skroef-, tapsheid-, ring-, en propykmate en die kalibrering van ykmete, mikrometers en wysermeters. Ook is toetse op krukasse, nokasratte, viskosimeters, krane, snyblokke en ratte uitgevoer.

Sulphuric acid tanks were also tested and several tests were conducted to determine the octane or cetane ratio of fuel for motor vehicles.

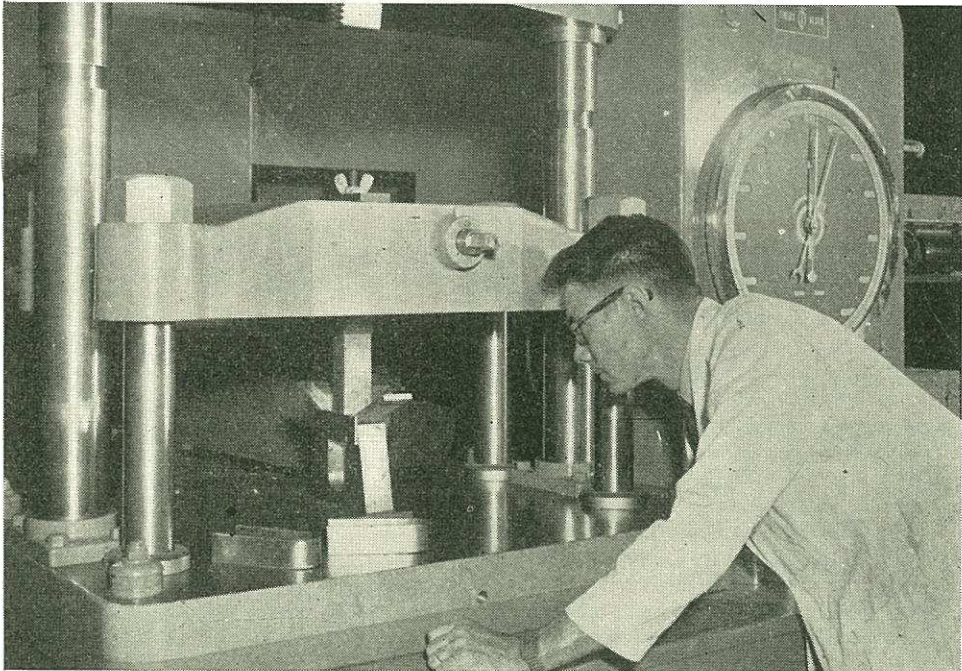
A further service to industry was the re-calibration of 43 testing machines and 28 pressure gauges.

Control tests continued on welding electrodes, electric water heaters, water taps, malleable cast iron pipe fittings, electric conduit, electric cables and telephone line materials manufactured under the standardization mark scheme.

Metrology

During the period under review 122 test reports were issued to manufacturers and government departments.

From the nature of the different types of work done, it appears that the importance of equipment calibration and dimensional testing is becoming evident to industry. Among the more important tests conducted were the checking of all types of gauge, namely, plain, screw, taper, ring and plug; the calibration of gauges, micro-meters and dial indicator gauges; and tests on crank-shafts, cam gear, viscometers, taps, dies and gears.



'n Buigtoets deur 180° op gesweiste sagte-staalplate word in die Werktuigkundige Laboratorium uitgevoer.

180° bend test on welded mild steel plates is carried out in the Mechanical Engineering Laboratory.

Gereelde kontrole-inspeksies en toetse is uitgevoer op goedere wat kragtens die standaardmerkskema vervaardig is. Hierdie sluit in hospitaaluitrusting, staalbuis-skoolmeubels, lêerkaste, isolatorsteunpenne, boute en moere.

'n Duidelike verbetering in die gehalte van produksie is opgemerk.

Verpakking

Daar is goeie vordering gemaak met die program vir die opstel van spesifikasies vir verpakkings vir gevaarlike artikels anders as plofstowwe. Hierdie projek is bestem om as basis te dien vir die bepaling van die geskiktheid van verskillende soorte verpakkings vir gevaarlike goedere vir vervoer met openbare vervoermiddels en vir die toets van alternatiewe metodes vir die verpakking van sulke artikels.

Die gebruikskode i.v.m. die kleurmerking van silinders wat mediese gas bevat, en van narkose-apparate is hersien, om hom te laat aanpas op onlangse voorstelle deur die Internasionale Standaardiseringsorganisasie (ISO) i.v.m. merking gedoen. Die meeste lande het reeds ingestem om die voorstelle aan te neem. Nakoming van die voorgestelde merkingskema is belangrik aangesien dit verwarring sal uitskakel by die vul en gebruik van silinders wat mediese gas bevat, veral op seeskepe en burgerlike vliegtuie, en wanneer die nodige aan silinders uit vreemde lande gedoen moet word.

'n Houkissie vir die verpakking van los geweerlope is vir die Krygsproduksiekantoor gewysig, en 'n metode vir beskerming van die lope teen roes met behulp van 'n warm indopingsmiddel is ondersoek en aanbeveel. In samewerking met Luggroep No. 3 is 'n spesifikasie opgestel vir suurstofsilinders vir militêre vliegtuie en 'n gebruikskode vir die onderhoud van sulke silinders.

Toetswerk in die laboratoriums was hoofsaaklik beperk tot ondersoek van die kwaliteit van geriffelde veselborddose vir springpatrone en 5-wandige papiersakke vir kunsmis.

Onder die ander produkte wat in die laboratoriums getoets is, was daar gevormde eierlaaie van pulp; poliëtileen karba's met 'n inhoudsmaat van 5 gallon, in ligte staaldromme; pakpapierjies vir sitrus; kaarte vir gebruik in rekenmasjiene; en baie ander handelsartikels.

AFDELING SIVIELE INGENIEURSWESE

Die betrokke tydperk is gekenmerk deur 'n merkwaardige uitbreiding van die dienste deur die Afdeling aan staatsdepartemente, raadgewende ingenieurs en munisipaliteite gelewer. 'n Onlangse diens aan een van die groter munisipaliteite gelewer, omvat die hele toesig oor die vervaardigingsproses van pype van voorgespanne beton wat vir gebruik in 'n waterskema-uitbreiding bestem is, sowel as die toets van die eindproduk. Dit is die eerste keer dat werk van dié aard deur die Buro gedoen is, en dit het die aanstelling van spesiale personeel meegebring,

Regular control inspections and tests were carried out on articles manufactured under the standardization mark scheme. These included hospital equipment, tubular steel school furniture, filing cabinets, insulator spindles and bolts and nuts. A marked improvement in the standard of production was observed.

Packaging

Progress was made with the programme for preparing specifications for packs for dangerous commodities other than explosives. This project is intended to form a basis for determining the suitability of different packs for dangerous goods for conveyance by public transport and for testing alternative methods of packing for such commodities.

The code of practice relating to the colour marking of medical gas cylinders and anaesthetic apparatus was revised in order to bring it into line with recent proposals for marking by the International Organization for Standardization (ISO). Most countries have already agreed to adopt these proposals. Adherence to the proposed marking scheme is important as it will eliminate confusion in the filling and using of medical gas cylinders, particularly on ocean liners and civil aircraft, and when servicing cylinders from foreign countries.

A wooden box pack for unassembled rifle barrels was amended for the Defence Production Office, and a method for protecting the barrels from corrosion by means of a hot dip compound was investigated and recommended. In conjunction with No. 3 Air Group, a specification was prepared for oxygen cylinders for military aircraft in addition to a code of practice for the maintenance of the cylinders.

Test work carried out in the laboratories was mainly confined to checking the quality of corrugated board boxes for blasting cartridges and 5-ply paper sacks for fertilizers.

Further products tested in the laboratories included moulded pulp trays for eggs, 5-gallon capacity polyethylene carboys carried in light steel drums, citrus wrappers, cards for use in accounting machines and many other commodities.

CIVIL ENGINEERING DIVISION

The period under review was remarkable for the broadening of the services rendered by the Division to government departments, consulting engineers and municipalities. A recent service to one of the larger municipalities involves the entire supervision of the manufacturing process as well as the testing of the finished pre-stressed concrete pipes intended for use in a water augmentation scheme. This is the first time that work of this nature has been conducted by the Bureau and it has necessitated the appointment of special staff,

bestaande uit 'n ingenieur en ses inspekteurs, wat blywend by die fabriek waar die pype vervaardig word, gestasioneer is. Dit is interessant om op te merk dat groot ondernemings gebruik van die Buro se inspeksiedienste maak.

Die inspeksie van besendings materiaal, soos by asbessementdakplate, betonpype en sement, vir staats- en munisipale liggame is op groot skaal voortgesit.

Die pasingestelde Struktuurtoetsafdeling wat hom toelê op die toets van die prestasie van boumateriale wat hul strukturele eienskappe en bestandheid teen weer en wind betref, het reeds 'n groot verskeidenheid verskillende boumateriale en nuwe boumetodes ondersoek. Hierdie ontwikkeling sal sowel vir nywerheidsondernemings as vir plaaslike besture van nut wees.

Modelboureghulasies

Die hoofstuk oor verligting en ventilering is voltooi en deur die Senior Komitees met die beheer oor hierdie projek belas, goedgekeur met dien verstande dat sekere besonderhede opnuut oorweeg moes word. Die nodige wysigings is daarna aangebring.

Die hoofstuk oor brandbeveiliging het sy eerste hersiening van 'n regs kundige oogpunt ondergaan, en 'n aantal punte is ter opheldering na die komitee terugverwys.

Spesifikasies en Gebruikskodes vir Boumateriale

Daar is besluit om die tipe pyp wat nie onder druk gebruik moet word nie en wat in die spesifikasie vir betonpype behandel is, te verdeel in stormwaterpype en pype vir algemene gebruik. Hierdie afdeling van die spesifikasie is vir kommentaar vrygestel.

Behalwe wat die vaststelling van 'n nuwe bron van standaard sand betref, is die spesifikasie vir sement voltooi.

Spesifikasies vir boukalk, betondakpanne en geglaasde keramiekmuurteëls en toebehoorsels is by die drukker. Die gebruikskode vir die bevestiging van dakpanne word binnekort gepubliseer.

Die werk i.v.m. spesifikasies vir betonboublokke en 'n hersiening van die spesifikasie vir asbessementplate word voortgesit. Die kode vir die water- en vogdigting van geboue het heelwat kommentaar uitgelok. Die kommentaar is gekollasioneer en benut.

'n Konsep vir die gebruikskode i.v.m. die aanbring van belegsels aan geboue is opgestel en met belanghebbende partye bespreek.

'n Uitgebreide reeks toetse is op hol boublokke van klei uitgevoer om te bepaal of hulle aan die konsepspesifikasie voldoen. Die resultate is ontleed en voorstelle vir wysiging van die konsep is gedoen.

'n Konsep vir die nuwe spesifikasie vir houtlere is opgestel en met vervaardigers bespreek. Voorlopige toetse is ook op verskeie lere van verskillende groottes gedoen.

namely, an engineer and six inspectors, who are permanently posted at the factory at which the pipes are made. It is interesting to note that the Bureau's inspection services are being used for major undertakings.

Consignment inspection of materials such as asbestos-cement roofing sheets, concrete pipes and cement for government and municipal bodies continued on a large scale.

The newly established Structural Testing Section which specializes in the performance testing of building materials for their structural properties and resistance to natural elements such as wind and rain, has already handled a wide variety of tests on diverse building materials and new methods of construction. This development will assist both industrial enterprise and local authorities.

Model Building Regulations

The chapters on lighting and ventilation were completed, and approved by the Senior Committees controlling this project, with the proviso that certain details should be reconsidered. These have been suitably amended.

The chapter on fire protection was taken through an initial legal review, and a number of points referred back to the committee for clarification.

Building Material Specifications and Codes of Practice

It was decided to divide the non-pressure type of pipe dealt with in the concrete pipe specification, into storm water and general purpose types, and this section of the specification was issued for comment.

Except for the establishing of a new source of standard sand the specification for cement was completed.

Specifications for building lime, concrete roofing tiles and glazed ceramic wall tiles are now in course of publication. The code of practice for the fixing of roofing tiles will be published shortly.

Work continued on specifications for concrete building blocks and a revision of the specification for asbestos-cement sheets. The code on the waterproofing and damp-proofing of buildings elicited good response when distributed for comment. Comments were collated and followed up.

A draft of the code of practice on the application of facings to buildings has been prepared and discussed with interested parties.

An extensive series of tests was carried out for conformity with the draft specification on hollow clay building blocks. The results were analysed and suggestions made for alterations in the draft.

A new specification for wooden ladders has been drafted and discussed with manufacturers. Preliminary tests have also been made on several ladders of different sizes.

Onderafdeling Struktuurtoetse

Toetse is uitgevoer op voorafgegiete betonblokke bestem vir gebruik in skemas vir natuurlikebehuising. Die toetse is sowel op die eenhede self as op mure wat daarmee gebou is, uitgevoer en het buigsterkte- (windbelasting), slag- en reënbestandheidstoetse ingesluit. Dit is opmerkenswaardig dat staatsowerhede en munisipale liggeme tans daarop staan dat nuwe materiale aan hierdie toetse onderwerp word alvorens hulle goedgekeur word.

Onderafdeling Boumateriale

Die Onderafdeling Boumateriale het 'n uitgebreide reeks toetse uitgevoer op talryke monsters van gebrande klei-bakstene, vooraf-gegiete betonblokke, plaveiplate en randstene, nuwe materiale vir vloer- en dakbedekking, en betonkubusse van Swaziland, die Rand, die Vrystaat en Noord- en Wes-Transvaal asook 'n nuwe tipe seëling vir asbessementdrukpype en betonpype met 'n groot deursnee uit Noord-Transvaal.

Die toetsing van pype van voorgespanne beton vir die wateruitbreidingskema wat vroeër gemeld is, val ook onder hierdie afdeling. Tot nog toe, is toesig gehou oor die spin-, winding- en bekledingsproses van ongeveer 200 pype. Hierdie pype sal getoets word sodra hulle vir die vereiste periode nabehandeling is. Die meeste pype wat tot dusver vervaardig is, het 'n deursnee van 45 dm. en 'n lengte van 23 vt. Die hoeveelheid pype met 'n deursnee van 51 dm. wat tot dusver vervaardig is, is betreklik klein.

Die inspeksie van besendings asbessementplate, betonpype en -pale vir staats- en munisipale liggeme is voortgesit. Gereelde inspeksies in fabriek wat kragtens die standaardmerkskema vervaardig is, is ook voortgesit. Riool- en afvoerpype en toebehore van geglasureerde erdewerk, asbessementpype vir gebruik onder druk en plate van pleistergips behoort tot die produkte wat ondersoek en getoets is.

Onderafdeling Sement, Kalk en Toeslag

Hierdie onderafdeling het ongeveer twaalf monsters Portland- en gesulfateerde-sement en 8 monsters growwe en fyn toeslag per maand getoets. Ook is talryke monsters boukalk volgens die nuwe Suid-Afrikaanse standaardspesifikasie vir hierdie produk getoets. Van spesiale belang is die feit dat monsters sement en toeslag wat voorgestel is vir gebruik in die vervaardiging van voorafgegiete betonpype vir die genoemde wateruitbreidingskema, deur die afdeling getoets is voordat hulle deur die betrokke munisipaliteit aangeneem is.

'n Volle reeks toetse op monsters vliegias, wat bestem is vir gebruik by die vervaardiging van groot hoeveelhede voorafgegiete betonprodukte, is uitgevoer.

DIE KAAPSTADSE KANTOOR

Nywerars het aangehou om volle gebruik te maak van die fasiliteite wat deur die kantoor aangebied word, en die werk wat gedoen is, het heelwat uitgebrei.

Structural Testing

Tests were carried out on pre-cast concrete blocks intended for use in Native Housing projects. The tests were conducted on the units themselves and on walls constructed of the blocks, and included transverse bending (wind load), impact and rain resistance tests. It is of note that government authorities and municipal bodies now insist upon these tests before new materials are approved.

Building Materials

The Section performed a wide range of tests on numerous samples of burnt clay building bricks, pre-cast concrete blocks, paving slabs and kerbs, new materials for flooring and roofing, concrete cubes from Swaziland, the Reef, the Free State and the Northern and Western Transvaal, a new type of seal ring for asbestos-cement pressure pipes and large diameter concrete pipes from the Northern Transvaal.

The testing of the pre-stressed concrete pipes for the water augmentation scheme previously mentioned is also being handled by the Section. To date, the spinning, winding and coating process of approximately 200 pipes has been supervised, and these pipes will be tested as soon as they have cured for the required period. The majority of the pipes manufactured so far have been 45 in. diameter by 23 ft. long. The number of 51 in. diameter pipes produced up to this stage has been relatively small.

Consignment inspection for government and municipal bodies continued on quantities of asbestos-cement sheets, concrete pipes and concrete poles. Regular inspections were also continued at factories manufacturing under the standardization mark scheme, the products inspected and tested being glazed earthenware drain and sewer pipes and fittings, asbestos-cement pressure pipes and gypsum plasterboard.

Cement, Lime and Aggregate Section

This Section tested approximately 12 samples of supersulphated and Portland cement and 8 samples of coarse and fine aggregate per month. In addition, numerous samples of building lime were tested in accordance with the new South African standard for this product. Of special interest was the fact that samples of the cement and aggregates proposed for use in the manufacture of the pre-stressed concrete pipes for the previously mentioned water augmentation scheme, were tested by the Section before they were accepted by the municipality concerned.

A full range of tests was conducted on samples of fly ash intended for use in the manufacture of large numbers of pre-cast concrete products.

CAPE TOWN OFFICE

Industrialists continued to make full use of the facilities offered by the office, and the work done showed considerable expansion.

Die ingemaakte vrugte-, groente- en konfytnywerheid het 'n goeie sagtevrugteseisoen deurgemaak. 25.09 miljoen pond van hierdie artikels is gedurende die seisoen 1955-56 kragtens die standaardmerkskema gegradeer en geëtiketteer. Dit verteenwoordig 'n toename van 17.1 persent in vergelyking met die hoeveelheid wat gedurende die daaraan voorafgaande seisoen kragtens die merkskema verpak is. Aansoeke om permitte om die standaardmerk te mag gebruik, is van twee verdere vrugte- en groente inmaakbedrywe ontvang.

Skakelverbinding met die Departement van Doeane en Aksyns en die Kaapse Kamer van Koophandel is tot stand gebring waardeur dit moontlik geword het om ingemaakte vis en vleissoorte aan die toetse vir voldoening aan die betrokke verpligtende spesifikasies te onderwerp.

Monsterneming van artikels in die Kaap en die Suidwestelike distrikte namens ander afdelings van die Buro is voortgesit. Die hoeveelheid van hierdie soort werk het heelwat vermeerder. Die monsters wat getrek is, is vir toetsdoeleindes na Pretoria weggestuur.

Tekstielkoopware en die sny, maak en afwerk van klerasie is namens die Unieraad vir Tenders en Leweransies, die Suid-Afrikaanse Spoorwegadministrasie, die Krygsproduksiekantoor en ander verskillende staatsdepartemente en provinsiale administrasies geïnspekteer. Vier-en-sestig inspeksiebesoeke aan 10 fabriekke in die Kaapse gebied is afgelê. Inspeksies op 323,000 jts. stukgoedere, 12,700 komberse, 11,300 handdoeke en 45,000 gebreide artikels is uitgevoer.

Die inspeksie in Kaapstad en die plattelandse distrikte van die Westelike Provinsie van wolstukgoedere en kledingstukke vir voldoening aan die wolgehalteterming van tekstielgoedere is voortgesit. Monsters kledingstukke wat vermoedelik verkeerd geëtiketteer was, is vir toetsdoeleindes na die laboratoriums te Pretoria gestuur.

'n Kenmerk van die onderhawige tydvak was die uitgebreide reklame wat deur permithouers aan die standaardmerk gegee word. Die toenemende belangstelling in die standaardmerkskema dui daarop dat Kaapstad al hoe meer „merkbewus” word.

DIE DURBANSE KANTOOR

Gedurende die onderhawige tydvak was daar 'n toenemende aanvraag om nie-vernietigende toetse. Net soos tydens vorige buiteseisoene is suikermeuluitrusting (hoofsaaklik skagte) by feitlik al die suikermeule in Natal getoets, en ook skagte van meule in Kenia, Mosambiek en Mauritius is getoets voordat hulle by plaaslike ingenieursfirmas van 'n nuwe dop voorsien is. Talryke ultrasoniese en magnetiese toetse is op motor- en stuurkomponente van swaartransportvoertuie uitgevoer.

Ultrasoniese resonansiefrekwensietoetse is uitgevoer om die wanddikte van koperpote wat in uitlooginstallasies gebruik word, te bepaal. 'n Deurdringingskleurstoetse is vir die Natalse Provinsiale Administrasie uitgevoer en 'n aansienlike aantal radiografiese toetse is op petroleum-

The canned fruit, vegetable and jam industry experienced a good deciduous fruit season, 25.059 million pounds of these commodities being graded and labelled under the standardization mark scheme during the 1955-1956 season. This represents an increase of 17.1 per cent. on the quantity packed under the mark scheme during the previous season. In addition, applications for permits to use the standardization mark were received from two further fruit and vegetable canneries.

Liaison was established with the Department of Customs and Excise and the Cape Chamber of Commerce, enabling canned fish and canned meats arriving at Cape Town to be subjected to tests for compliance with the relevant compulsory specifications.

The sampling of commodities in the Cape and South Western Districts on behalf of other sections of the Bureau continued, the volume of the work increasing. The samples drawn were despatched to Pretoria for testing.

Inspections were carried out on textile merchandise and the cut, make and trim of clothing on behalf of the Union Tender Board and Supplies Office, the South African Railways Administration, the Defence Production Office and various other government departments and provincial administrations. Sixty-four inspection visits were paid to 10 factories in the Cape area, inspections being carried out on 323,000 yards of piece goods, 12,700 blankets, 11,300 towels and 45,000 knitted garments. In addition, inspection in Cape Town and Western Province country districts continued on woollen piece goods and garments for compliance with the wool content marking of textile goods, samples of garments which appeared to be incorrectly labelled being sent to the Pretoria laboratories for testing.

The extensive publicity given to the standardization mark by permit holders was a feature of the period under review. The growing interest displayed in the standardization mark scheme indicates that Cape Town is becoming increasingly “mark conscious”.

DURBAN OFFICE

During the period covered there was a steady demand for non-destructive testing. As in previous off-crop seasons, sugar mill equipment (mainly shafts) was tested at practically all the sugar mills in Natal and, in addition, shafts from mills in Kenya, Mozambique and Mauritius were tested prior to re-shelling at local engineering firms. Numerous ultrasonic and magnetic tests were carried out on engine and steering components of heavy transport vehicles.

Ultrasonic resonant frequency tests were conducted to determine the wall thicknesses of copper vessels used in extraction plants; a penetrant dye test was performed for the Natal Provincial Administration and a considerable amount of radiographic testing was carried out

en algemene opslagtenks, ketels, keteltype en hoëdrukstoomtype uitgevoer.

Die skeepsreparasie het nog steeds volle gebruik gemaak van die nie-vernietigende toetsfasiliteite wat gebied word.

Die roetine-inspeksie en monsterneming was deur die administrasie van die verpligtende standaardspesifikasies vir ingemaakte vleis en vleisprodukte genoodsaak word, si by vleisinmaakfabrieke in die Durbanse en Pietermaritzburgse gebiede uitgevoer. Dit verdien vermelding dat uitstekende samewerking tussen die inspekteur en die bestuur van die betrokke fabrieke bestaan het en dat gereelde verbetering in die uitrusting en inmaakmetodes hoogs bevredigend was.

Monsters ingevoerde vleis- en visprodukte is met gereelde tussenpose direk in die pakhuis by die Durbanse dokke getrek en vir toetsdoeleindes na Pretoria gestuur. 'n Toename in die besendings ingevoerde ingemaakte vleis en -vis wat by Durban afgelaai is, is opgemerk.

Gereelde kontrole-inspeksies is by pluimveevoer, insekte- en ontsmettingsmiddel- en bruisdrankfabrieke gedoen.

Monsterneming onder die 1½-persentskema en aanname-inspeksie het heelwat vermeerder en sluit in produkte soos verf, onderklere, sokkies, papiersakke en mangatdeksels.

Daar was 'n voortdurende vraag na die Britse en S.A.B.S.-spesifikasies wat in die Durbanse kantoor in voorraad gehou word.

DIE PORT ELIZABETHSE KANTOOR

Na die nodige onderhandelings is met die Port Elizabethse Stadsraad ooreengekom dat die Buro vir Standaarde die toesig en toets van vooraf-gegiet betontype en spesiale artikels wat vir die Port Elizabethse wateruitbreidingskema bestem is, op hom sal neem. Die hoof-ingenieur en ses inspekteurs wat vir die doel aangestel is, werk nou by die fabriek in Port Elizabeth. Die beraamde koste verbonde aan die lê van die pype en spesiale artikels vir die eerste deel van die kontrak is ongeveer £900,000. Die administratiewe werk in verband met hierdie skema het heelwat van die kantoor se tyd in beslag geneem.

Sekretariële werk is vir die aktiewe liggaam Middel-landse Streeknavorsingskomitee, van die Wetenskaplike en Nywerheidsnavorsingsraad, onderneem.

Aanname-inspeksies is namens die Transvaalse Provinsiale Administrasie op meubels uitgevoer, en verf en verfkwasmonsters is vir die Unieraad vir Tenders en Leweransieskantoor gekeur. Verdere produkte wat getoets is, sluit in pikstele, houtverduursamingsmiddels en kisseplanke vir die Krygsproduksiekantoor, die Departement van Publieke Werke, die Transvaalse Provinsiale Administrasie en die Suid-Afrikaanse Koöperatiewe Sitrusraad.

on petroleum and general storage tanks, boilers and boiler tubes and high-pressure steam pipes.

The shipping repair industry continued to make good use of the non-destructive testing facilities offered.

The routine inspection and sampling entailed by the administration of the compulsory standards for canned meat and canned meat products were carried out at meat canning factories in the Durban and Pietermaritzburg areas. It should be mentioned that excellent co-operation existed between the inspector and the management of the factories concerned, and that the steady improvement in the equipment and canning methods was most satisfactory.

Samples of imported meat and fish products were drawn direct from warehouses at the Durban docks at regular intervals and despatched to Pretoria for testing. An increase in the consignments of imported canned meat and fish landed at Durban was noticed.

Regular control inspections were done at poultry feed, insecticide, disinfectant and mineral water factories.

Sampling, under the 1½ per cent. acceptance inspection scheme, increased considerably and included products such as paint, underwear, socks, paper sacks and manhole covers.

There was a constant demand for the British and S.A.B.S. specifications held at the office.

PORT ELIZABETH OFFICE

Negotiations were initiated and subsequently concluded with the Port Elizabeth City Council for the undertaking by the Bureau of Standards of the supervision and testing of the pre-stressed concrete pipes and specials intended for the Port Elizabeth water augmentation scheme. The engineer in charge and six inspectors appointed for this purpose are now working at the factory in Port Elizabeth. The estimated cost of the piping and specials for the first part of the contract is in the region of £900,000. The administrative work connected with this scheme occupied a considerable amount of the office's time.

Secretarial work was undertaken for that active body, the Midland Regional Research Committee of the Council for Scientific and Industrial Research.

Acceptance inspections were carried out on furniture on behalf of the Transvaal Provincial Administration, and inspections of paints and paint brush samples were conducted for the Union Tender Board and Supplies Office. Further products inspected included pick handles, wood preservative materials and box shooks for the Defence Production Office, the Public Works Department, the Transvaal Provincial Administration and the South African Co-operative Citrus Exchange.

Gedurende die onderhawige tydvak is 60 inspeksies op die perseel van vier vervaardigers van pluimveevoer uitgevoer, en 45 inspeksies is by fabriek wat remvloeistof, vloerblokkies, veiligheidshandskoene, sagte soldeersel, drukkersmetaal en landboukissieplanke uitgevoer. Vyf-en-veertig besoeke is afgelê aan bruisdrankfabriek in die Oostelike Provinsie wat kolaprodukte in bottels tap.

Terwyl die fabriek vir die jaarlikse vakansie tydperk gesluit was, het die kantoor koördinasiewerk i.v.m. die nie-vernietigende toets van masjienonderdele uitgevoer. Waardering vir die uitstekende diens, wat deur die nie-vernietigende toetslaboratorium gelewer is, is deur die betrokke vervaardigers uitgespreek.

Die mening is dikwels deur verbruikers en vervaardigers uitgespreek dat die Buro se beleid om takkantore te stig om sodoende sy dienste makliker ter beskikking van die nywerheid te stel, veel bygedra het om die goeie gesindheid te bevorder en om koördinasie tussen alle betrokke partye te bewerkstellig.

Die stigting van die takkantoor op Port Elizabeth word as 'n aanduiding beskou dat die Buro daarna streef om sy goeie dienste te vermeerder deur die tydruimte tussen die indiening van toetsmonsters en die ontvangs van toetsresultate tot 'n minimum te beperk.

Heelwat vervaardigers, kopers en ander belangstellendes het die kantoor besoek om die Britse en S.A.B.S.-spesifikasies wat vir naslaandoeleindes daar ter insae lê, te raadpleeg.

During the period under review, 60 inspections were carried out at the premises of four manufacturers of poultry feed, and 45 inspections were undertaken at factories producing brake fluid, floor blocks, safety gloves, soft solder and printers' metal and agricultural box shooks. Forty five visits were paid to mineral water factories in the Eastern Province engaged on the bottling of cola products.

During the period when factories were closed for the annual holidays, the office carried out co-ordination work in respect of the non-destructive testing of machine parts. Appreciation of the excellent service rendered by the non-destructive testing laboratories was expressed by the manufacturers concerned.

The view was frequently expressed by consumers and manufacturers that the Bureau's policy of establishing branch offices to bring its services to the doorstep of industry has done much to create goodwill and to establish co-ordination between all concerned. The establishment of the branch office in Port Elizabeth is taken as an indication that the Bureau is striving to increase its good services by reducing to an absolute minimum the time elapsing between the submission of test samples and the receipt of test results.

Numbers of visits were received from manufacturers, buyers and other interested persons wishing to study the British and S.A.B.S. specifications held at the office for reference purposes.

Nasionale Chemiese Navorsingslaboratorium

Direkteur: DR. W. S. RAPSON

Die moeilikhede in verband met die nakoming van die verpligtings van die Water- en Prosesontwikkelingsafdelings het voortgeduur.

In die geval van die Waterafdeling het die normale aanvraag om dienste aansienlik toegeneem as gevolg van die Waterwet van 1956, en met sy huidige personeel is die Afdeling tans nie in staat om aan hierdie aanvraag, plus die versoeke afkomstig van die Departement van Waterwese in verband met aansoeke om permitte vir watergebruik en die verwydering van afloopwaters te voldoen nie. 'n Groot gedeelte van hierdie werk kan alleen gedoen word deur senior en ervare personeel, wat moeilik is om te werf. 'n Spoedige oplossing van die probleem is dus nie moontlik nie. Die posisie word verder bemoeilik deur die ontoereikendheid van die huidige akkommodasie en fasiliteite, wat sal voortduur totdat die nuwe Water-

National Chemical Research Laboratory

Director: DR. W. S. RAPSON

The difficulties in meeting the commitments of the Water and Process Divisions have continued.

In the case of the Water Division, the normal demand for services has increased very considerably as a result of the Water Act of 1956, and the Division with its present establishment is now unable to meet them, plus the requests which flow from the Department of Water Affairs in respect of applications for permits to use water and to discharge effluents. Much of this work can be done only by senior and experienced personnel of a type which is difficult to recruit, so that a rapid solution to the difficulty is not possible. The position is made worse by the inadequacy of the present accommodation and facilities, which will continue until the new Water Laboratory is completed, probably in the latter half of 1958.

A significant contribution to the development of the demineralization process in South Africa has been the success of the Division in developing new types of ion-selective membranes which can be produced at a fraction of the cost of membranes which have been so far available. In order that these membranes might be available in time to be used in the large scale plant, negotiations were begun in December for the licensing of a firm to manufacture the new membranes. As a result, manufacture of the membranes will be started towards the middle of the year and should lead to the establishment of a new enterprise in the Union. The company concerned will play an active role, not only in producing membranes for demineralization units, but also in the production and sale of the units themselves.

A start was also made on the development of small units for use on farms and tests of a first experimental design have begun. Attention is also being paid to possible future applications of electro-dialysis in the chemical and metallurgical industries.

The small team working on seaweed carbohydrates at the University of Cape Town was transferred to Pretoria where work on wood chemistry is gradually gaining momentum. In this connection it is of interest to record that an appointment has now been made to the Wattle Growers' Union Fellowship, established for investigations of the wattle wood, which is available in such large quantities as a result of the demand for wattle tannin.



Dr. W. S. Rapson.

laboratorium voltooi is, waarskynlik in die tweede helfte van 1958.

'n Belangrike bydrae tot die ontwikkeling van die ontsoutingsproses in Suid-Afrika was die sukses van die Afdeling in die ontwikkeling van nuwe soorte ioonselektiewe membrane wat vervaardig kan word teen 'n baie laer koste as die van die membrane wat tot dusver beskikbaar was. Ten einde hierdie membrane betyds beskikbaar te hê vir gebruik in die grootskaalse installasie, is onderhandelings in Desember begin vir lisensieverlening aan 'n firma vir die vervaardiging van die nuwe membrane. As gevolg hiervan sal die vervaardiging van membrane teen die middel van die jaar 'n aanvang neem, en dit behoort tot die invoering van 'n nuwe nywerheidsonderneming in die Unie te lei. Die betrokke maatskappy sal 'n aktiewe rol speel, nie alleen in die vervaardiging van membrane en die ontsouting van water nie, maar ook in die produksie en verkoop van die eenhede self.

'n Begin is ook gemaak met die ontwikkeling van klein ontsoutingseenhede vir gebruik op plase, en proewe met 'n eerste eksperimentele ontwerp het begin. Aandag word tans ook geskenk aan die moontlike toekomstige toepassings van elektrodialise in die chemiese en metallurgiese industrieë.

Die klein groep wat gewerk het op die gebied van seegraskoolhidrate aan die Universiteit van Kaapstad is nou na Pretoria oorgeplaas, waar werk in verband met houtchemie besig is om op dreef te kom. In hierdie verband is dit van belang om te vermeld dat 'n aanstelling gedoen is aan die Beurs van die Wattelkwekersunie, wat gestig is vir die ondersoek van wattelhout. Hierdie hout is in groot hoeveelhede beskikbaar as gevolg van die aanvraag na wattelantienne.

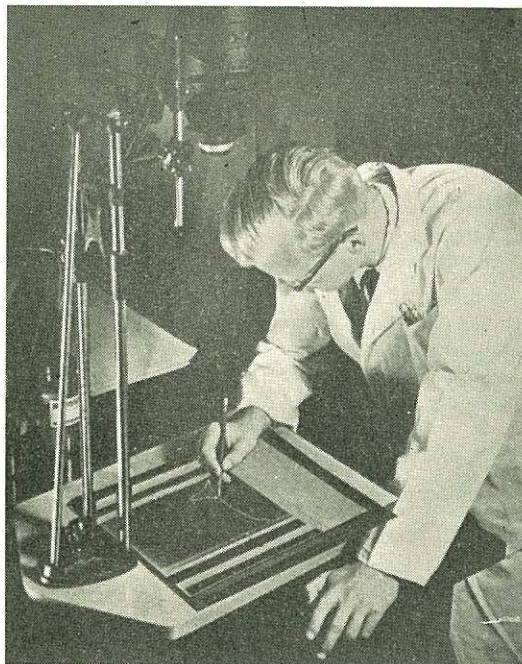
'n Verdere Beursooreenkoms is aangegaan waarvolgens 'n beampte en assistent van die Fosfaatontwikkelingskorporasie tydelik vir werk na hierdie Laboratorium oorgeplaas is. Die werk in verband met hierdie Beurs is reeds aan die gang. Dit bring die totale aantal personeel wat tans beurshouers is en onder kontraktooreenkomste werk, of wat vir diens deur ander organisasies en nywerheidsfirmas na hierdie Laboratorium gesekondeer is, op 37 te staan.

Op versoek van die Departement van Verdediging het 'n beampte Groot Brittanje en Holland besoek, ten einde onlangse ontwikkelings in die voorkoming van korrosie te bestudeer, met die doel om die nodige maatreëls in die Unie te tref.

MINERAALPRODUKTE

Kleisoorte

In die vorige verslag is vermeld dat die betrokke beampte na die buiteland vertrek het om 'n Beurs te aanvaar. Hy het teen die einde van 1956 teruggekeer en 'n begin is met 'n nuwe navorsingsprogram gemaak. 'n



Calculation of lipoprotein content of blood sera from ultracentrifuge measurements.

Berekening van die lipoproteïeninhoud van bloedsersum met behulp van ultrasentrifuge-bepaling.

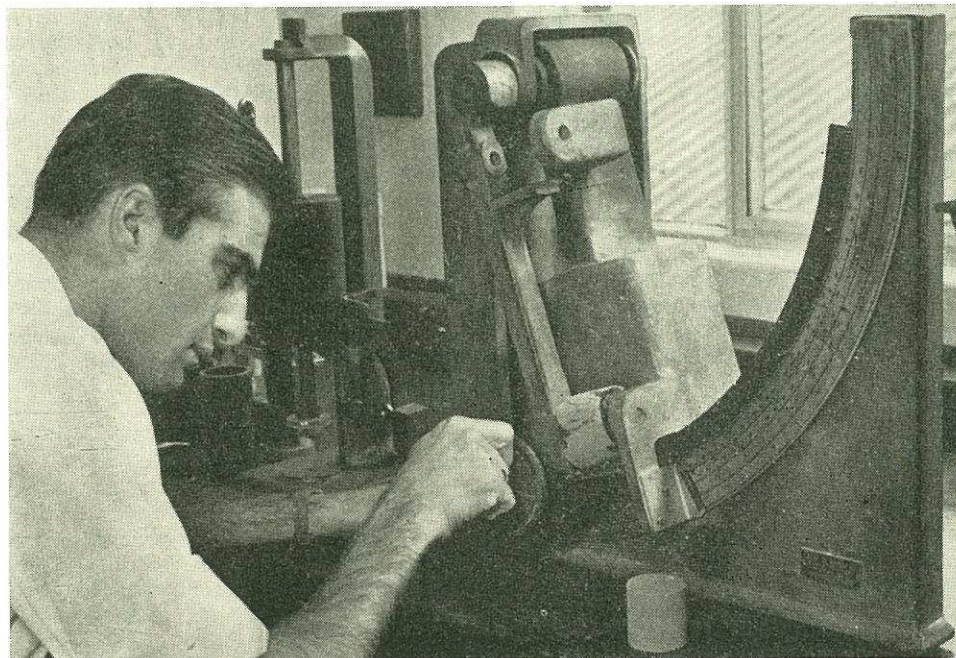
A further Fellowship Agreement has been concluded in terms of which an officer and assistant from the Phosphate Development Corporation have been seconded to work in the Laboratory. The work of the Fellowship is already well under way. This brings the total number of staff currently employed against fellowship and contract arrangements or seconded for duty in the Laboratory from other organizations or industrial firms to 37.

At the request of the Department of Defence, an officer has visited Great Britain and Holland in order to study recent developments in the prevention of corrosion, with a view to their introduction in the Union.

MINERAL PRODUCTS

Clays

In the last report it was indicated that the officer concerned in this work had proceeded overseas to take up a Fellowship. Towards the end of 1956, he returned and a programme of work is being restarted. A number



Bepaling van die rou saamdrukkende sterkte van gieteryklei.

Measurement of green compressive strength of foundry clays.

Aantal klein ondersoekes is reeds uitgevoer, insluitend (a) 'n studie van die mineralogiese samestelling en ontginningsmoontlikhede van 'n kaolienneerslag deur wasmetodes, vir 'n sekere firma, (b) bepaling van die mineralogiese inhoud van grondkleie vir die Afdeling Skeikundige Diens, Departement van Landbou, (c) ondersoek na die keramiese moontlikhede van 'n kleimonster wat van buite af ingestuur is.

'n Verslag oor die oorsese besoek is opgestel, en aanbevelings vir toekomstige keramiese en grondwetenskaplike navorsing in die Unie is gedoen. 'n Lesing en 'n artikel vir publikasie is vir belanghebbendes in die Departement van Landbou opgestel.

Fosfate

Die bereiding van natriumfosfaat uit aluminium-ysterfosfaatertse deur vertering met alkali is voltooi en die resultate saamgestel vir publikasie.

'n Langtermynse ondersoek na die bewerkingsmoontlikhede van die uitgestrekte fosfaatneerslae te Phalaborwa is aangevoer as 'n nuwe rigting in fosfaatnavorsing. Hierdie werk word hoofsaaklik met behulp van bogenoemde Beurs uitgevoer, dog die personeel van die Laboratorium werk ook saam.

Olie uit Steenkool

Fundamentele navorsing op katalisatore wat gebruik word by die Fischer-Tropschproses is voortgesit, hoewel daar, weens verlies aan personeel, betreklik min vordering sedert die laaste verslag gemaak is. Daar is vantevore

of small investigations were carried out, including (a) study of the mineralogical composition and washing possibilities of a kaolin deposit for a certain firm, (b) determination of mineralogical content of soil clays for Division of Chemical Services, Department of Agriculture, (c) study of ceramic possibilities of a clay sample sent in for examination.

A report on the overseas visit was drawn up, and recommendations put forward for the future of ceramic research and of soil science in the Union. A lecture and an article for publication were prepared for interested parties in the Department of Agriculture.

Phosphates

The study of production of sodium phosphate from ores consisting of iron- and aluminium-phosphates, by treatment with alkali, was completed, and the results prepared for publication.

As a fresh direction in the study of phosphates, a beginning has been made on long-term studies for exploitation of the extensive phosphate deposits at Phalaborwa. This is being undertaken primarily by the Fellowship mentioned previously, but work is also being carried out by staff of the Laboratory.

Oil from Coal

Fundamental studies on catalysts used for the Fischer-Tropsch process were continued but, owing to loss of staff, progress since the last report has been small.

gevind dat die baie suiwer ysterkatalisator wat verkry word wanneer baie suiwer magnetiet gereduseer word, 'n besonder egalige oppervlak het. Verdere eksperimente waarby die omstandighede gevarieer is, het getoon dat wanneer magnesium by die magnetietspinel gevoeg word, die ysteroppervlak by reduksie nie meer egalig is nie.

Goeie vordering is gemaak met die ondersoek van die outoksidasie van die Fischer-Tropschmodel koolwaterstof, 5-metielnonaan. Die werk is hoofsaaklik toegespits op die ontleding van die primêre produkte, gedeeltelik deur middel van die nuwe ontledingstechniek, gaschromatografie. Hoewel fundamenteel van geaardheid, is die uiteindelige doel van hierdie werk 'n ondersoek na die moontlikhede om sintese-koolwaterstowwe aan te wend as uitgangsmateriale by die vervaardiging van chemikalieë deur middel van outoksidasieprosesse.

DIERLIKE PRODUKTE

Wolvetstudies

Die ondersoek is voortgesit om die aard van die chemiese reaksies vas te stel wat verantwoordelik is vir die afbreking van wolvet op wolvels by blootstelling aan weer en wind, en om die daaropvolgende invloed van sulke reaksies op die eienskappe van die wolvels te bepaal. Hierdie werk, tesame met die ondersoek van die verwerking van modelwolvetkomponente, gee 'n duidelike insig in die aard van die basiese veranderings wat intree, en ook 'n aanduiding van die aard van die stowwe wat in kommersiële wolwas aanwesig is en ontstaan as gevolg van die verwerking van pas-afgeskeide wolvet. Die soek na nuwe gebruike vir hierdie oorvloedige neweproduk is voortgesit en in medewerking met 'n industriële organisasie word 'n veelbelowende afsetmoontlikheid ondersoek.

Chemie van Wolvels

Hierdie werk word uitgevoer ingevolge 'n Beurs wat deur die Wolraad beskikbaar gestel is. Die werk i.v.m. die bepaling van sulfhidriëlgroepe wat in vorige verslae behandel is, is ook in ander laboratoriums in Suid-Afrika en elders van nut bevind. Verdere werk is dus gedoen om die metode te vereenvoudig.

'n Algemene werkgigting is 'n studie van chemiese metodes om skade aan velles vas te stel. Besondere aandag word bestee aan 'n studie van metodes vir die bepaling van swavelverbindings.

Aanvoorwerk word ook gedoen in verband met die skeiding en identifikasie van peptiede wat gevorm word deur gedeeltelike hidrolise van wol.

Oplosbare Proteïene in Huid

Gedurende die jaar was 'n beampte van die Leer-nywerheidsnavorsingsinstituut 'n tyd lank aan die Nasionale Chemiese Navorsingslaboratorium verbonde om ultrasentrifugale en ander tegnieke toe te pas op die karakterisering van proteïene wat met 10-persent-natriumchloriedoplossings uit huide geloog is. Hierdie

It was previously shown that the very pure iron catalyst obtained by reducing very pure magnetite had an unusually uniform surface. Further experiments under a variety of conditions showed that, if magnesia is introduced into the spinel structure of magnetite, the resulting iron no longer possesses a uniform surface.

Good progress was made with the study of the autoxidation of the model Fischer-Tropsch hydrocarbon, 5-methylnonane. The work was concerned mainly with the analysis of primary products, partly by means of the new analytical technique, gas chromatography. These studies, though fundamental in character, have as their ultimate aim, the evaluation of synthesis hydrocarbons as raw materials for the manufacture of chemicals by autoxidation processes.

ANIMAL PRODUCTS

Wool Wax Studies

Further studies of the degradation of wool wax on wool fibres exposed to the weather were carried out to elucidate both the nature of the chemical reactions which take place, and the subsequent effect upon the properties of the wool fibre. This work, coupled with studies of the weathering of model wool wax components, gives a clear insight into the basic changes which take place, and has provided some clues to the nature of substances present in commercial wax, which are products of the weathering of the freshly secreted wax. The search for new uses for this abundant by-product was continued and a promising outlet is being investigated in co-operation with an industrial concern.

Wool Fibre Chemistry

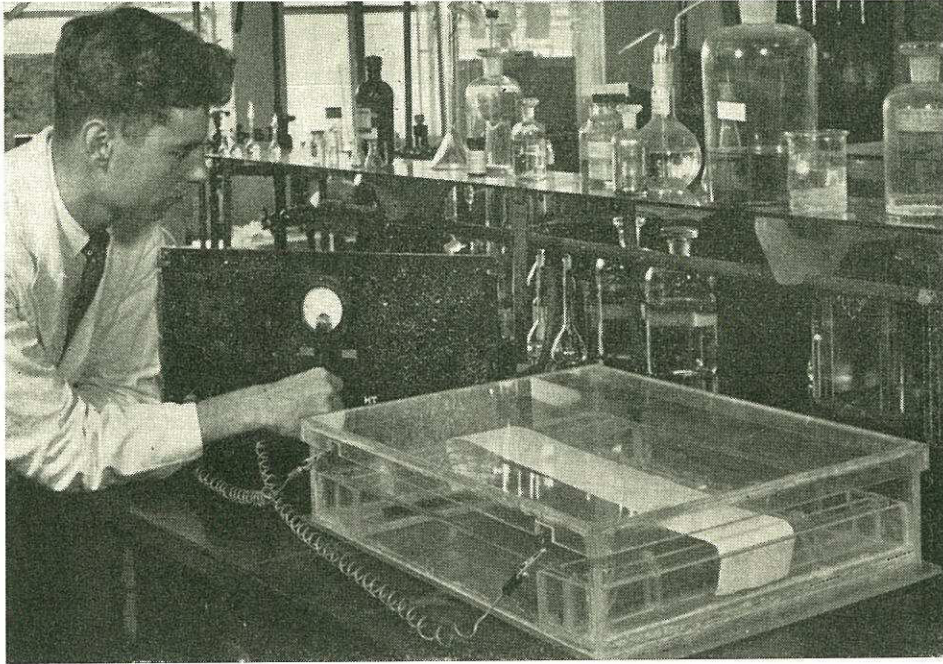
This work is carried out under a Fellowship sponsored by the Wool Board. The work on estimation of sulphhydryl groups described in previous reports has proved useful in other laboratories in South Africa and elsewhere. Further work was therefore carried out to simplify the method.

A general line of work is a study of chemical methods for assessing damage to fibres. The estimation of sulphur compounds in particular is being studied.

Preliminary work is also being carried out on separation and identification of peptides formed in partial hydrolysis of wool.

Soluble Proteins in Skin

During the year, an officer from the Leather Industries Research Institute was attached for some time to the National Chemical Research Laboratory in order to be able to apply ultracentrifugal and other techniques to characterization of proteins leached out of skin by 10 per cent. sodium chloride solutions. Comparisons were



Skeiding van die bestanddele van gedeeltelik gehidroliseerde wol deur middel van papier-elektroferese.

Paper electrophoresis separation of constituents from partially hydrolysed wool.

ekstrakte is met serumproteïene uit dieselfde diere vergelyk. Verskillende huidlae is vergelyk en ook die huid van volgroeiende diere met jong aktiefgroeiende huid. Die dermis-epidermistussenlaag, en ook die jong huid is die rykste aan oplosbare globulêre proteïene. Die jong huid bevat ook „oplosbare kollageen”.

Die Lipoproteïene in Eiergeel

Een van die senior beamptes van die Laboratorium het oorsee gegaan om 'n Kanadese Navorsingsbeurs te aanvaar. Gedurende die kursus onderneem hy 'n studie van die lipoproteïene in eiergeel.

Visolies

Hierdie werk word nie meer finansiële gesteun deur Marine Oil Refiners of Africa nie. Die fundamentele ondersoek van sardynoliebestanddele is voortgesit om 'n basis vir groter gebruik daarvan te probeer vasstel. Die struktuur van die dokosaheksaeensuur uit sardynolie waarna in die vorige verslag verwys is, is vasgestel. As gevolg van resultate wat deur Nieu-Seelandse navorsers verkry is, naamlik dat beesniervet spore biologies belangrike vlugtige sure (van C_1 tot C_{10}) bevat, is dit raadsaam geag om ook die vlugtige vetsure van sardynolie te ondersoek. Deur middel van gaschromatografie is bewys dat miere-, asyn-, propioon-, *n*-botter- en *n*-valeriaansure

made of such extracts with serum proteins from the same animal. Various layers of a hide were compared, and also mature skin as against young, actively growing skin. Soluble, globular proteins are most abundant in the dermis-epidermis interface, and also in young skin. The latter also contains “soluble collagen”.

Egg Yolk Lipo-protein

One of the senior officers in the Laboratory has proceeded overseas to take up a Canadian Research Fellowship. During the course of the fellowship, he is undertaking a study of lipo-proteins in egg yolk.

Marine Oils

Although the term of the Marine Oils Research Fellowship sponsored by Messrs. Marine Oil Refiners of Africa Ltd. has now expired, fundamental investigations of pilchard oil constituents were continued with a view to providing a basis for its more extended use. The structure of the docosaheptaenoic acid from pilchard oil, referred to in the last report, has been determined. As a result of findings by New Zealand investigators that ox perinephric fats contain trace amounts of biologically important volatile fatty acids (from C_1 to C_{10}), it seemed desirable to investigate the volatile fatty acids in pilchard oil. Formic, acetic, propionic, *n*-butyric and *n*-valeric acids, representing about 0.005 per cent. of the oil, were

voorkom (in totaal 0.005 persent van die olie). Dit is egter nog nie bekend of hierdie sure slegs artefakte is of nie.

Alkaliëse Isomerisasie van Diëne

In die verlede is altyd aangeneem maar nooit volledig bewys nie dat gedurende die analise van *al-cis* metileen-onderbreekte onversadigde vetsure (dié wat gewoonlik in die natuur voorkom) enige aanwesige *al-cis* etileen-onderbreekte onversadigde sure nie deur alkali gekonjugeer word nie onder omstandighede wanneer konjugasie van eersgenoemde grotendeels volledig verloop. Die juistheid van hierdie teorie is deur die sintese van so 'n etileen-onderbreekte suur (*al-cis* tridek-5:8-dienoësuur) bewys. Hierdie suur word nie deur alkali onder standaard-kondisies gekonjugeer nie. Dit sal in die toekoms die interpretasie van die alkali-isomerisasiegegewens vereenvoudig wanneer sulke sure aanwesig is, en is van onmiddellike belang by die verklarings van die struktuur van sekere visoliebestanddele.

PLANTPRODUKTE

Essensiële Olies

Gedurende die afgelope jaar is in medewerking met die Afdelings Tuinbou en Plantkunde van die Departement van Landbou, 'n gemeenskaplike navorsingsprogram onderneem, wat as doel het die ondersoek van sekere plante waaruit essensiële olië gehaal kan word. Sulke plante is veral laventel, peperment, Japanse kruisement en ook malva- en bloekomsoorte. Vroeëre voorlopige ondersoeke, hoofsaaklik by die Nasionale Botaniese Tuine te Kirstenbosch, Kaapstad, en nou meer onlangs aan die Tuinboukundige Navorsingsinstituut te Pretoria, het aan die lig gebring dat 'n groot aantal sulke olie-houdende plante in verskillende dele van Suid-Afrika welig groei. Die doel van die huidige werk is die verskaffing van verdere inligting betreffende die opbrengs en gehalte van sulke olië wat verkry word uit plante wat onder verskillende Suid-Afrikaanse klimaatstoestande gekweek is. 'n Opname word ook gemaak van inheemse, sowel as uitheemse essensiële-olie-houdende plante wat in Suid-Afrika voorkom.

Aangesien sommige essensiële-olie-houdende plante onder betreklik droë klimaatstoestande gekweek kan word, bestaan daar 'n moontlikheid dat hulle nog op voordelige wyse in grondbewaringskemas toegepas sal kan word. Ook is dit miskien moontlik om die produksie van essensiële olië in die naturellegebiede as 'n „Huisnywerheid” te ontwikkel.

Ondersoek van Giftige Plante

Geeldikkopsiekte

Hierdie ondersoek is voortgesit in samewerking met die Afdelings Veeartsenydiens en Plantkunde van die Departement van Landbou. Die ensiematies gehidroliseerde saponiene, waarvan 'n beskrywing in die vorige verslag verskyn, is aan skape by Onderstepoort gevoer.

shown to be present by gas chromatography. However, it is not yet clear whether these acids are artefacts or not.

Alkali Isomerization of Dienes

In the analysis of *all-cis* methylene-interrupted unsaturated fatty acids (the ones usually found in nature) it has always been assumed, but never really proven, that *all-cis* ethylene-interrupted unsaturated acids, if present, are not conjugated by alkali under conditions which cause substantially complete conjugation of the former. This hypothesis was shown to be valid by the synthesis of such an ethylene-interrupted acid (*all-cis* tridec-5:8-dienoic acid) which was not conjugated by alkali under the standard conditions of treatment. This will in future simplify the interpretation of the alkali isomerization data when such acids are involved, and is of immediate significance in the elucidation of the structures of certain marine oil constituents.

PLANT PRODUCTS

Essential Oils

During the year a joint programme of research was agreed upon with the Horticultural and Botanical Divisions of the Department of Agriculture, to investigate the economic possibilities of a number of essential oil-bearing plants; lavender, peppermint, Japanese mint, geranium and eucalypt species in particular. Early preliminary trials mainly at the National Botanic Gardens, Kirstenbosch, Cape Town, and now more recently at the Horticultural Research Station, Pretoria, have shown that a large number of essential oil-bearing plants grow vigorously in many parts of South Africa. The present work aims at providing further information about the yield and quality of the oils produced from plants cultivated under various South African climatic conditions. A survey is also being made of both indigenous and exotic essential oil plants found in South Africa.

As some essential oil plants can be grown under fairly arid conditions, it is possible that they may be profitably used in soil conservation schemes and, furthermore, the production of essential oils could be developed as a “Cottage Industry” in the Native territories.

Investigations of Poisonous Plants

“Geeldikkop” disease

In continuing this investigation in collaboration with the Divisions of Veterinary Services and Botany of the Department of Agriculture, the enzymically degraded saponins, obtained as described in the previous report, were fed to sheep at the Onderstepoort Laboratories. Liver damage was observed only in those cases where the degraded saponin contained an ester group. This is the

Hierdie het geblyk dat slegs dié saponien wat 'n ester-groep in sy molekule bevat het, in staat was om 'n skaap se lewer aan te tas. Dit is die eerste keer dat geeldikkop op kunsmatige wyse in 'n skaap veroorsaak is deur 'n stof wat uit duwweeltjies (*Tribulus terrestris*) verkry is; dit is uiters belangrik aangesien die soektog na die aktiewe bestanddeel in *Tribulus terrestris*, wat dié siekte veroorsaak, daardeur tot 'n paar definitiewe moontlikhede beperk word.

Vermeersiekte

Soos in die geval van die geeldikkopprobleem word hierdie projek voortgesit in samewerking met die voormelde afdelings van die Departement van Landbou. Verskeie komponente is deur middel van papierchromatografie in die ekstrak van *Geigeria africana* aangetoon en fraksies wat ryk aan sekere komponente is, is verkry. Weens die onhanteerbaarheid van die ekstrak van hierdie plant, is die werk egter tydelik gestaak en word voortgegaan met werk op *Geigeria aspera*, die plant wat deur al die vorige werkers op hierdie gebied ondersoek is. Die samestelling van die ekstrak van hierdie plant is grotendeels dieselfde as die van *Geigeria africana*, en 'n nuwe kristallyne verbinding, geigerinien, $C_{15}H_{20}O_4$, is geïsoleer.

Bitterstowwe van die Cucurbitaceae

Toenemende belangstelling in die chemie en biochemie van hierdie stowwe is gewek deur die ontdekking dat sommige bitterstowwe kankerwerende eienskappe besit. Verdere ondersoek in hierdie verband word uitgevoer in samewerking met die National Cancer Institute, Bethesda, V.S.A. Die ondersoek van die skeikundige kenmerke van die bitterstowwe is vergemaklik deur die Afdelings Tuinbou en Plantkunde van die Departement van Landbou wat nie alleen die plantmateriaal voorsien het nie, maar ook belangrike genetiese en biochemiese werk op verskeie lede van die Cucurbitaceae uitgevoer het.

Seegrasse

Carrageenin, 'n gom wat uit Ierse mos (*Chondrus crispus*) en verskillende ander rooi seegrasse geëkstraheer word, word op uitgebreide skaal as 'n emulsiestabiliseerder in die lekkergoed- en aptekersbedryf gebruik. Verskillende Suid-Afrikaanse seegrasse, naamlik *Hypnea specifera*, *Aodes orbitosa* en *Gigartina radula* lewer soortgelyke ekstrakte, maar hulle is nog nie ondersoek nie.

Daar is aangetoon dat gesulfateerde polisakkaried, wat uit *Hypnea specifera* geïsoleer is, uit die suikers D-galaktose en 3, 6-anhidro-D-galaktose opgebou is. In hierdie opsig is dit soortgelyk aan carrageenien, maar 'n noukeurige vergelyking sal slegs moontlik wees wanneer die molekulêre struktuur bekend is. Dit is die doel van die huidige ondersoek.

Wattelhout

In verdere hemisellulose studies is 'n suiwer xilaan uit wattelhout geïsoleer (met 'n opbrengs van 12 persent), en die struktuur daarvan word ondersoek.

first case of artificially produced "geeldikkop" by a *Tribulus terrestris* constituent and is a highly significant result, because it implies that the search for the active principle in the plant responsible for the disease may be narrowed down to a few definite possibilities.

Vomiting sickness (Vermeersiekte)

As with the "geeldikkop" problem, this project continues in collaboration with the previously-mentioned Divisions of the Department of Agriculture. Paper chromatography revealed the presence of several components in the extract of *Geigeria africana*, and fractions rich in certain components were obtained. However, owing to the intractability of the extract from this plant, work was temporarily suspended in favour of work on *Geigeria aspera*, the plant investigated by all the previous workers in this field. The extract of this plant has essentially the same composition as that of *Geigeria africana*, and a new crystalline substance, geigerinien, $C_{15}H_{20}O_4$, was isolated.

Bitter principles of the Cucurbitaceae

Added interest in the chemistry and biochemistry of these compounds was aroused by the discovery that some of the bitter principles possess anti-cancer properties. Further work along these lines is being carried out in collaboration with the National Cancer Institute, Bethesda, U.S.A. The investigation of the chemistry of the bitter principles has been facilitated by the Divisions of Horticulture and Botany of the Department of Agriculture. Not only have they provided ample plant material, but they have also carried out valuable genetic and biochemical work on several of the Cucurbitaceae.

Seaweeds

Carrageenin, a mucilage extracted from Irish moss, *Chondrus crispus*, and several other red seaweeds, is extensively used as an emulsion stabilizer in the confectionery and pharmaceutical trades. Several South African seaweeds, *Hypnea specifera*, *Aodes orbitosa* and *Gigartina radula* give similar extracts, but hitherto they have not been investigated.

A sulphated polysaccharide, isolated from *Hypnea specifera* was shown to be built up of the sugars D-galactose and 3,6-anhydro-D-galactose. In this respect it is the same as carrageenin, but an accurate comparison will only be possible when its molecular structure is known. Current work has this aim in view.

Wattle Wood

In continuation of the hemicellulose studies, a pure xylan was isolated in 12 per cent. yield from the wattle wood and an investigation of its structure is in progress.

'n Projek om die verdere nuttige gebruik van wattlehout te ondersoek, is aangepak. Dit word gedoen onder 'n Beursskema met die Suid-Afrikaanse Wattlekwekers-unie.

Kafferkoring

Hierdie ondersoek is weereens ondersteun deur 'n toekenning van die Instituut van Administrateurs van Nie-Blanke Aangeleenthede.

Laboratoriumstudies op mouting van Kort Rooi kafferkoring is voortgesit. Die doel van die navorsing was om die faktore, wat die ontwikkeling van die versuikeringsvermoë van mout beïnvloed, meer noukeurig te kan definieer en 'n sisteem te ontwikkel wat by kleinskaalse mouting reproduceerbare resultate sal oplewer. Dit is dringend noodsaaklik aangesien die Laboratorium deur die Potchefstroomse Landboukollege versoek is om die moutingskwaliteit van nuwe variëteite kafferkoring deur die Kollege ontwikkel, te ondersoek.

Die ondersoek van suikers met 'n lae molekulêre gewig in kafferkoring en hul verandering gedurende mouting, is voortgesit. Die suikers is geïsoleer en geïdentifiseer en die verskille in konsentrasie gedurende verskillende stadia van mouting is vasgestel. 'n Inleidende ondersoek is ook gedoen i.v.m. die hemisellulose van kafferkoring. Daar is aangetoon dat ten minste twee fraksies van dié kompleksemengsel verkry kan word.

Die invloed van temperatuur, suurheid, mout-tot-graanverhouding en ander faktore op die aktiwiteit van die amilases van kafferkoring gedurende die beslagproses is in die laboratorium bestudeer sowel uit die oogpunt van suikerproduksie as van viskositeit van die beslag. Die kennis van die biochemiese sy van die beslagproses is heelwat deur hierdie werk uitgebrei en die grondslag vir die voorspelling van optimum toestande vir die beslagproses is daardeur gelê. Groot skaalse beslagproewe sal in samenwerking met die Pretoriase Brouery uitgevoer word om hierdie resultate onder praktiese toestande te bevestig.

Op versoek van die Instituut van Administrateurs van Nie-Blanke Aangeleenthede is daar ook gesoek na passende masjinerie om kafferbier af te meet. Verskeie belowende masjiene is uitgekies en vir beproewing deur sekere munisipale brouerye bestel. Die ontwerp van 'n wasmasjiene vir plastiekbierbekers is ook aangepak. Advies is ook aan verskeie mouters en brouers gegee in verband met ander uitrustingsprobleme, insluitende die keuse van 'n moutingsinstallasie, die inrigting van 'n brouery en die gebruik van suurvaste sement.

Om die industrie te help om die navorsingsresultate van die W.N.N.R. te verstaan en toe te pas, sal 'n reeks pamflette uitgereik word, wat die grondbeginsels van die wetenskap van mouting en brou en sy praktiese voordele sal weergee. In die eerste twee uitgawes word die chemie van die beslagproses en die mikrobiologie van fermentasie respektiewelik behandel.

A project to investigate the further utilisation of wattle wood was started. It is being done under a Fellowship arrangement with the South African Wattle Growers' Association.

Kaffircorn

This investigation has continued to be supported by a grant from the Institute of Administrators of Non-European Affairs.

Laboratory studies on the malting of Short Red kaffircorn have been carried further. The object of this work was to define more precisely the factors influencing the development of diastatic power in malt and to evolve a system of small-scale malting which gives reproducible results. This is urgently needed since the Laboratory has been requested by the Potchefstroom College of Agriculture to test the malting quality of new varieties of kaffircorn developed by the College.

The examination of the low molecular weight sugars in kaffircorn and their changes during malting was continued. The sugars were isolated and identified and the changes in concentration at different stages of malting were determined. A preliminary investigation of the hemicelluloses of kaffircorn was also made. It was demonstrated that at least two fractions of this complex mixture can be obtained.

The influence of temperature, acidity, malt-to-grain ratio and other factors on the activity of the amylases of kaffircorn during the mashing process has been studied in the laboratory from the point both of production of sugar and of effect on viscosity of the mash. This work has added greatly to the understanding of the biochemistry of the mashing process and has provided the basis for the prediction of optimum conditions of mashing. Large-scale mashing tests will be carried out in collaboration with the Pretoria brewery to confirm these results under practical conditions.

At the request of the Institute of Administrators of Non-European Affairs a search was made for suitable machines for metering kaffir beer. Several promising machines were selected and have been ordered for trial by various municipal breweries. The design of a washing machine for plastic beer mugs has also been undertaken. Advice has been given to a number of maltsters and brewers on other equipment problems including the choice of malting plant, the layout of a brewery and the use of acid-resistant cements.

In order to assist the industry to understand and apply the results of the research carried out by the C.S.I.R., a series of pamphlets is being prepared explaining the basic science of malting and brewing and its practical significance. The first two to be issued deal with the chemistry of the mashing process and the microbiology of fermentation.

Stokroos

Die ondersoek na die invloed van die tyd wanneer geoes word op die opbrengs en kwaliteit van vesels van verskillende variëteite stokroos (Kenaf, *Hibiscus cannabinus*) is voortgesit in samewerking met die Afdeling Akkerbou en Weiding van die Departement van Landbou. 'n Vyftigtal monsters van stokrooslinte, onder verskillende omstandighede gekweek, is groot en die veselopbrengs bepaal. Reëlins is met die Buro vir Standaarde getref om die treksterkte van die vesels te toets.

MEDIESE BIOCHEMIE

Studies in verband met Vitamien-A-Stofwisseling

Dit is 'n program in samewerking met die Voedingnavorsingseenheid aan die Universiteit van die Witwatersrand. By 'n verdere ondersoek van die fisiologiese funksie van vitamien A, is die assosiasie van hierdie vitamien met rotserumproteïene nagegaan met behulp van radioaktief gemerkte sintetiese vitamien A. Die serumproteïene is geskei deur elektroforese en daar is bevind dat die vitamien A geassosieer is met die α_1 -globulien, maar nie met die α_1 -lipoproteïene en waarskynlik ook nie met die α_1 -glikoproteïene nie.

Gedurende hierdie ondersoek is die aanwesigheid van 'n moontlike vitamien-A-stofwisselingsproduk aangedui. Aangesien die enigste metode van ondersoek hiervan op kleurreaksies berus, is 'n begin gemaak met 'n sistematiese ondersoek van halochromiereaksies op vitamien A en verwante verbindings.

Kankernavorsing

Die chemiese meganisme van kankerverwekking

Hierdie werk is onlangs begin en word gefinansier deur die Nasionale Kankervereniging. Die ondersoek is veral toegespits op die meganisme van velkankerverwekking. Proewe word tans gedoen om vas te stel of die vatbaarheid van muis en die weerstand van rotte teen velkankerverwekking verbonde is aan chemiese verskille in die velafskiedings van die twee soorte diere.

Die binding van tripaanblou deur bloed- en weefseleiwitte

Hierdie werk word gefinansier deur 'n toelae van die Nasionale Kankervereniging van Suid-Afrika en word onderneem in samewerking met die W.N.N.R. se Voedingnavorsingseenheid aan die Universiteit van die Witwatersrand.

'n Fisies-chemiese studie van die binding van tripaanblou deur rotserumeiwitte is gedoen. Die doel was om uit te vind aan welke eiwit of eiwitte die kleurstof gebind is en of die aard van die binding *in vivo* dieselfde is as wanneer tripaanblou aan die serum *in vitro* toegevoeg word. Hierdie sera is spektrofotometries in die ultrasentrifuge en deur middel van papierelektroforese en vrye elektroforese ondersoek. Die resultate toon aan dat die binding van tripaanblou deur rotserumeiwitte *in vivo* en *in vitro* soortgelyk is, so nie identies nie.

Kenaf

The study of the influence of the time of harvesting on the yield and quality of fibres from different varieties of kenaf ("Stokroos", *Hibiscus cannabinus*) were continued in collaboration with the Division of Crops and Pastures of the Department of Agriculture. Some 50 batches of ribbon from plants grown under different conditions were retted and the yield of fibre determined. Arrangements have been made with the Bureau of Standards for testing the tensile strength of the fibres.

MEDICAL BIOCHEMISTRY

Studies Relating to the Metabolism of Vitamin A

This is a collaborative programme with the Nutrition Research Unit at the University of the Witwatersrand. In a further study of the physiological function of vitamin A, its association with rat serum proteins was studied with the aid of synthetic radioactively-labelled vitamin A. The serum proteins were separated by electrophoresis and it was found that the vitamin A was associated with the α_1 -globulin, but not with the α_1 -lipoprotein and probably also not with the α_1 -glycoprotein.

During this investigation the presence of a possible metabolite of vitamin A was demonstrated. Since the only way of investigating this depends on colour reactions, a start was made with a systematic investigation of halochromic reactions of vitamin A and related compounds.

Cancer Research

The chemical mechanism of carcinogenesis

This work began recently and is sponsored by the National Cancer Association. The primary interest of the investigation is in the mechanism of carcinogenesis in the skin. Mice are susceptible to external applications of skin carcinogens while rats are not, and experiments are at present being carried out to determine whether the resistance of the latter is related to chemical differences in the skin secretions of these animals.

The binding of Trypan Blue by blood and tissue proteins

This work is supported by a grant from the National Cancer Association of South Africa and is being undertaken in collaboration with the C.S.I.R. Nutrition Research Unit at the University of the Witwatersrand.

A physico-chemical study of the binding of Trypan Blue by rat serum proteins was made. The aim was to find out to which protein or proteins the dye is bound and whether the mode of binding *in vivo* is the same as when Trypan Blue is added to the serum *in vitro*. The sera were examined spectrophotometrically in the ultracentrifuge, and by paper and free electrophoresis. The results show that the binding of Trypan Blue by rat serum proteins *in vivo* and *in vitro* is very similar, if not identical.

'n Ondersoek is uitgevoer om na te gaan of herhaalde-like inspuiting van tripaanblou enige veranderings in die serumeiwitte teweegbring en of hierdie veranderings die ontwikkeling van gewasse in die retikulo-endoeteelsisteam voorafgaan of volg. Volgens die resultate wat sover verkry is, veroorsaak tweeweeklikse inspuiting van rotte met tripaanblou geen belangrike veranderings in die serumeiwitte nie, totdat die diere gewasse ontwikkel. Sodra dit gebeur, neem die totale eiwitgehalte en die albumiengehalte van die serum aansienlik af, terwyl die α_1 -globulienfraksie na verhouding toeneem. Hierdie werk word voortgesit.

Lipoproteiene en Aterosklerose

Hierdie is 'n voortsetting van werk wat gedoen word in samewerking met die Suid-Afrikaanse Instituut vir Mediese Navorsing. Moeilikhede in verband met die kwantitatiewe bepaling van lipoproteienfraksies deur die Gofman-metode is oorwin deur die gebruik van 'n dubbelsektorsel in die ultrasentrifuge. Behalwe vir 'n onderbreking as gevolg van 'n lekkasie in die sel, word monsters nou gereeld ondersoek. Gevolgtrekkings sal slegs gemaak word nadat al die data versamel is. 'n Studie van die uitwerking van verskeie buffers op die β -lipoproteienfraksie het aan die lig gebring dat dit nie geaffekteer word nie; maar dit word ernstig verander deur ureum en deur natriumdodesielsulfaat.

MIKROBIOLOGIESE CHEMIE

Metabolisme van Swawelverbindings deur Bakterië

Hierdie ondersoek is voltooi. Daar is bewys dat, behalwe *Thiobacillus thiooxydans*, ook ander *Thiobacillus* soorte, naamlik *Thio. thioparus* en *Thio. denitrificans* tiosianaat as enigste swawelbron vir groei kan gebruik. Die drie soorte wys interessante verskille in die verbruik van nitraat vir die oksidasie van tiosianaat en tiosulfaat onder anaërobe omstandighede. Sowel tiosulfaat as tiosianaat laat *Thio. denitrificans* nitraat tot stikstofgas reduceer onder vorming van slegs spore van nitriet. *Thio. thioparus* produseer groot hoeveelhede nitriet maar geen stikstof nie. *Thio. thiooxydans* reduceer nitraat onder vorming van sowel nitriet as stikstof op 'n tiosulfaatbevattende medium, terwyl alleen nitriet in 'n tiosianaatmedium ophoop.

In die aanwesigheid van lugsuurstof kan *Thio. denitrificans* nie nitraat vir die oksidasie van tiosulfaat tot sulfaat gebruik nie. Andersyds kan *Thio. thioparus* nitraat as enigste stikstofbron gebruik.

Pekeluitjies

Een gis en drie bakteriesoorte wat *in vitro* geel kristalle uit uie-ekstrak vorm op dieselfde manier as geel vlekke in die weefsel van aangetaste uie ontstaan, is geïsoleer. Die kenmerke van hierdie organismes word vasgestel.

A study was made to see whether repeated injection of Trypan Blue brought about any changes in the serum proteins and whether these changes preceded or followed the development of tumours in the reticulo-endothelial system. The results obtained so far indicate that fortnightly injections of rats with Trypan Blue does not cause any significant changes in the serum proteins until the animals develop tumours. When this occurs there is a significant decrease in the total protein content of the serum, a lowering of the albumen content and a relative rise in the α_1 -globulin fraction. This work is being continued.

Lipoproteins and Atherosclerosis

This continues work being carried out in collaboration with the South African Institute for Medical Research. Difficulties in quantitative estimation of lipoprotein fractions by the Gofman method were overcome by use of a double sector cell in the ultracentrifuge. Apart from a breakdown occasioned by a leakage in the cell, regular examination of samples is now under way. Conclusions will be drawn only after the data are complete. A study of the effect of various buffers on the β -lipoprotein fraction showed that it is not affected, but it is severely altered by urea and by sodium dodecyl sulphate.

MICROBIOLOGICAL CHEMISTRY

Metabolism of Sulphur Compounds by Bacteria

This study has been concluded. It has been shown that in addition to *Thiobacillus thiooxydans*, other species of thiobacillus, namely, *Thio. thioparus* and *Thio. denitrificans* can utilize thiocyanate as sole source of sulphur for growth. The three species show interesting differences in their mode of utilization of nitrate for the oxidation of thiocyanate and also thiosulphate under anaerobic conditions. With both thiocyanate and thiosulphate *Thio. denitrificans* reduces nitrate to nitrogen gas with the formation of only traces of nitrite. *Thio. thioparus* produces large quantities of nitrite but no nitrogen. *Thio. thiooxydans* reduces nitrate with production of both nitrite and nitrogen in thiosulphate-containing medium, whereas only nitrite accumulates in thiocyanate medium.

In the presence of atmospheric oxygen *Thio. denitrificans* cannot use nitrate to oxidise thiosulphate to sulphate. *Thio. thioparus*, on the other hand, can use nitrate as sole nitrogen source.

Pickled Onions

One yeast and three species of bacteria have been isolated which can form yellow crystals from onion extract *in vitro* in a manner analogous to the formation of the yellow spots in the tissues of affected onions. These organisms are being characterized.

Die vorming van geel kristalle *in vitro* is deur lae temperatuur verhinder. Proewe word uitgevoer om te bepaal of die hou van uie by lae temperatuur gedurende pekeling ook die vorming van geel vlekke voorkom. Die resultate tot dusver verkry is bemoedigend.

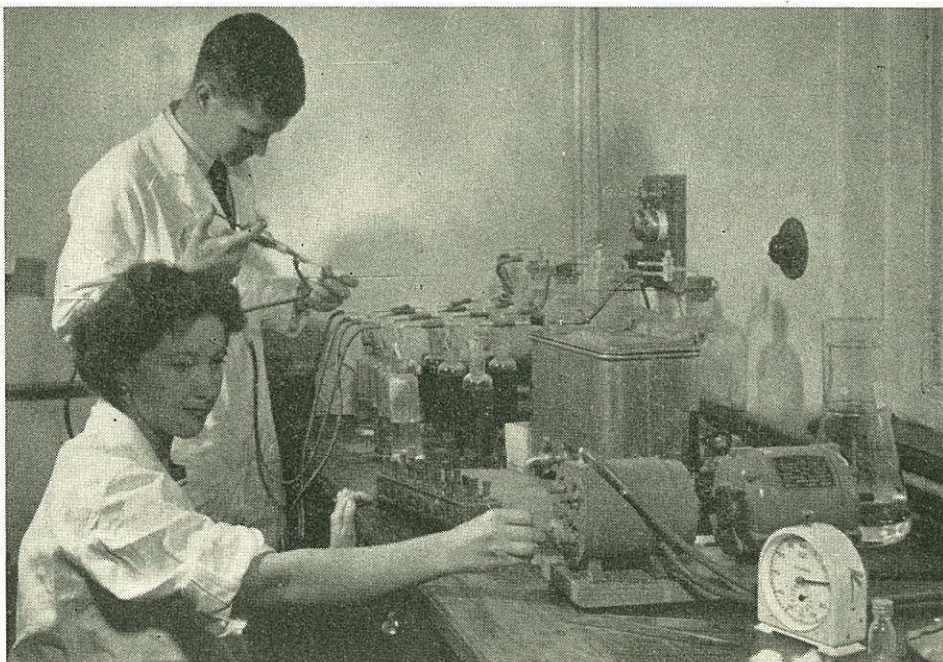
Die Vertering en Metabolisme van die Herkouer

In samewerking met die Veeartsenykundige Navorsingslaboratorium op Onderstepoort is die ondersoek in verband met die mikrobiologiese en biochemiese aspekte van die vertering en metabolisme van die herkouer voortgesit.

The formation of yellow crystals *in vitro* was inhibited by low temperatures. Experiments are being carried out to see whether keeping the onions at a low temperature during pickling also prevents the formation of yellow spots. The results to date are promising.

The Digestion and Metabolism of the Ruminant

Collaboration with the Veterinary Research Laboratory at Onderstepoort in the study of the microbiology and biochemistry of ruminant digestion and metabolism has been continued.



Bepaling van metaboliese bakteriegroepe wat in die grootpens van skape aangetref word.

Determining metabolic groups of bacteria found in the rumens of sheep.

Invloed van Koolhidrate op Ureumverbruik

Die invloed van stysel en glukose op die verbruik van ureum deur skape op 'n basiese dieet van tefhooi word met behulp van verskillende eksperimentele metodes ondersoek. Die metodes sluit in die bepaling van die afbraaksnelheid van ureum en koolhidrate sowel as hul metaboliëte *in vivo* en *in vitro*, studies van stikstofbalanse en 'n bakteriologiese ondersoek na die aantal en soorte mikro-organismes in die rumen wanneer stysel en glukose gevoer word. Die moontlikhede en beperkings van elke tegniek is bepaal. Die resultate tot nou toe het die bevindings van vorige werkers bevestig dat ureum meer doeltreffend vir proteïensintese gebruik word as stysel in plaas van glukose gegee word.

Influence of Carbohydrates on the Utilization of Urea

The influence of starch and glucose on the utilization of urea by sheep on a basal diet of teff hay is being investigated by a number of different experimental techniques. These include the determination of the rate of breakdown of urea and carbohydrate as well as their metabolites *in vivo* and *in vitro*, nitrogen balance studies and a bacteriological study of the numbers and types of micro-organisms in the rumen when starch or glucose is fed. The scope and limitations of each technique have been determined. The results to date have confirmed the findings of previous workers that urea is more efficiently utilized for protein synthesis when starch is fed than when glucose is given.

Domsiekte (Pregnancy Toxaemia)

Vorige werk op hierdie gebied het aan die lig gebring dat die verhouding van propioonsuur tot bottersuur in die rumen 'n belangrike faktor in die ontwikkeling van ketose by skape is. Propioonsuur ontstaan vernaamlik by die vertering van sellulose deur rumenbakterieë. 'n Metode vir die tel van sellulose-afbrekende bakterieë in die rumen is dus gesoek. Dit is baie moeilik om hierdie organismes in kultuur te laat groei, maar 'n geskikte metode vir tellingsproewe is uiteindelik ontwerp. Dit word nou gebruik vir 'n studie van die aantal sellulose-afbrekende bakterieë in die rumen van skape wat op verskillende diëte gehou is.

Die invloed van estrum op bloedglukose en ketoonliggame word deur Onderstepoort-werkers ondersoek.

Wynnavorsing

Die plan bestaan om 'n mikrobiologiese navorsings-eenheid in Stellenbosch te vestig, ten einde in samewerking met die Wynnavorsingsinstituut van die Departement van Landbou 'n studie te maak van die probleme van die Suid-Afrikaanse wynindustrie.

'n Beampte van die Laboratorium het die Kaap besoek om 'n voorlopige opname van die probleme in dié industrie te doen voordat hy vir vier maande oorsee gaan om die mikrobiologiese aspekte van die wynindustrie in Europa en Amerika te bestudeer.

Skimmelinfeksies in Natal

Op versoek van die Natalse Streekkomitee is 'n besoek aan Durban gebring om 'n opname van die probleme in verband met skimmelinfeksies in Natal te doen. Oor die algemeen gesproke, was die aard van hierdie probleme soortgelyk aan dié van warm, vogtige klimaatstreke in ander wêrelddele. Die meeste van die plaaslike probleme sou deur die toepassing van resultate van oorsese navorsing opgelos kan word.

PROSESONTWIKKELING EN PROEFAANLEGGINGSWERKSAAMHEDE

Waterontsouting deur Elektrodialise

Daar is baie aktief met hierdie onderneming voortgegaan. Ondersoeke met behulp van die proefaanleg in die Vrystaat met sy waterontsoutingsvermoë van 24,000 gallon per dag is uitgebrei, en belangrike tegniese verbeterings is aangebring. Dit het tot gevolg gehad dat verdere patentaansoeke gedoen is.

In samewerking met die goudmynmaatskappye is werk voortgesit in verband met die ontwerp en konstruksie van 'n prototipe eenheid wat sal dien as basis vir die beplande installasie met 'n ontsoutingsvermoë van 2½-miljoen gallon per dag. Die plan is dat die proewe met hierdie eenheid in April 1957 'n aanvang neem.

Met die oog op die oprigting deur die mynmaatskappye van een of meer installasies met 'n vermoë van 2½-miljoen gallon per dag, is tenders gevra vir die vervaardiging van

Domsiekte (Pregnancy Toxaemia)

Previous work on this problem has shown that the ratio of propionic acid to butyric acid in the rumen is an important factor in the development of ketosis in sheep. Propionic acid arises mainly from the digestion of cellulose by the rumen bacteria. A method for counting cellulolytic bacteria in the rumen was therefore sought. These organisms are very difficult to grow in culture, but a suitable method for counting them was eventually developed. This is now being applied to a study of the numbers of cellulolytic bacteria in the rumen of sheep on different diets.

The effect of oestrus on blood glucose and ketone bodies is being studied by the Onderstepoort team.

Wine Research

It is proposed to establish a microbiological research unit at Stellenbosch to study the microbiological problems of the South African wine industry in collaboration with the Oenological Research Institute of the Department of Agriculture.

An officer of the Laboratory visited the Cape to make a preliminary survey of the industry's problems before going overseas for four months to study what is being done in the way of microbiological research in the wine industry in Europe and America.

Mould Infections in Natal

At the request of the Natal Regional Committee a visit was paid to Durban to survey the problems associated with mould infections in Natal. Generally speaking, the problems encountered were similar to those in hot humid climates in other parts of the world. Most of the local problems could be solved on the basis of information available from research already carried out overseas.

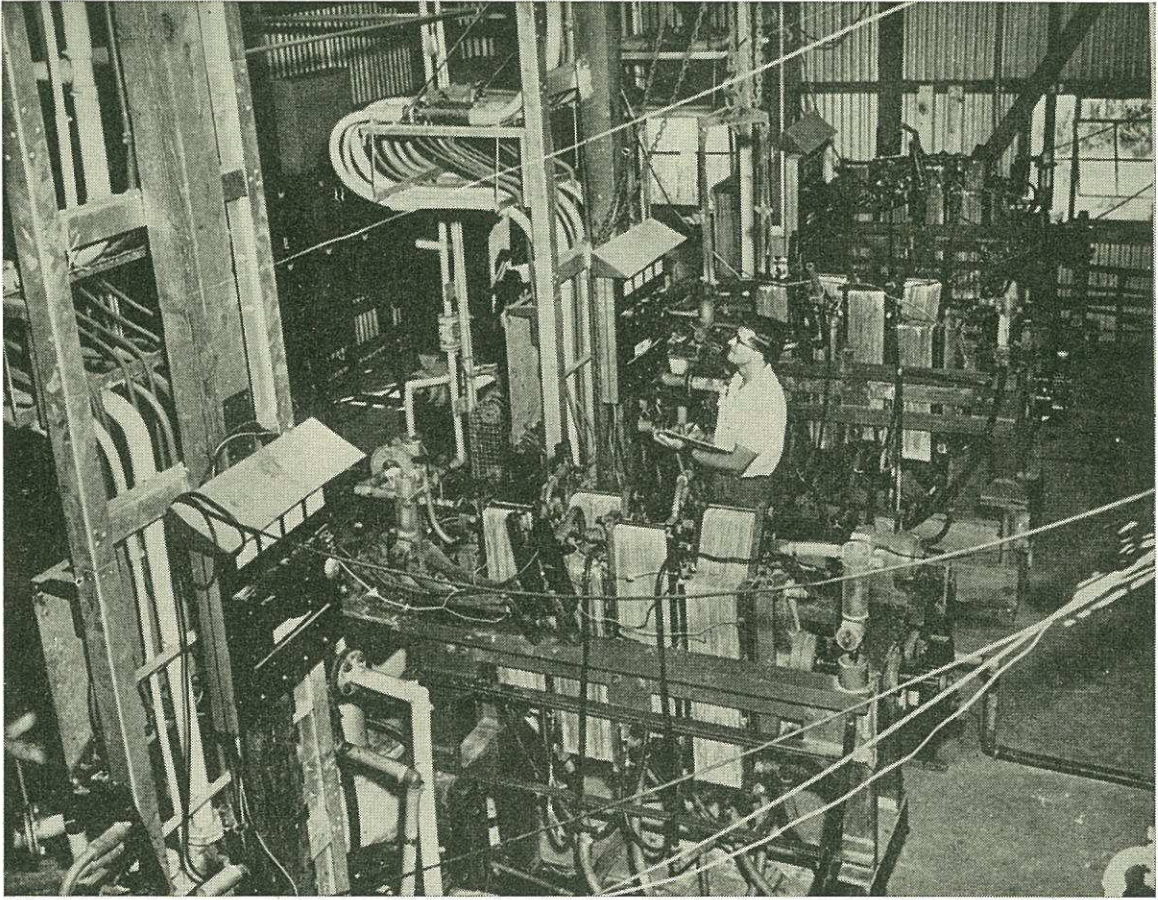
PROCESS DEVELOPMENT AND PILOT PLANT ACTIVITIES

Water Demineralization by Electrodialysis

This project has continued very actively. The investigations with the 24,000 gallon per day pilot plant desalting mine water in the Orange Free State were extended, and led to significant technical improvements, which resulted in further patent applications being filed.

In collaboration with the gold mining companies, work was continued on the design and construction of a prototype unit which will form the basis of the projected 2½ million gallon per day plant. Tests on this unit are scheduled to begin in April, 1957.

In anticipation of the erection by the mining companies of one or more 2½ million gallon per day plants, invitations to tender for the manufacture of the necessary ion-selective membranes were issued. This evoked a



Die proefaanleg op Welkom vir die ontsouting van water behandel 24,000 gallon daaglik.

The water desalting pilot plant at Welkom handles 24,000 gallons daily.

die benodigde ioonselektiewe membrane. Dit het 'n groot reaksie uitgelok van al die belangrikste fabriserende maatskappye van die wêreld. Waarskynlik sal die goedkoop membrane wat in hierdie Laboratorium ontwikkel is, in die eerste grootskaalse installasie gebruik word wat deur die mynmaatskappye in bedryf gestel sal word. Onderhandelings vir die vervaardiging van die membrane kragtens 'n lisensie is begin, en duur nog voort. Verskeie liggame wat hulle met waterontsouting besig hou, het die mening uitgespreek dat die oprigting van die eerste werklike groot installasie in die wêreld vir die ontsouting van brakwater, en die ontwikkeling in hierdie Laboratorium van geskikte membrane teen 'n lae koste, 'n aansienlike uitbreiding in die gebruik oor die hele wêreld van elektrodialise vir die grootskaalse ontsouting van brakwater en vir ander doeleindes tot gevolg sal hê.

big response from the major manufacturing companies of the world. It seems probable that the low-cost membranes developed in this Laboratory will be used in the first large-scale desalting plant to be operated by the mining companies. Negotiations for the manufacture of the membranes under licence were opened and are proceeding.

The opinion has been voiced by various concerns working in the water demineralizing field that the erection of the first really large-scale plant in the world to desalt brack water, and the development in this Laboratory of suitable low-cost membranes, will result in a considerable acceleration in the use throughout the world of electro dialysis for the large-scale desalting of brack water and other purposes.

Die groot somme geld wat die W.N.N.R. en die mynmaatskappye in hierdie onderneming gestee het, kan dus tot internasionale sowel as nasionale voordeel strek.

'n Begin is gemaak met die ontwikkeling van 'n klein elektrodialise-eenheid wat geskik sal wees vir gebruik op plase en op die platteland. Voorlopige toetse in hierdie Laboratorium met behulp van sintetiese waters met verskillende soutkonsentrasies was baie bemoedigend. Die doel is om 'n eenheid te konstrueer wat slegs eenvoudige onderhoudsprosedures sal vereis, en wat deur plaasarbeiders bedien kan word. 'n Belangrike aspek van die saak is die moontlikheid om beter en meer ekonomiese gebruik te maak van uitgestrekte gebiede wat weens watertekort tot dusver moeilik bruikbaar of selfs nutteloos was. Op die oomblik word grootskaalse besproeiing nog nie as 'n lonende onderneming beskou nie, en dit word dus nie ondersoek nie.

Wolwas

Ettlike honderde pond wolwas, verseep volgens die proses wat in hierdie Laboratorium ontwikkel is, is berei vir gebruik deur 'n fabrikant in 'n markwaardasie en vir die toets van een van sy produkte wat hierdie materiaal bevat.

Pynappelafval

Toetse op 'n proefaanleg skaal is by 'n groot inmaakfabriek uitgevoer in verband met die droog van pynappelafval, met die oog op die gebruik daarvan in gebalanseerde voedselrantsoene vir diere, veral koeie en varke.

Hierdie werk, wat voortgesit word, is uitgevoer in medewerking met die inmaakfabriek en 'n kommersiële firma wat te doen het met droogtoerusting. 'n Hele aantal ton gedroogde materiaal is op bevredigende wyse vervaardig, en sal gebruik word by gekontroleerde diervoedingtoetse wat deur die Departement van Landbou uitgevoer sal word. Die opruiming van die groot hoeveelhede pynappelafval wat ontstaan, deesdae omtrent 30,000 ton per jaar, en volgens skatting omtrent 60,000 ton per jaar binne die volgende paar jaar, is 'n moeilike probleem. Die algemene gebruik van bogenoemde proses behoort dus 'n lonende oplossing daarvan te wees en tegelykertyd 'n waardevolle aanvullende veevoer beskikbaar te stel, wat na beweer word o.a. die melkproduksie van koeie verhoog.

Ondersoek van Reuke afkomstig van Nywerhede

Werk kragtens 'n kontrak met 'n nywerheidsfirma vir die uitskakeling van reuke afkomstig van industriële prosesse is voortgesit. 'n Lid van die Laboratoriumpersoneel het onlangs teruggekeer van 'n besoek aan Kanada, waar hy werkers op hierdie gebied geraadpleeg het.

Raadgewende dienste is kragtens 'n tweede kontrak in hierdie verband aan 'n munisipaliteit verleen.

The large sums of money invested by the C.S.I.R. and the mining companies in this project are therefore likely to be of international, as well as national benefit.

The development of a small electro dialysis unit suitable for farm and rural use was started. Preliminary tests in the Laboratory on synthetic waters of various salt concentrations were very encouraging. The aim is to produce a unit which requires only simple maintenance procedures and can be operated by farm labour. The possibility of making better and more economic use of wide areas of marginal, or at present useless land is important. The possibility of large-scale irrigation is not yet considered to be an economic proposition and is, therefore, not being explored.

Wool Wax

Several hundred pounds of wool wax, saponified according to the process developed in this Laboratory, were prepared for use by a manufacturer in the market evaluation and testing of one of his products incorporating this material.

Pineapple Waste

Pilot-scale tests were carried out at a large canning factory on the drying of pineapple waste with a view to its incorporation in balanced food rations for animals, particularly cows and pigs.

This work, which is continuing, was carried out in collaboration with the canning factory and a commercial firm associated with drying equipment. Several tons of dried materials were satisfactorily produced and will be used in controlled animal feeding tests to be carried out by the Department of Agriculture.

Disposal of the large quantities of pineapple waste produced, at present some 30,000 tons per annum and estimated at 60,000 tons per annum in a few years, poses serious problems. Adoption of this process should give an economic solution to the problem, while making available a valuable animal feed supplement which is reported to be of particular value in increasing milk yields in dairy cattle.

Industrial Odour Investigations

A contract with an industrial concern for the elimination of process odours was continued. A member of the Laboratory's staff returned from a visit to Canada where he consulted workers in this field.

Services to a municipality were continued in connection with a second contract in which technical consultant services were given.

Gebruik van Nieuwprodukte van 'n Chemiese Proses

Kragtens 'n kontrak met 'n groot nywerheidsfirma is 'n Beurshouer aangestel om moontlike ekonomiese gebruike vir die firma se nuweprodukte te ondersoek. Gestadige vooruitgang is gemaak, en daar word gehoop dat dit sal lei tot 'n uitbreiding van die firma se werksaamhede op die gebied van chemiese produksie.

WATERNAVORSING

Verdere Suiwering van Uitvloeiels vanaf Rioolwatersuiweringswerke

Sowel ammoniumverbindings as nitrate is ongewenste bestanddele in oppervlaktewater, aangesien hulle 'n uitermatige groei van alge in die hand werk en gevolglik skade aan visse en ander biologiese lewe kan berokken; daarbenewens kan water wat nitrate bevat ook toksies wees vir babas onder een jaar. Die aanwesigheid van ammoniak en nitrate is kenmerkend van 'n riooluitvloeiels en derhalwe doen die Afdeling navorsing om hierdie stikstofverbindings te verwyder sodat volledig gesuiwerde rioolwater nie van normale natuurlike water onderskei kan word nie.

Om die oksidasie van ammoniak tot nitraat in die uitvloeiels van biologiese sypelbeddings te bewerkstellig, is gebruik gemaak van die welbekende geaktiveerde slykproses waarvolgens die uitvloeiels, in kontak met sy eie humusslyk, belugting ontvang. Die humusslyk word toegelaat om te vermeerder totdat dit 'n aktiewe nitrifiserende medium word en die finale uitloop hoegenaamd

Utilization of Chemical Process By-products

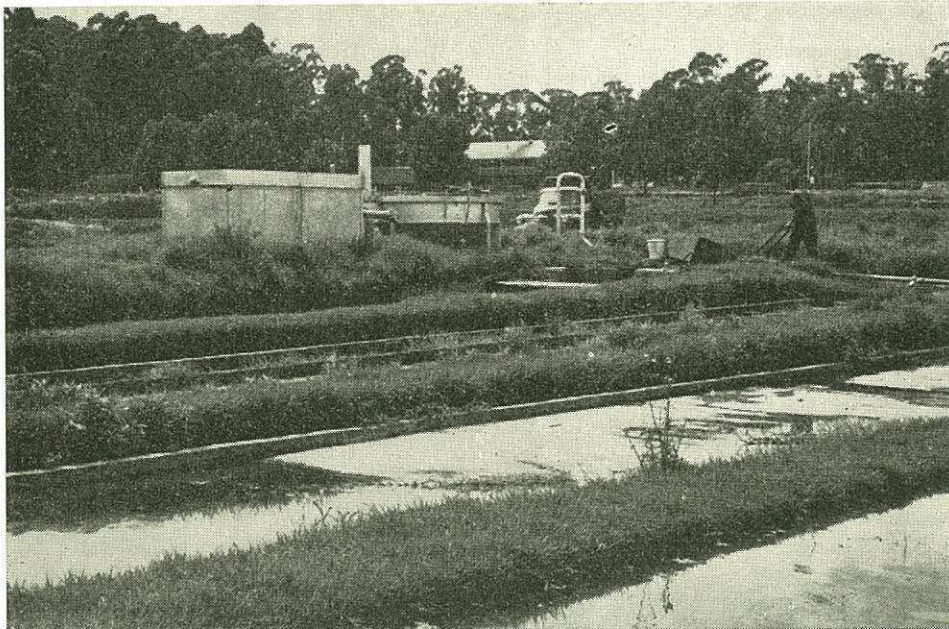
A Research Fellow was appointed, in terms of a contract with a large industrial firm, to investigate possible economic uses of the firm's by-products. Steady progress was maintained, which it is hoped will lead to an expansion of the Company's activities in the chemical production field.

WATER RESEARCH

Further Purification of Effluents from Sewage Works

Both ammonia and nitrate are undesirable constituents in a surface water since they encourage excessive algal growth, can be harmful to fish and other biological life, and can be toxic to babies under one year old. The presence of nitrogen compounds such as ammonia and nitrate characterises a sewage effluent; consequently the Division has been experimenting on the removal of these compounds in order to render purified sewage effluent indistinguishable from normal surface waters.

For the oxidization of ammonia to nitrate the well-known activated sludge process was applied to biological filter effluent containing its own sludge. By aerating this effluent in contact with its own sludge, which is allowed to accumulate, the latter became an active nitrifying agent and an effluent was produced containing no ammonia whatsoever. The process was developed in



Proewe in verband met die verdere suiwering van rioolafvalwater deur middel van geaktiveerde humus.

Experiments on the further purification of sewage effluents by the activated humus process.

geen ammoniak meer bevat nie. Hierdie proses is in die laboratorium ontwikkel en word nou getoets in 'n proef-eenheid by die rioolwerke van Pretoria. Die werking van die eenheid was tot dusver geslaagd en dit wil voorkom asof die proses geheel en al prakties is en ekonomiese moontlikhede bied.

Nadat alle ammoniak geoksideer is, is die reduksie van nitrate tot stikstofgas deur bakteriologiese denitrifikasie ondersoek. Na uitgebreide ondersoekingswerk, het die Afdeling daarin geslaag om 'n aanhoudende denitrifikasie-proses in die laboratorium tot stand te bring. Deur die toevoeging van sekere eenvoudige organiese voedingsmiddels was dit moontlik om nitrate om te sit in stikstofgas en sodoende die hoeveelheid nitraat baie te verminder. Die werk het egter nog nie ver genoeg gevorder om oor te skakel na proefnemings in 'n proefaanleg nie.

'n Vertakking van hierdie ondersoek in verband met denitrifikasie is die moontlike toepassing van die proses op natuurlike watervoorrade in Suid-Afrika wat baie nitrate bevat. Die nitraatinhoud van hierdie waters kan nie volgens bestaande prosesse verminder word nie en gevolglik word baie ondergrondse voorrade vir menslike gebruik uitgeskakel.

Proefnemings, om die verdere suiwing van riooluitvloeiels deur middel van grasbeddings en natuurlike suiweringsdamme te bepaal, het ver gevorder. Daar is vasgestel dat hierdie eenhede baie doeltreffend is om die finale afronding te gee aan die suiweringskringloop van rioolwaters. Ook is die bakteriologiese kwaliteit van sulke waters na bogenoemde behandeling beter as die van sand-gefiltreerde uitvloeiels.

Aërobiese Behandelingsmetodes

Laboratoriumtoetse in verband met die suurstofver-skaaffende en suurstofeisende faktore in biologiese sy-pelbeddings is voltooi en 'n proefaanleg, om die hersirkulasie van humusslyk deur 'n sypelbedding te bestudeer, word tans oorweeg. Daar is voorlopig vasgestel dat dit moontlik is om humusslyk in die stelsel te laat opbou en sulke humusslyk te aktiveer deur die sypelbedding self as belugtingsmedium te gebruik.

Anaërobiese Behandelingsmetodes

Veral in die Verre Ooste en in die Verenigde State van Amerika het navorsers, sonder enige mate van sukses, geprobeer om 'n metode te vind om nagvuil te verteer. Die vernietiging van nagvuil, afkomstig uit ongerioleerde gebiede soos lokasies en kleiner dorpe, gaan gepaard met groot probleme. Die Afdeling het 'n geslaagde metode vir die anaërobiese vertering van nagvuil, deur middel van 'n reeks laboratoriumtoetse, ontwikkel. Die werk kan nou oorgaan tot 'n loodsinstallasie en baie munisipaliteite het reeds groot belangstelling getoon.

Eksperimente in verband met die vertering van afvalwater van 'n hardbordfabriek is gedoen en daar is bevind dat die gistingproses baie doeltreffend is om die organiese lading van so 'n gekonsentreerde uitvloeielsel tot so 'n lae

the laboratory and is now being tried out on pilot plant scale at the Pretoria Sewage Works. The operation has thus far been successful and the process appears to be completely practicable and economically feasible.

With all the ammonia oxidized, the problem of reducing the nitrate to nitrogen gas by the bacterial denitrification process was investigated. After a considerable amount of preliminary investigational work, the Division was successful in establishing a continuous denitrification process in the laboratory. By the addition of certain simple organic nutrients it was found possible to convert the nitrate to nitrogen gas, thus reducing the former to very low levels, but the work has not progressed sufficiently to plan experiments on a pilot plant scale.

A side issue of the investigations on denitrification is the applicability of the process to natural water supplies in South Africa which are highly charged with nitrates. The nitrate concentration of these waters cannot be reduced by any known process, consequently many of the underground water supplies are totally unsuitable for human consumption.

Experiments on evaluating the further purification of sewage effluents by the use of grass beds and maturation ponds have reached an advanced stage. It was established that these units are very effective in providing the final "polishing" stages in the purification cycle of sewage effluent and that the bacteriological quality of the effluent from these units is much higher than could be obtained by sand filtration.

Aerobic Treatment Methods

Laboratory studies on oxygenating and oxygen consuming factors in biological filters were completed and pilot plant studies on the recirculation of humus sludge through a biological filter are in progress. It was found possible to accumulate humus sludge in the recirculation system and to establish activity in the sludge by using the biological filter itself as the aeration unit.

Anaerobic Treatment Methods

Many unsuccessful attempts have been made by research workers, especially in the East and in the United States, to evolve a process for digestion of night soil, the disposal of which in unsewered areas such as native locations and small towns often presents very serious difficulties. The Division worked out a successful process for anaerobic digestion of night soil in a series of laboratory experiments. The work has now reached the pilot plant stage and many local authorities have expressed great interest in the results.

Experiments were carried out on the digestion of effluent from a hardboard factory. Anaerobic digestion proved quite effective in reducing the organic load of the concentrated waste to a level sufficiently low for further

peil te verminder dat dit daarna verder deur middel van 'n spjelbedding gesuiwer kan word. Dit was egter nodig om 100 dele per miljoen ammoniakstikstof by die gekonsentreerde afvalwater by te voeg.

Rivieropnames

Sedert die bekragtiging van die Waterwet nr. 54 van 1956, het die werksaamhede van die Afdeling aansienlik uitgebrei.

Een van die belangrikste ondersoeke waarmee 'n begin gemaak is, staan in verband met die opvanggebied van die Vaal, die Vaaldam en die Vaalrivierstudam. Die ondersoekingswerk het chemiese, bakteriologiese en biologiese aspekte van die water gedek, asook volledige studies van die bodemneerslae, om sodoende te bepaal wat die uitwerking is van besoedeling deur rioolwater, industriële afvalwater en landboukundige bedrywighede op die verskillende bogronde waters wat in die opvanggebied van die Vaal bokant die studam ontstaan.

Die ondersoek van die Jukskei-Krokodilrivier-stelsel vorder goed. Data is versamel in verband met die uitwerking van rioolwater, industriële en landboukundige besoedeling op die biologiese toestande in die riviere. Besondere aandag is gewy aan die uitwerking op vislewe.

Met betrekking tot die navorsing in verband met bilharziase wat ondersteuning ontvang van die Transvaalse Provinsiale Administrasie, het die Afdeling chemiese dienste verskaf vir rivieropnames in Oos-Transvaal.

In Natal is die werksaamhede in verband met die Tugelarivierstelsel reeds in die finale stadium.

Watervoorsiening

Werk in hierdie verband was hoofsaaklik toegespits op 'n oplossing vir die watervoorsieningsprobleme in die droë streke van ons land. Toetse is met sondistillasie gedoen en 'n volledige eenheid is ontwerp om die koste vir die verkryging van vars water te bepaal. Uit die eksperimentele eenhede blyk dat volgens hierdie beginsel groot-skaalse permanente installasies teen lae koste sal werk, terwyl die koste aan volledige, vervoerbare eenhede verbonde moontlik aan die hoë kant sal wees.

Heelwat addisionele werk is gedoen in verband met die ontfuoring van fluoriedhoudende waters en groot-skaalse ondersoek met 'n gebruiklike ioon-uitruilingskolom is tans afgehandel. Die koste van ontfuoring is bereken op 4/2d. per 1,000 gallon vir 'n installasie met 'n kapasiteit van 6,000 gallon per dag. Daar is egter vasgestel dat die koste afgebring kan word deur aanwending van die stelsel van serie-ontfluoring. Werk in hierdie verband bereik tans die stadium van 'n proefaanleg. In die laboratorium is bepaal dat waters met 'n hoë chloriedinhoud die ontfuoringskapasiteit van die ioon-uitruilingskolom kan verlaag. Hierdie moeilikheid kan te bowe gekom word deur vermeerdering van die vernuwingsvloeistof. Volle besonderhede aangaande ontfuoring van huishoudelike watervoorsiening is reeds opgestel.

purification on the biological filter. It was found necessary, however, to add ammonia nitrogen to the concentrated waste to the extent of 100 parts per million.

Stream Surveys

The activity of the Division in this field has been extended quite considerably since the implementation of Water Act No. 54 of 1956.

One of the most important surveys to be initiated was that of the catchment area of the Vaal Dam, the Vaal Dam itself and the Vaal River Barrage. The investigational work covered chemical, bacteriological and biological studies on the water, together with complete investigations on bottom sediments, in order to assess the effects of sewage, industrial and agricultural pollution on the various surface waters which arise in the catchment area of the Vaal River above the Vaal Barrage.

The survey of the Jukskei-Crocodile River system has progressed well. Data were collected on the effects of sewage, industrial and agricultural pollution on the biological conditions in the streams. Particular attention was given to the effects on fish life.

With regard to the research on bilharziasis sponsored by the Transvaal Provincial Administration, the Division has established chemical services for the stream survey work in the Eastern Transvaal.

In Natal the work on the Tugela River system has been carried to its final stages.

Water Supplies

Most of the work in this connection was directed towards the solution of water supply problems in the arid regions of the country. Experiments were conducted with solar distillation and a self-contained unit designed for evaluating costs of production of fresh water. The principles observed on the experimental units so far, indicate that low costs could be attained in the case of large-scale permanent installations, whereas the cost for portable self-contained units would be on the high side.

A considerable amount of additional work was done on the defluoridation of fluoride-bearing waters and full-scale plant studies with a conventional ion-exchange column were finalised. The cost of defluoridation was found to be 4/2d. per 1,000 gallons for a plant with a capacity of 6,000 gallons per day. It was established, however, that this cost could be reduced by the use of the principle of series defluoridation, the work on which has now reached the pilot plant stage. In laboratory studies, it was established that high concentrations of chloride in water could reduce the defluoridation capacity of an ion-exchange column. This difficulty could be overcome by increasing the amount of regenerant. Full details for defluoridating household supplies have been evolved.

Tegniese Dienste aan die Departement van Waterwese

Waterwet nr. 54 van 1956 maak, onder andere, voorsiening vir strenger beheer oor die gebruik van water vir industriële doeleindes; vir die suiwing en afvoer van industriële- en rioolwateruitvloeiens, en vir die beskerming van riviere teen besoedeling. Ten einde die toepassing van van sekere afdelings van die Wet te bewerkstellig, is die Afdeling versoek om uitgebreide tegniese en raadgevende dienste te verskaf.

Tegniese Dienste aan ander Organisasies

Die Streekslaboratorium in Windhoek, wat tot stand gekom het met die hulp van 'n toekenning van die Suidwes-Afrika Administrasie, het sy werksaamhede aansienlik uitgebrei. Besondere aandag is geskenk aan die oorsprong van gemineraliseerde waters wat na die Swakoprivier vloei asook die posisie van vars en gemineraliseerde watersones in die sanderige rivierbedding. Uit voorlopige data wil dit blyk dat die invloei van waters met hoë minerale soutinhoud betreklik gering is in vergelyking met dié van vars water in die sanderige bedding, maar as gevolg van vermenging word dikwels 'n water verkry wat ongeskik is vir gebruik.

Die vermindering van verdamping deur die toediening van setielalkohol aan wateroppervlakke en die bewaring van water in sandopgaardamme, word bestudeer.

Oorwegings is geskenk aan die totstandkoming van tegniese dienste in Windhoek in verband met sake rakende rioolwater- en drinkwatersuiwing in die belang van munisipaliteite. Alreeds is heelwat werk gedoen in verband met die suiwing van uitvloeisel van die Windhoekse Munisipale Rioolwerke met die doel om die water weer vir sekere ander doeleindes te gebruik.

Dit was moontlik om 'n Streekseenheid van die Afdeling in Natal op te rig om sodoende dienste aan die Natalse Provinsiale Administrasie te lewer i.v.m. rioolwater, nywerheidsafvalwater- en drinkwatersuiwing.

Die Afdeling het ook kragtens kontrak ondersoekingswerk gedoen en raadgevende dienste gelewer in verband met rioolwaters, industriële afvalwater, drinkwatersuiwing en waterversagting aan verskeie stadsrade in die Unie.

'n Aantal nywerheidsondernemings het ook gebruik gemaak van die dienste van die Afdeling, hoofsaaklik in verband met die suiwing van hul industriële afvalwater.

FISIËSE EN ANALITIESE CHEMIE

Diffusie in Oksiede

Hierdie fundamentele ondersoek is voortgesit. In die vorige verslag is daarop gewag dat eksperimente op die uitruiling tussen gemerkte suurstof en 'n oksied in 'n silikahouer bederf was deur uitruilings met die silika self. Sedertdien is gesinterde aluminahouers verkry, en dit het geblyk dat hulle, ten minste vir die duur van die eksperi-

Technical Services to the Department of Water Affairs

Water Act No. 54 of 1956 makes provision, *inter alia*, for stricter control of the use of water for industrial purposes, for the purification and disposal of industrial wastes and sewage effluents, and for the prevention of pollution. In order to implement the relevant sections of the Act the Division has been called upon to provide comprehensive technical and advisory services.

Technical Services to Other Organizations

The regional laboratory in Windhoek, established with the aid of a grant from the South West Africa Administration, has expanded its activities considerably. Particular attention was given to the origin of mineralised flows into the Swakop River and the location of fresh and mineralised water zones in the sandy beds of the river. From preliminary data it appears that the volume of mineralised flow into the Swakop River is fairly small compared with the fresh water in the sand beds and that mixing of these two types of water sometimes results in a water which is unsuitable for use. The control of evaporation by the application of cetyl alcohol to water surfaces and by the storage of water in sand storage dams were studied.

Consideration was given to the establishment of technical services in Windhoek on matters relating to sewage and water purification on behalf of local authorities. In particular, a considerable amount of work was carried out in connection with the purification of sewage effluent from the Windhoek Municipal Sewage Works for certain purposes.

It has been possible to establish a regional unit of the Division in Natal with a view to supplying services to the Natal Provincial Administration on matters relating to sewage, water and industrial effluent purification.

The Division provided investigational and advisory services in connection with sewage and industrial waste disposal, water purification and water softening under contract to a number of municipalities in the Union.

In a number of cases industrial undertakings called upon the services of the Division mainly in connection with the treatment of industrial wastes.

PHYSICAL AND ANALYTICAL CHEMISTRY

Diffusion in Oxides

This fundamental investigation has continued. In the last report, it was pointed out that experiments on exchange between labelled oxygen and an oxide in a silica vessel were spoiled by exchange with the silica itself. Subsequent to this, sintered alumina vessels were procured and were found to be free from exchange, at least

ment, uitruilvry gebly het. Die uitruilingsreaktiwiteit van silika het daartoe gelei dat die eerste eksperimente met silika uitgevoer is. Sowel kwarts as glasagtige silika is gebruik en selfdiffusiekoëffisiënte gemeet. Soos verwag, was die waarde vir laasgenoemde bepaal, groter.

Selfdiffusie in Mengsels

Na verloop van 'n tydperk waarin personeelkrigte vir meer dringende probleme aangewend moes word, is hierdie fundamentele ondersoek gedurende die jaar hervat. 'n Ideale en nie-ideale sisteem is gekies en diffusiekoëffisiënte is gemeet. Die bepaling van selfdiffusiekoëffisiënte is gemeet. Die bepaling van selfdiffusiekoëffisiënte met behulp van radioaktiewe isotope is tans aan die gang.

Radiochemie

Die voorsiening van gemerkte superfosfaat vir bemestingstudies asook die meting van die opname daarvan deur tabakplante het nou 'n gereelde diens geword, en is in die afgelope jaar voortgesit.

C^{14} -bepalings word vir 'n hele aantal projekte op 'n roetinebasis uitgevoer. 'n Lagie bariumkarbonaat op 'n proporsionele telbuis het geblyk heeltemal sensitief genoeg te wees in alle gevalle tot dusver ondersoek, bv. metabolisme van vitamien A, werkingswyse van insulien, ens. Dieselfde metode is toegepas vir die bepaling van Ca in die vorm van $CaCO_3$, wat een aspek uitmaak van 'n ondersoek i.v.m. die differensieel-termiese analise van kalsiet, 'n projek wat deur die Nasionale Bounavorsings-instituut uitgevoer word.

Werk i.v.m. die afskeiding van draervrye isotope van siklotronskywe is voortgesit, en wel niobium van sirkonium en silwer van palladium. Die moontlikheid om molibdeen, wat ontstaan deur dubbele beta-verval, van sirkoon af te skei, is ook bestudeer, tot dusver egter sonder sukses.

Die afskeiding van draervrye UX_1 uit groot hoeveelhede uraan is bestudeer en 'n suksesvolle metode uitgewerk, wat tans toegepas word.

Radioaktiewe uitval word tans sistematies ondersoek deur die Onderafdeling Biofisika van die N.F.N.L. Volgens 'n chemiese ondersoek van die skeidingsmetodes vir die seldsame aardbestanddele van die uitval, blyk dat die aangewende metodes nie heeltemal bevredigend is nie, en dat verdere navorsing onderneem sal moet word.

Bystand is aan die Bernard Price Instituut verleen by die skeiding van rubidiumvrye stroncium uit biotiete deur middel van radioisotope. Hierdie maak deel uit van 'n program i.v.m. die ouderdomsbepaling van rotse.

Verder is 'n metode uitgewerk vir 'n firma waarby katoendraad gemerk word met uitstralers van gammastrale met hoë energie en 'n kort lewensduur.

Korrosie

Die werk i.v.m. die korrosie van staal in gewapende beton in die vorige verslag beskrywe, is in die afgelope jaar voortgesit kragtens 'n Beurs onder die gesamentlike

within the time of an experiment. Owing to the exchange reactivity of silica, the first experiments have been with silica. Both quartz and vitreous silica have been used, and self-diffusion coefficients have been measured. As expected, the value for the latter form is the larger.

Self-diffusion in Mixtures

After a period in which staff had to be employed on more urgent problems, this fundamental study was resumed during the year. An ideal and a non-ideal system have been selected and diffusion coefficients have been measured. Determination of self-diffusion coefficients using radio-active isotopes is now under way.

Radiochemistry

The now regular task of supplying labelled superphosphate for fertilizer studies was continued in the past year. So also was measurement of its uptake by tobacco plants.

Determinations of C^{14} for a number of projects are being carried out on a routine basis. A layer of barium carbonate in a proportional counter has proven adequate in sensitivity for all purposes thus far, for example, metabolism of vitamin A, mode of action of insulin. The same method has been employed for calcium as calcium carbonate, as part of an investigation on differential thermal analysis of calcite by the National Building Research Institute.

Work was continued on separation of carrier-free isotopes from cyclotron targets, namely, niobium from zirconium, silver from palladium. The possibility of separating molybdenum produced by double β -decay from zirconium was also studied, thus far without success.

The separation of carrier-free UX_1 from large quantities of uranium was studied to the point of devising a successful procedure. This is now being applied.

Radio-active fall-out is being studied systematically by the Biophysics Section of the National Physical Research Laboratory. A chemical investigation of separation of rare-earth components in the collected fall-out shows that the techniques employed are not entirely satisfactory and further research will be undertaken.

Assistance was given the Bernard Price Institute in use of radio-isotopes to devise a method of separating strontium, free from rubidium, from biotites. This is part of a programme on age determination of rocks.

A method of labelling cotton thread with short-lived, high-energy, gamma-radiation emitters was studied on behalf of a firm.

Corrosion

Work on corrosion of steel in reinforced concrete described in the last report has been continued in the past year by Fellowships under the joint supervision of

toesig van die Nasionale Bounavorsingsinstituut en die Nasionale Chemiese Navorsingslaboratorium. Afgesien van 'n reeks beplande blootstellingstoetse is 'n redelik suksesvolle poging aangewend om die variasies in deurlaatbaarheid van 'n betonstruktuur vas te stel deur middel van kalsium-hidroksiedistribusie. 'n Aantal toetse is ook met gegalvaniseerde staalwapening uitgevoer.

Blootstellingstoetse op gegalvaniseerde yster aan die atmosfeer is voortgesit. Die metode om die mate van korrosie vas te stel, deur die gewigsverlies te bepaal wanneer die korrosieprodukt verwyder is, is beproef deur dit toe te pas op sinkplate wat deur middel van 'n humiditeitsapparaat in die laboratorium gekorrodeer is. Die gewigsverlies het goed ooreengestem met die gewigstoename in bogenoemde apparaat.

'n Studie is gemaak van die korrosie van koper en staal in swart ystersulfiedmodder, 'n saak wat van belang is by oprigtingswerk in die drooggelegde gebied te Kaapstad.

'n Besoek aan die Verenigde Koninkryk ten einde onlangse ontwikkelinge in die katodiese beskerming van oorlogskiprompe te bestudeer is deur die Departement van Verdediging ondersteun.

Verder is, soos in vorige jare, inligtings verskaf en 'n aantal klein kontrakondersoeke uitgevoer.

Ioonselektiewe Membrane

Fisies-chemiese ondersoekingswerk is voortgesit op hierdie membrane wat by die ontsouting van water gebruik word. Daar is vasgestel dat die metode vir die bepaling van die uitruilkapasiteit van membrane wat vroeër aanbeveel is, aanleiding gee tot ernstige foute vir sekere soorte positiewe membrane. 'n Verbeterde metode, wat die gebruik van alkaliese oplossings uitskakel, is daarop uitgewerk. Die onstabieleit van sulke membrane in alkaliese oplossings het die noodsaaklikheid vir die ontwikkeling van meer stabiele membrane aan die lig gebring.

Die mobiliteit van sowel natrium- as chloridione in die membraanfase is bepaal deur gegewens oor die geleidingsvermoë en ionetransport in verband met die ionekonsentrasie in die membrane te bring. Daar is bevind dat, vir sowel positiewe as negatiewe ione, die mobiliteit van ione met die teenoorgestelde lading van 'n vaste ioongroep in die membraan ongeveer een grootteorde hoër is as dié van ione met dieselfde lading. Dit geld veral wanneer die konsentrasies in die eksterne oplossing laag is.

'n Ondersoek na die uitwerking van sekere swaar ione (barium- en ferri-) op die elektrochemiese eienskappe van membrane is begin.

Die aanpassing van die Hittorfmetode aan die roetinebepaling van transportgetalle is aan die gang.

Amalgaamchemie

Verdere werk is uitgevoer i.v.m. die sisteem mangaankwik. Legerings wat 1 tot 50 atoompersent Mn bevat is berei en normaal-geloei vir twee tot drie maande by

the National Building Research Institute and the National Chemical Research Laboratory. Apart from a planned series of exposure tests, a fairly satisfactory attempt was made to assess permeability of variations in a concrete structure by calcium hydroxide distribution. Some tests of galvanised steel reinforcing were also carried out.

Atmospheric exposure tests of galvanised iron samples have been continued. In order to check the method of assessing corrosion by loss in weight on removal of corrosion product, this was applied also to sheets which had been corroded in a laboratory humidifier. The loss in the weight correlated well with the gain in weight during corrosion in the latter apparatus.

A study was made on corrosion of copper and steel in black ferrous sulphide mud, a matter which is of interest in regard to construction work on the Cape Town foreshore.

Under the sponsorship of the Defence Department, a visit was paid to the United Kingdom to study recent progress in cathodic protection of warship hulls.

The usual provision of information and of small contract investigations has continued as in past years.

Permselective Membranes

Physico-chemical investigations on membranes used in the demineralization of water have been continued. It was found that the method previously advocated for determination of ion exchange capacity of membranes is seriously at fault for certain types of positive membrane, and an improved method which avoids use of alkaline solutions has been worked out. Instability of such membranes in alkaline solutions revealed the necessity for developing membranes of higher stability.

Mobilities of both sodium and chloride ions in the membrane phase were determined by linking up conductance and ionic transport data with concentrations of ions in the membranes. For both positive and negative membranes, it was established that mobility of ions with the opposite charge to the fixed ionic groups in the membrane have a mobility about an order of magnitude higher than ions with the same charge. This is particularly true at low concentrations in the external solutions.

A study of the effect of certain heavy ions (barium and ferric) on electrochemical properties of membranes has been commenced.

Adaption of the Hittorf method for routine measurement of transport numbers is under way.

Amalgam Chemistry

Some further work has been done on the manganese-mercury system. Alloys containing 1 to 50 atomic per cent. manganese were prepared and subjected to con-

68–70°C. om die formasie van Mn_2Hg_5 aan te moedig. Termiese analise tussen kamertemperatuur en –60°C. is uitgevoer deur die monsters teen 'n konstante, stadige snelheid te lig of te laat sak in 'n vertikale buis waaroor 'n egalige temperatuurgradiënt aangelê is. Die smelting van kwik was egter die enigste termiese effek wat waargeneem kon word. Konvensionele termiese analise van bogenoemde monsters tot by 450°C. is uitgevoer teen verhitings- (of afkoelings-) snelhede van 1° per minuut, maar geen inligting kon oor die likwidus ingewin word nie; die enigste termiese effek wat waargeneem kon word was die peritektiese ontbinding van Mn_2Hg_5 by 73.7°C. Die bepaling van die likwidus in die kwikryke gebied van die fase-diagram deur meting van die soortlike weerstand van vloeibare amalgame, word tans uitgevoer.

By die struktuuranalise van Mn_2Hg_5 is Weissenberg-fotos van enkel kristalle verkry, maar dit het nog nie geluk om die ruimtgroep ondubbelsinnig vas te stel nie.

Gaschromatografie

'n Aansienlike hoeveelheid werk i.v.m. die toepassing van gaschromatografie op produkte met 'n hoë kookpunt is uitgevoer in samewerking met die Departement Fisiese Chemie aan die Universiteit van Pretoria, aangesien 'n hele aantal belangrike ontledings en skeidings vir die Afdeling Organiese Chemie met hierdie hulpmiddel beskikbaar sou word. Kolomme word gepak met seliet wat Apiezonvet (voor gebruik molekuler gedistilleer in die laboratorium by 300°C. en 10^{-3} mm) bevat vir nie-polêre bestanddele, en van poliëtileenglikol vir polêre bestanddele. Moeilikhede is ondervind deurdat gomagtige neerslae by die aangewende temperatuur op die platinumdrade van die termiese geleidingsvermoëdetektors vorm, sodat voorlopig vlamdetektors gebruik word. Die faktore wat 'n rol speel by die beheer van laasgenoemde detektors is deeglik bestudeer en baie belowende resultate is tot dusver verkry. Met die oog op die identifikasie van bepaalde fraksies is dit egter nie wenslik dat uitkomende fraksies deur 'n vlam vernietig word nie. Verdere werk op die ontwikkeling van detektors is dus nodig.

Ontledingslaboratorium

Soos gewoonlik is 'n groot verskeidenheid ontledings in die afgelope jaar uitgevoer vir hierdie Laboratorium, ander W.N.N.R.-laboratoria en vir die nywerheid. 'n Aantal baie noukeurige ontledings is vir sekere firmas uitgevoer om referensiestandaarde te voorsien. 'n Aantal noukeurige ontledings om uraan, torium en lood te bepaal, is uitgevoer vir geokronologiese ondersoeke. Verlede jaar is spesiale werk i.v.m. die konsentrasie van baie klein hoeveelhede spoorelemente begin, en in die afgelope jaar tot voltooiing gebring met 'n bevredigende prosedure.

Mikro-analises en infra-rooimetings is soos in die verlede vir ander Afdelings van die Laboratorium uitgevoer.

ditioning at 68–70°C. for two to three months to encourage formation of Mn_2Hg_5 . Thermal analysis was carried out between room temperature and –60°C. by raising and lowering samples in a vertical tube at a constant, slow rate in a tube maintained with a uniform temperature gradient. The melting of mercury, however, was the only thermal effect observed. Conventional thermal analysis of the above samples up to 450°C., using heating (or cooling) rates of 1° per minute, produced no information on the liquidus; the only thermal effect to be observed was the peritectic decomposition of Mn_2Hg_5 at 73.7°C. The determination of the liquidus on the mercury-rich side of the phase diagram by means of resistivity measurements on liquid amalgams is in progress.

In structure analysis of Mn_2Hg_5 , Weissenberg photographs were obtained of single crystals, but unequivocal determination of the space group has not yet been achieved.

Gas Chromatography

In collaboration with the Physical Chemistry Department at the University of Pretoria, a considerable amount of work has been carried out on the application of gas chromatography to high boiling products, since a number of analyses and separations of importance to the Organic Division would become available with this tool. Columns were packed with celite containing Apiezon grease (molecularly distilled at 300°C. and 10^{-3} mm. in the laboratory before use) for non-polar substances and with polyethylene glycol for polar substances. Difficulties have been experienced with formation of gummy deposits on the platinum wires of thermal conductivity detectors at the temperatures used, so that, for the present, flame detectors have been introduced. The factors required for control of these have been thoroughly studied, and some very promising results have been obtained. For identification of fractions, however, it is not desirable to destroy the emerging fractions in a flame, so that further work on development of detectors is necessary.

Analytical Laboratory

The usual wide variety of analyses were carried out for this Laboratory, as well as for other C.S.I.R. laboratories and for industry. A number of very careful analyses were carried out for certain firms to provide reference standards. Several careful analyses for uranium, thorium and lead were carried out for geochronological investigations. Special work on concentration of very small amounts of trace elements was started last year and brought to an end in the current year with a satisfactory procedure.

Provision of microanalyses and of infra-red measurements for other Divisions of the Laboratory has continued as in the past.

Nasionale Fisiese Navorsingslaboratorium

Direkteur: DR. E. J. MARAIS

KERNFISIKA

Kernemulsies in Kernfisiese Navorsing

Een van die belangrikste gebiede in kernfisiese navorsing is die bestudering van die verskillende tipes wisselwerking wat plaasvind as snelbewegende deeltjies deur die atome waaruit alle materie opgebou is, heen beweeg. Indien so 'n deeltjie deur 'n fotografiese emulsie beweeg, kan die baan wat dit gevolg het, sigbaar gemaak word deur geskikte ontwikkeling van die emulsie. Van die eienskappe van die baan kan dan heelwat inligting afgelei word.

In 'n projek wat in die Afdeling Kernfisika onderneem is, is die neon-isotoop met massa 20 bestraal met deuterone wat deur 'n siklotron versnel is. Die deuterone wat deur die kerne van die neon-20 atome verstrooi is, het dan op 'n fotografiese emulsie geval. Die intensiteit en energie van die deuterone is bepaal vir verskillende hoeke van verstrooiing. Die resultate is toe vergelyk met die bewerings van twee teorieë.

National Physical Research Laboratory

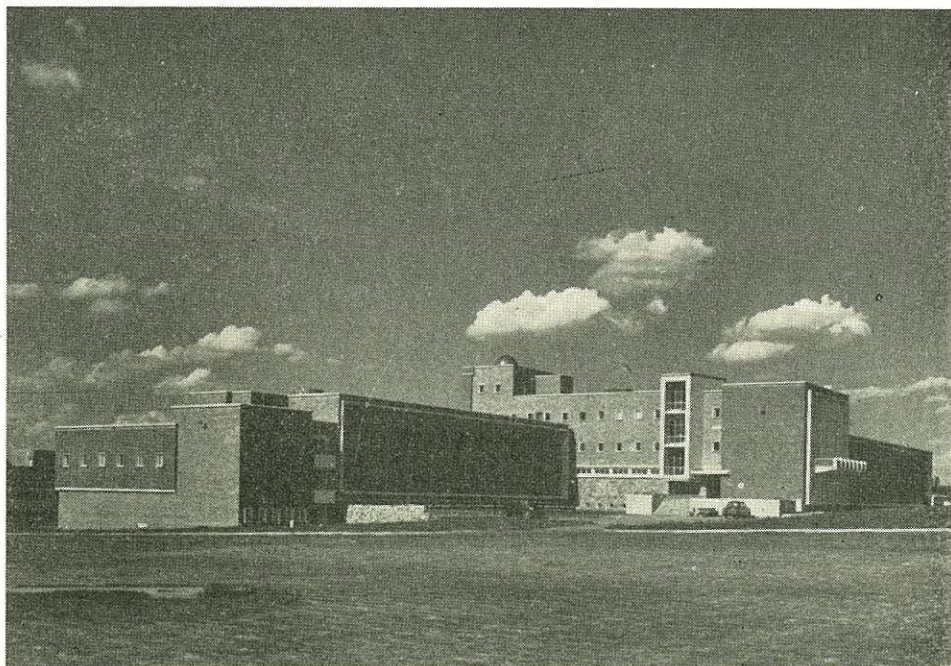
Director: DR. E. J. MARAIS

NUCLEAR PHYSICS

Nuclear Emulsions in Nuclear Physical Research

One of the most important fields of study in nuclear physics is that of the various interactions that take place when swiftly moving particles penetrate through the atoms of which all matter is composed. When such a particle moves through a photographic emulsion the track it has followed can be made visible by suitable development of the emulsion and, from the appearance of the track, a great deal of information can be deduced.

In a project undertaken in the Nuclear Physics Division, the isotope of mass 20 of neon was subjected to bombardment by cyclotron accelerated deuterons. The deuterons, scattered by the nuclei of the neon-20 atoms then fell on a nuclear emulsion and the intensity and energy of the scattered deuterons were studied for various scattering angles. The results were then compared with the predictions of two theories.



Die hoofgebou van die Nasionale Fisiese Navorsingslaboratorium.

The main physics laboratory of the National Physical Research Laboratory.



Dr. E. J. Marais.

Die W.N.N.R.-Siklotron

As eerste gedeelte van die program om die werkverrigting van die siklotron te verbeter is die magnetiese veld met die grootste noukeurigheid uitgemeet volgens 'n gevoelige metode wat in die laboratorium ontwikkel is. Deur dun plaatjies staalfoelie in die magnetiese stroombaan aan te bring is die veldvorm met 'n faktor van 2 by groot strale en 'n faktor 15 by strale kleiner as 30 sentimeter verbeter.

Die radiofrekwente ossillator is volgens 'n beplande program verbeter sodat die kragopbrengs vervierdubbel is. Onderdele wat nodig is om die bundel uit die siklotron te haal, word nou ontwerp en vervaardig.

Isotoopafskeier

Goeie vordering is gemaak in die ontwerp en konstruksie van hierdie apparaat wat gebou word om volkome skeiding tussen atome van dieselfde element, maar met verskillende massas, teweeg te bring. Die juk van die magneet van 10 ton is voltooi en is noukeurig afgewerk binne 'n duisendste van 'n duim. Winding van die spoel met koperpyp wat tot 'n reghoekige deursnee gerol is, vorder goed.

Kernteorie

In die vorige verslag is aandag gevestig op 'n nuwe voorgestelde wisselwerking vir nukleone in kerne. Sedert

The C.S.I.R. Cyclotron

As the first part of the programme of improving the performance of this machine, the magnetic field was surveyed with the utmost care, using a very sensitive method developed in the laboratory. By adding thin foils of steel to the magnetic circuit the field form was improved by a factor of two at large radii, and by a factor of 15 at radii smaller than 30 centimeters.

A systematic programme of improvement of the radio-frequency oscillator, has led to an increase of four times in the power delivered by the oscillator.

Components necessary for the final extraction of the beam from the cyclotron are being designed and manufactured.

Isotope Separator

Good progress was made on the design and construction of this instrument which is being built to effect the complete separation of atoms of the same element differing in mass. The yoke of the 10-ton electro-magnet has been completed and is accurate to within a thousandth



A dome for sun-energy measurement being hoisted on to the roof of the main building of the National Physical Research Laboratory.

'n Koepel om son-energiemetinge uit te voer, word met 'n hyskraan aangebring op die hoofgebou van die Nasionale Fisiese Navorsingslaboratorium.

daardie tyd is hierdie teorie in meer besonderhede uitgewerk en is dit met heelwat sukses op verskillende probleme toegepas.

'n Reeks publikasies oor hierdie werk het al verskyn of is nog ter perse.

Metodes om Gelaaide Deeltjies te Fokuseer

In die meeste kernfisiese eksperimente word snelbewegende gelaaide deeltjies soos protone, mesone en elektrone gebruik en waargeneem. Om sulke eksperimente noukeurig te kan uitvoer is dit nodig om bundels van hierdie deeltjies te fokuseer deur gebruikmaking van verfynde tegnieke, op dieselfde manier as by spektroskopiese metings waar van optiese fokussing gebruik gemaak word.

Vir hierdie doel is die fokuseringseienskappe van vierpool-magnete met pole van 'n spesiale vorm bestudeer. 'n Intense elektronebron is verkry deur 'n klein elektroneversneller van 150,000 volt te bou en in werking te stel. Die fokuseringseienskappe van vierpool-magnete is eers teoreties ondersoek. Die daaropvolgende eksperimentele waarneming het die teorie bevestig en toon verder dat die vierpoolfokussing groot moontlikhede inhou. Die eerste aanwending van hierdie metode is om die dubbele verstrooiing van elektrone in materie te bestudeer.

KERNSPEKTROSKOPIE

Die eienskappe van die permanente magneet beta-spektrometer wat in 1956 gebou is, is sistematies ondersoek. Tegnieke waardeur besondere dun radioaktiewe bronne gemaak kan word om sodoende die selfabsorpsie in die bron tot 'n minimum te beperk, is ontwikkel. Die beste fotografiese plate is uitgesoek asook die beste metodes om hulle te ontwikkel. Dit het daartoe gelei dat die oplossingsvermoë van die apparaat verhoog is tot 8 in 10,000 wat tweemaal beter is as die oorspronklike. Hierdie verbeterings het dit moontlik gemaak om die LI-, LII- en LIII-lyne van goud-198 vir die eerste keer op te los. Die verhoudings van die intensiteite van hierdie lyne het belangrike teoretiese implikasies.

TOEGEPASTE RADIOAKTIWITEIT

Daar was toenemende belangstelling in moontlike toepassings van radioaktiwiteit in die nywerheid, medisyne en landbou. Sulke toepassings sluit in die opsporing van lekke in 'n twee myl lange waterpylyn met 'n deursnee van 30 dm., die bepaling van die volledigheid van semantasie in voorgespanne beton, die merk van kledingstukke met radioaktiwiteit vir die opsporing van diefstal in 'n fabriek, en die gebruik van straling om mutasies vir verbeterings in graskwekery te verkry. Dit is duidelik dat die metode om radioaktiewe spoor-tegnieke te gebruik, waardevol is by hierdie ondersoeke.

of an inch. The winding of the coils, consisting of copper tubing rolled to a rectangular section is well under way.

Nuclear Theory

In the previous report attention was drawn to a new interaction proposed for nucleons in nuclei. This theory has since been worked out in greater detail and applied to different problems with a great deal of success.

A series of papers on this work has appeared or is in the Press.

Methods for the Focussing of Charged Particles

Most nuclear physical experiments involve the use and observation of swiftly-moving charged particles such as protons, mesons and electrons and, in order to be able to perform accurate experiments it is necessary to be able to focus beams of such particles by using refined techniques, in the same way as the study of spectroscopy depends on optical focussing.

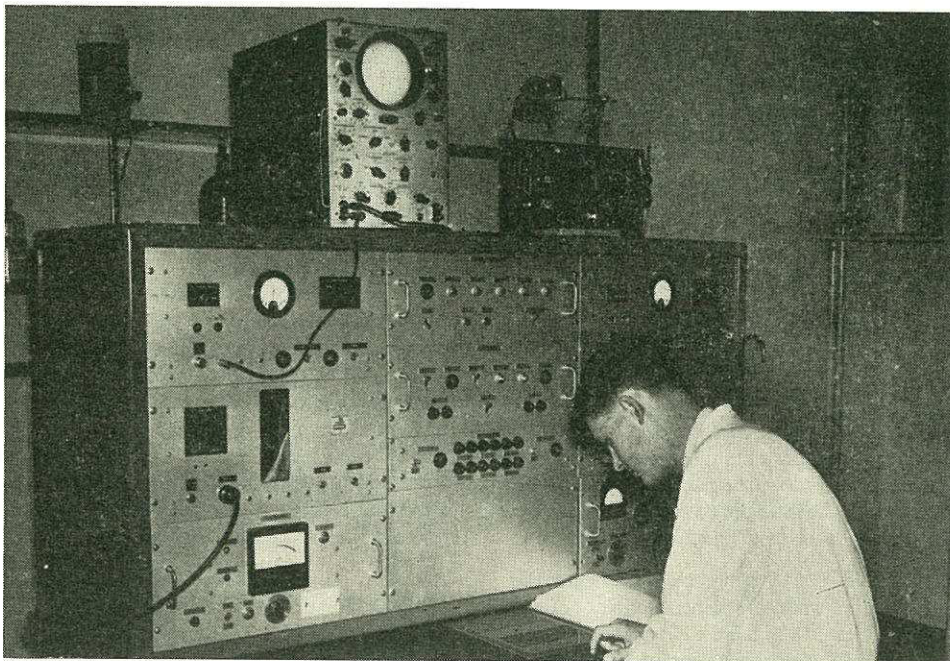
The properties of four-pole magnets with specially shaped pole faces were studied for this purpose. To obtain an intense source of electrons, a small accelerator of 150,000 volts was built and put into operation. The focussing properties of quadrupole magnets were first studied theoretically. Subsequent experimental observations then confirmed the theoretical predictions and demonstrated that the quadrupole focussing method shows great promise. This method will in the first instance be applied to study the double scattering of electrons by matter.

NUCLEAR SPECTROSCOPY

The characteristics of the permanent magnet beta-ray spectrometer which was assembled in 1956, were studied systematically. Techniques for the preparation of exceedingly thin radioactive sources, needed in order to reduce the self-absorption in the source itself to a minimum, were developed. The best photographic plates were selected and the most favourable techniques of developing these plates determined. As a result, the resolving power of the instrument was improved to 8 in 10,000 which is a factor two better than the original resolving power. This improvement made it possible to resolve the LI, LII and LIII lines of gold-198 for the first time. The ratio of the intensities of these lines has important theoretical implications.

APPLIED RADIOACTIVITY

There has been increasing interest in possible applications of radioactivity in industry, medicine and agriculture. Such applications include the finding of leaks in a 2-mile length of 30-inch diameter water pipe line, testing the completeness of grouting in pre-stressed concrete, tagging articles of clothing with radioactivity to detect theft in the factory, and the use of radiation to induce mutations for improvements in grass-breeding. The radioactive method is proving a valuable technique in these investigations.



Die kontrole-paneel van die tussenbeeld beta-spektrometer.

The control panel for the intermediate-image beta-ray spectrometer.

BIOFISIKA

Daar bestaan 'n teorie dat die rekking van die cervix van die menslike uterus wat met die geboorte van een of meer kinders plaasvind, 'n groot invloed op die weerstand van die cervix teen uitsetting, en dus op die moeilikheid van toekomstige geboortes het. 'n Reeks proewe om hierdie teorie te toets, is in samewerking met die Mediese Departement van die Witwatersrandse Universiteit uitgevoer. Die resultate word nou bestudeer.

SPEKTROSKOPIE

In die vorige verslag is vermeld dat daar begin is met 'n studie van 'n verbode elektroniese oorgang in die spektrum van koolstofmonoksied. Die struktuur van hierdie sisteem kon nie in ooreenstemming gebring word met die bestaande teorie van bandstrukture nie. Hierdie teenstrydigheid is bestudeer, maar geen bevredigende verklaring is tot nog toe gevind nie.

'n Spektrograaf met hoë oplosvermoë wat in die nuwe gebou gehuisves sal word, is ontwerp en die instrument word tans gebou.

Gedurende die onderhawige periode is 'n moderne infra-rooi registrerende instrument uit die buiteland ontvang. Navorsing in verband met die gebruik van gepolariseerde infra-rooilig om die struktuur van organiese

BIOPHYSICS

In co-operation with the University of the Witwatersrand Medical Department, a series of experiments has been carried out to make a critical test of the theory that previous stretching of the cervix of the human uterus during the delivery of one child or more, has an effect upon the resistance of the cervix to dilation and therefore an effect upon the difficulty of subsequent labours in child birth. The results of these experiments are at present under discussion.

SPECTROSCOPY

In the previous report it was mentioned that a forbidden electronic transition in the spectrum of carbon monoxide was being studied. The structure of this system could not be reconciled with the existing theory on band structure. This discrepancy was studied, but no explanation has as yet been found.

A high-resolution spectrograph to be housed in the new building was designed and construction of the instrument is proceeding.

During the period under review a modern infra-red recording instrument was received from overseas. Research in connection with the use of polarised infra-

molekules te bestudeer, word nou met behulp van hierdie instrument gedoen.

Daar is gevind dat die nabye infra-rooispektra van wolwesels wat in hierdie laboratorium opgeneem is, baie ooreenstem met dié van Australiese wol. Hierdie werk word gedoen om vas te stel of daar enige verwantskap tussen die voeding van 'n skaap en die wol wat hy produseer bestaan.

CHEMIESE FISIKA

Spektrochemiese Analise

Die gebruik van 'n lugstroom rondom die elektrodes van 'n gelykstroombog, soos oorspronklik in Kanada ontwikkel, is krities ondersoek. Daar is gevind dat 'n lugstroom rondom die brandende bog die reproduseerbaarheid van die ontledingsresultate aansienlik verhoog. Die belangrike parameter „lugstroomsnelheid”, beïnvloed binne sekere perke, nie die intensiteitsverhoudings van die afsonderlike analise- en interne standaardlyne nie. Die sianogeenbande in die 4000-Å-gebied beïnvloed egter die ontleding van kalium wanneer plantmateriale ontleed word om die aanwesigheid van hierdie element vas te stel. Die opstelling van die elektrodes ten opsigte van die lugstroom moet sorgvuldig gedoen word om te verhoed dat die bog uitgeblaas word.

Die Suid-Afrikaanse Spoorweë is op die oomblik besig met die aankoop van Diesel-lokomotiewe. Die onderhoud van hierdie lokomotiewe vereis dat die smeerolie gereeld ondersoek word om vas te stel of dit behalwe die byvoegingstowwe ook kontaminerende stowwe bevat. Die spektrografiese ontledingmetode word oorse, veral in die Verenigde State van Amerika, gereeld vir hierdie doel gebruik. In hierdie laboratorium word op die oomblik 'n personeellid van die Suid-Afrikaanse Spoorweë opgelei en hy sal binnekort hierdie ontledings waarneem. Die geskikte metode vir Suid-Afrikaanse toestande word tans uitgewerk.

Om die nywerheid te help, lei hierdie laboratorium gereeld personeellede van individuele ondernemings op in die gebruik van die spektrochemiese ontledingstechniek. Twee industriële ondernemings het gedurende die afgelope jaar van hierdie fasiliteit gebruik gemaak.

X-straal en Elektronmikroskopiese Werk

X-straaldiffraksie- en elektronmikroskopiese tegnieke is weer ten behoeve van 'n aantal verskillende organisasies op 'n groot verskeidenheid ontledingsprobleme toegepas. Gedurende die afgelope jaar is sowat 120 monsters d.m.v. X-straal-tegnieke ontleed en sowat 30 met behulp van die elektronmikroskoop. Tipiese voorbeelde van X-straal-probleme is die oriëntasiebepaling van legering-monsters vir die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese, fase-identifikasie in minerale en neerslae vir die Nasionale Chemiese Navorsingslabora-

red light to study the structure of organic molecules is at present being done on this instrument.

The near infra-red spectra of wool fibres recorded in this laboratory, were found to be very similar to those of Australian wool. This work is being undertaken in an attempt to establish a relationship between the nutritional status of a sheep and the wool that it produces.

CHEMICAL PHYSICS

Spectrochemical Analysis

The use of an air jet around the electrodes of a direct current arc originally developed in Canada, was critically investigated. It was found that an air jet around the burning arc improves the reproducibility of the analytical results considerably. The important parameter “air jet velocity” was found, within certain limits, not to affect the intensity ratios of the individual analysis and internal standard lines. The cyanogen bands in the 4000 Å region, however, affect the analysis of potassium when analysing for this element in plant materials. Care must also be exercised with the alignment of the electrodes relative to the air jet, to avoid the blowing out of the arc.

The South African Railways are at present buying Diesel locomotives. The maintenance of these locomotives demands that the lubricating oil be regularly examined for contaminants as well as for additives. Overseas, especially in the United States of America, the spectrographic method of analysis is regularly used for this purpose. At present this laboratory is training a staff member of the South African Railways who will, in due course, undertake these analyses. The most suitable method under South African conditions is also being developed.

To help industry this Laboratory regularly trains staff members of individual concerns to use spectrochemical analytical techniques. Two industrial concerns made use of this facility during the past year.

X-ray and Electron-microscope Work

X-ray diffraction and electro-microscope methods have again been applied to a wide variety of analytical problems for a number of different organizations. During the period under review about 120 samples were analysed by X-ray techniques and about 30 with the electron microscope. Typical X-ray problems were the orientation of alloy samples for the National Mechanical Engineering Research Institute, identification of phases in minerals and deposits for the National Chemical Research Laboratory and industrial firms, and the accurate deter-

torium en nywerhede, en die noukeurige bepaling van die kristalroosterparameter van verskeie granaatstene vir die Departement Geologie, Universiteit van Natal. Met behulp van die elektronmikroskoop is die struktuur van leervesels vir die Leernywerheid-Navorsingsinstituut ondersoek, asook melaatsheidbakterië vir Westfort Instituut, en die oppervlakke van 'n aantal staalmonsters vir die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese.

Die Ontwikkeling van 'n Massaspektrometer

Vir die ontwikkeling en kontrolering van 'n nuwe proses in 'n nywerheidsonderneming was 'n tweeduimskrommingsradius massaspektrometer, vir bepaling van isotoopverhoudings in die lae massagebied, dringend nodig. Die instrument is in hierdie laboratorium ontwerp en in 'n rekordtyd van drie en 'n halwe maand in die Sentrale Werkplaas gebou, en in die betrokke firma se laboratorium opgestel. Die elektroniese onderdele van die instrument is deur 'n handelsfirma gemaak.

SPOORELEMENTNAVORSING

Op die oomblik word sekere spektrochemiese ontledingsmetodes wat in hierdie laboratorium ontwikkel is, suksesvol toegepas vir roetine-ontledings in die Onderste-poortlaboratorium van die Departement van Landbou.

Die gebruik van 'n lugstroom rondom die brandende boog het die hoeveelheid werk aan 'n spektrochemiese ontleding verbonde aansienlik verminder. Dit is nou moontlik om plantmateriale bevedigend te ontleed deur slegs gebruik te maak van duplikaatopnames in plaas van die drie wat ander gelykstroombogopwekkings vereis.

METAALFISIKA

Studie van Witroes op Sinkplate

Werk in verband met hierdie probleem is hoofsaaklik toegespits op „humidor“-metings van die relatiewe korrosie-tempo's van verskillende legering- en sinkplaatmonsters. Die oppervlakke van die twee tipes sinklegerings wat gebruik word, is ook deur middel van die elektronmikroskoop ondersoek. As gevolg van die ingewikkeldheid van die probleem is maar stadig met die projek gevorder.

Die Bestudering van Plasties-ervormde Metale met behulp van die Elektronmikroskoop

GEDURENDE die afgelope vyf jaar het twee verdere ontwikkelings in die afdruktegniek dit moontlik gemaak om hierdie werk verder uit te brei. Dit is eerstens nou moontlik om elektronmikrofoto's van dieselfde kristaloppervlak na opeenvolgende vervormings te neem; met behulp van hierdie metode is plasties-ervormde alfa-geelkoperkristalle ondersoek met betrekking tot afskuiwingslyndigtheid

mination of the lattice parameters of different garnets for the Department of Geology, University of Natal. The electron microscope was used to investigate the structure of leather fibres for the Leather Industry Research Institute, leprosy bacteria for Westfort Institute and the surfaces of a number of steel samples for the National Mechanical Engineering Research Institute.

Development of Mass Spectrometer

In order to assist in the development and control of a new process at an industrial concern, a two-inch radius of curvature mass spectrometer for the determination of isotopic ratios in the low mass range was urgently required. The instrument was designed in the laboratory and constructed in the workshop in a record period of three and a half months, and installed in the laboratories of the concern. A commercial firm undertook the construction of the electronic parts of the instrument.

TRACE ELEMENT RESEARCH

Certain spectrochemical methods of analyses developed in this laboratory, are at present being successfully used for routine analysis in the Onderstepoort Laboratory of the Department of Agriculture.

Using an air jet around the burning arc, the amount of work involved in a spectrochemical analysis has been considerably reduced. It is now possible to analyse plant materials satisfactorily, using only duplicate exposures instead of the three that other direct current arc excitations demand.

METAL PHYSICS

Study of White-rusting of Galvanised Sheets

Work on this problem has been concentrated mainly on humidior measurements of the relative corrosion rates of different alloy and galvanised sheet samples. The surfaces of the two types of galvanising alloy used have also been investigated with the electron microscope. The complexity of this problem has resulted in slow progress.

Electron Microscope Study of Plastically-deformed Metals

Two advances in technique during the past five years have made possible further extensions of this work. Firstly, it has become possible to take electron micrographs of the same crystal surface after successive deformations; using this method plastically-deformed alpha-brass crystals have been investigated with regard to slip-line density and the distribution of line depths

en die verspreiding van lyndieptes by ontbonde afskuiwingswaardes (resolved shear strain) vanaf 0.05 tot 1.2. Tweedens is 'n tegniek ontwikkel waarmee herhaalde afdrucke van presies dieselfde plek op 'n kristaloppervlak verkry kan word. Gevolglik is dit moontlik om die vorming van groei van afskuiwingslyne te volg namate die vervorming toeneem.

Werk wat gesamentlik deur die Metallurgiese Afdeling van die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese en die X-straalonderafdeling van hierdie laboratorium uitgevoer is, het gelei tot die neem van elektronmikrofoto's wat duidelik aantoon hoe etsputjies op alfageelkoper 'n spiraalvormige trappiestruktuur aanneem. 'n Voorlopige verslag oor dié werk is vir publikasie voorberei.

KRISTALSTRUKTURE

Die kristalroosterparameter van 'n paar kristalle is tot 'n noukeurigheid van een deel op 40,000 gemeet met behulp van die toebehore wat onlangs hier ontwerp is om die Weissenbergkamera in 'n terugrefleksie-instrument te verander. 'n Voorlopige verslag oor dié werk is vir publikasie voorberei.

Die molekulêre gewig van nege verskillende verbindings van onbekende chemiese struktuur is met behulp van die X-straal-metode bepaal. Hierdie verbindings kom in plantsoorte van die komkommerfamilie voor, en word in samewerking met die Nasionale Chemiese Navorsingslaboratorium ondersoek. Hierdie werk het die bewys gelever dat dié molekulêre gewigte sowat tien persent hoër is as wat voorheen veronderstel is op grond van chemiese bewyse. Molekulêre gewigte is ook vir vier ander natuurprodukte bepaal. 'n Gekombineerde verslag van die Nasionale Fisiese en die Chemiese Navorsingslaboratoriums oor dié werk is vir publikasie voorberei.

GEOFISIKA

Nuwe Vasstelling van Swaartekrag by die Suid-Afrikaanse Basisstasies

Slingerapparaat van die Departement van Geodesie en Geofisika, Universiteit van Cambridge, is gebruik vir 'n nuwe bepaling van die swaartekragverskille tussen die drie Suid-Afrikaanse basisstasies en die Britse swaartekragbasisstasie te Teddington. Die uitslae word nog bereken, maar daar bestaan rede om te glo dat die nuwe vasstelling die onsekerheid in die verbinding tussen die Suid-Afrikaanse en die internasionale netwerke aansienlik sal verminder.

Die Meting en Registrering van die Geluidsnelheid en Watertemperatuur teenoor Diepte in Seewater

Apparate waarmee hierdie metings gedoen kan word, is voltooi en toets is vanaf die „*Africana II*” ter see uitgevoer. Daar is bevind dat klankgolwe in seewater gemeet

for resolved shear strain values ranging from 0.5 to 1.2. Secondly, a technique has been developed whereby repeated replicas can be obtained from exactly the same spot on the crystal surface. This enables one to follow the formation and growth of slip-lines as deformation proceeds.

Combined work of the Metallurgy Section of the National Mechanical Engineering Research Institute and the X-ray Subdivision of the laboratory, has led to the production of electron micrographs which clearly show a spiralling stepped structure in etch pits on alpha-brass. A preliminary report on this work has been submitted for publication.

CRYSTAL STRUCTURES

Results obtained with the adaptor designed here to convert a Weissenberg camera into a back-reflection instrument, show that lattice parameters can be measured by this method with an accuracy of about one part in 40,000. A preliminary report on this work has been submitted for publication.

Molecular weights were measured by the X-ray method for nine different complex compounds of unknown chemical structure which originate from plants of the cucumber family. (The chemical part of this work was done at the National Chemical Research Laboratory.) These measurements show that the molecular weights are about ten per cent. higher than had previously been supposed from chemical evidence. Molecular weights have also been measured for four other natural products. These results have been the subject of a combined publication from the National Chemical and Physical Research Laboratories.

GEOPHYSICS

New Determination of Gravity at the South African Base Stations

Pendulum apparatus belonging to the Department of Geodesy and Geophysics, University of Cambridge, was used for a new determination of the gravity differences between the three South African base stations and the British gravity base station at Teddington. The results are still being worked out, but there is reason to believe that the new determination will substantially reduce the uncertainty in the link between the South African network and the international network.

The Measurement and Recording of the Velocity of Sound and Temperature Versus Depth in Sea Water

Apparatus for making these measurements was completed and tests were carried out at sea from the *Africana II*. The accuracy of measurement of sound waves in sea

kan word met 'n noukeurigheid van 1 deel op 30,000. Elke opname neem net enkele sekondes in beslag. Om die instrument meer gerieflik vir gebruik te maak, word sekere veranderinge aangebring.

GEOKRONOLOGIE

Ouderdomsverskille

Ten einde te probeer onderskei tussen die verskillende meganismes verantwoordelik vir ouderdomsverskille met die loodmetode, is drie fraksies sirkone, met verskillende korrelgroottes, van 'n Bosveldgraniet geskei, en ouderdomsbepalings en uitloogingseksperimente daarop uitgevoer. 'n Soortgelyke studie op 'n monasiet van Houtenbeck is onderneem ten einde vas te stel hoe die verskille tussen thoriumlood- en uraanloodouderdomme verband hou met die radiale verspreiding van uraan, thorium en lood in die monasietkristal. Ses fraksies van hierdie monasiet is ontleed.

Ouderdomsbepalings op Suid-Afrikaanse Minerale

'n Studie van die Damara-sisteem in Suidwes-Afrika is onderneem ten einde die ouderdom van mineralisasie van dié sisteem te bepaal. Vier monsters is ontleed.

Twee ouderdomsbepalings op monasiete uit die Witwatersrand-sisteem is gedoen. Ten einde ouderdomsbepalings op die Witwatersrand-sisteem beter te kan beoordeel, is 14 loodglansmonsters ontleed vir hul loodisotoopverhoudings.

PALEOMAGNETISME

Paleomagnetiese Studie van die Pilansberggange

Bepaling van die rigting van „fossiel”-magnetisering deur baie gesteentes vertoon, verskaf die geleentheid om die posisie van die magnetiese pole ten tye van die vorming van sulke gesteentes vas te stel. Deur gesteentes van verskillende ouderdom te bestudeer, is dit moontlik om enige bewegings in die verlede op te spoor van die hele aarde met betrekking tot die draaias (poolsverwring), en van die vastelande met betrekking tot mekaar (vastelandskuiwing). Sulke paleomagnetiese studies geniet oor die hele wêreld groot belangstelling. As deel van die laboratorium se program, is die Pilansberggange intensief bestudeer. Die resultate dui aan dat daar 'n magnetiese noordpool in Ethiopië was, op 'n tydstop wat onbepaald is maar wat meer as 250-miljoen jare gelede moet wees. 'n Deeglike petrologiese studie van hierdie gange is voortgesit. Hierdie studie sal die magnetiese data aanvul met inligting aangaande die samestelling, verspreiding en herkoms van die ysteroksiede wat die magnetiese gedeelte van die gesteentes uitmaak.

Paleomagnetiese Studie van die Bosveldkompleks

Aangesien daar rede bestaan om te verwag dat die ouderdom van die Bosveldstollingskompleks deur middel

water was found to be 1 part in 30,000 and only a few seconds were needed for making one record. In order to make the instrument more convenient in use, however, certain modifications are being made,

GEOCHRONOLOGY

Age Discrepancies

In order to try to differentiate between the various mechanisms involved in the lead method of age determination, three fractions of zircons, having different particle sizes, were separated from a Bushveld granite, and age determinations and leaching experiments were conducted on them. A similar study was undertaken on a monazite from Houtenbeck in an attempt to link the discrepancies between the uranium-lead and thorium-lead ages with the radial distribution of uranium, thorium and lead within the monazite crystal. Altogether six fractions of this monazite were analysed.

Age Determination on South African Minerals

A study was undertaken on the Damara system in South West Africa in order to derive the age of mineralization of this system. Four samples were studied.

Two age determinations on monazites from the Witwatersrand system were made. In order to assist in the evaluation of the results on age determinations from this system, fourteen galenas were analysed for the isotopic constitution of the “common lead” in the Witwatersrand.

PALAEOMAGNETISM

Palaeomagnetic Study of the Pilansberg Dykes

Measurements of the directions of “fossil” magnetisation possessed by many rocks enable the positions of the magnetic poles at the date of formation of each such rock to be found. By studying rocks of various ages it is possible to trace any past movements of the whole body of the Earth relative to the axis of rotation (polar wandering), and of the continents relative to one another (continental drift). Such palaeomagnetic studies are the subject of intense interest and activity throughout the world. As part of the programme of the laboratory, the Pilansberg dykes have been intensively studied and indicate a North magnetic pole in Ethiopia at an undetermined date which must, however, be earlier than 250 million years ago. A detailed petrological study of these dykes has been continued during the period here reviewed. This study will supplement the magnetic data with information concerning the composition, distribution and mode of origin of the oxides of iron which form the magnetic constituents of the rock.

Palaeomagnetic Study of the Bushveld Complex

As there is reason to expect reliable determinations, from the decay of radioactive minerals, of the age of the

van die verval van radioaktiewe elemente vasgestel sal word, is daar 'n begin gemaak met die bestudering van noriet, wat 'n groot deel van die Kompleks uitmaak. Eerste uitslae verkry met monsters uit 'n steengroef noord van Pretoria dui daarop dat die magnetisering waarskynlik bestendig en stabiel is. Hierdie resultate moedig tot verdere ondersoek aan.

ATMOSFERIESE FISIKA

Moontlike Invloed van Meteorietstof op Reënval

Bepalings van die konsentrasie van ysvormende kerne in die lug is hierdie somer voortgesit. Vermoedelik bestaan hierdie kerne, wat moontlik noodsaaklik is vir reënformasie, uit meteorietstof en kom hulle omtrent 'n maand na die datum van meteorreëns, die meeste voor.

Gedurende November en Desember 1956 en Januarie 1957, is daaglikse vrieskerntellings in die lug by Swakopmund, S.W.A., uitgevoer. Weens die aanhoudende winde wat van die see af waai, behoort die besoedeling veroorsaak deur bronne op die land baie gering te wees. 'n Verbeterde wolkekamer is vir hierdie eksperiment gebou.

Die resultate staaf slegs in geringe mate die meteorietstofteorie want die hoogtepunte in die aantal vrieskerne val oor die algemeen nie op die verwagte datums nie. Resultate word nou vergelyk met dié uit Australië en Amerika.

Navorsing op Windvlae wat deur Vliegtuie

Ondervind word

Die doel van hierdie werk is om inligting aan vliegtuigontwerpers te verskaf aangaande die sterkte van die kragte wat as gevolg van windvlae op vliegtuie inwerk. Dit verskaf ook inligting oor die vliegtoestande op die verskillende Suid-Afrikaanse lugroetes. Waarnemings is op 'n Dakota-vliegtuig van die Suid-Afrikaanse Lugmag gedoen, en die rekords wat opgeneem is oor ongeveer seshonderd vliegre, is bestudeer. Soortgelyke waarnemings is ook vir nagenoeg driehonderd vliegre op 'n Skymaster-vliegtuig van die Suid-Afrikaanse Lugdiens gedoen.

Lugbesoedeling

Die waarnemings wat gedurende die afgelope twee jaar in Pretoria gedoen is, dui sterk daarop dat 'n groot gedeelte van die lugbesoedeling oor die stad deur 'n groot aantal klein bronne, soos byvoorbeeld huise, woonstelle en kantore veroorsaak word. Hier word steenkool ondoeltreffend by 'n lae temperatuur verbrand. Hierdie gevolgtrekking het 'n belangrike invloed op die metodes waardeur die besoedeling verminder kan word.

Radioaktiwiteit in die Atmosfeer

Die daaglikse bepaling van die hoeveelheid kunstmatige radioaktiwiteit in stof en reënwater aanwesig as

Bushveld Igneous Complex, 'n eksploratory programme has been started on the norite which makes up a large part of the Complex. First results from specimens taken from a quarry north of Pretoria suggest that the magnetisation may be consistent and stable, and encourage further work.

ATMOSPHERIC PHYSICS

Possible Influence of Meteorite-Dust on Rainfall

Measurements of the concentration of ice-forming nuclei in the air were continued this summer. It has been suggested that these nuclei, which may play an essential part in the formation of rain, are particles of meteoric dust and are more copious about a month after the dates of meteor showers.

Daily counts of freezing nuclei were carried out during the months of November, December, 1956, and January, 1957, at Swakopmund, S.W.A. Here the prevailing sea-breeze should reduce contamination from the land to a minimum. A new and improved type of cloud chamber was built for these experiments.

The results give little support to the meteorite dust theory, as the peaks in the number of ice-forming nuclei do not, in general, occur on the expected dates. Results are being compared with observations in Australia and the U.S.A.

Study of Gusts Experienced by Aircraft

This work is designed to give information to aircraft designers concerning the severity of the forces acting upon aircraft as a result of their meeting gusts of air in flight. It is also providing information about the flight conditions on various air routes used in South Africa. Measurements have been made on Dakota aircraft of the South African Air Force, in which over six hundred hours of flying have been studied, and on Skymaster aircraft of the South African Airways in which nearly three hundred hours of flying have been observed.

Air Pollution

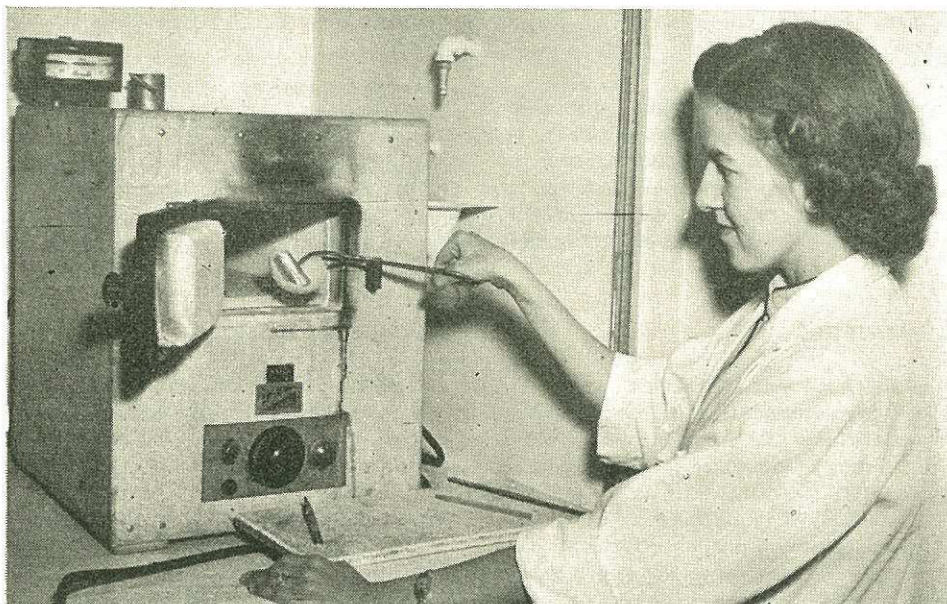
The observations which have been made in Pretoria during the last two years have been studied and there is considerable evidence to suggest that in Pretoria a large percentage of the pollution in the atmosphere is caused by large numbers of small sources, such as houses, blocks of flats and offices, where coal is burned inefficiently at low temperature. This deduction has an important bearing upon the methods which must be chosen to reduce the pollution.

Radioactivity in the Atmosphere

The daily determination of the artificial radioactivity present in dust and rain water, as a result of the atom

gevolg van atoom- en waterstofbomtoetse, is te Pretoria voortgesit. 'n Voorlopige verslag is aan die Wetenskaplike Komitee insake die uitwerking van Atoomstraling van die Verenigde Volke Organisasie gestuur. Hierdie metings word nou uitgebrei na Windhoek, Kaapstad, Port Elizabeth, Beaufort-West, Bloemfontein en Durban, waar die plaaslike Weerbuurstasies met die versameling van monsters en hulle versending na Pretoria sal help.

and hydrogen bomb tests, was continued at Pretoria. A preliminary report has been sent to the Scientific Committee on the Effects of Atomic Radiation of the United Nations Organizations. These measurements are now being extended to Windhoek, Cape Town, Port Elizabeth, Beaufort West, Bloemfontein and Durban, where the local Weather Bureau stations will assist with the collection of samples and their despatch to Pretoria.



Bepaling van radioaktiewe neerslag opgevang op gekomde papier tydens 'n nasionale opname.

Determination of radioactive fall-out caught on gummed paper in the course of a national survey.

OPTIKA

Lensontwerp

Die ontwerp van 'n objektief vir die laboratorium se spektrometer is voltooi. Die lens is gekorrigeer vir vier kleure, naamlik rooi, groen, blou en violet.

Interferensiemetodes

Die tegnieke vir die vervaardiging van toebroodjietipe filters is verbeter tot die stadium waar stabiele filters met voorafbeplande eienskappe vervaardig kan word.

Ontwikkelingswerk vir die vervaardiging van diëlektriese veellaagfilters gaan voort. Filters bestaande uit vyf lae is reeds met sukses vervaardig.

Fotometrie en Spektrofotometrie

Die foto-elektriese fotometerkop wat in die laboratorium ontwikkel is, is grondig getoets en geskik gevind.

OPTICS

Lens Design

The design of an objective lens for the spectrometer of this laboratory has been completed. This lens is corrected for four colours, namely red, green, blue and violet.

Interference Methods

The techniques for the manufacture of sandwich-type filters have been improved to the stage where stable filters with predetermined characteristics can be manufactured.

Development work on the manufacture of multi-layer di-electric filters is in progress. Filters consisting of five layers have been manufactured successfully.

Photometry and Spectrophotometry

The photo-electric photometer head, which has been developed in the laboratory, was tested exhaustively and found satisfactory.



Fotoëlastisiteit

Werk is gedoen in verband met die eienskappe van verskeie plastiekstowwe ten einde vas te stel of hulle geskik sal wees vir die maak van modelle wat gebruik kan word vir die bestudering van moeilike strukturele probleme waar die modelle in drie dimensies bestudeer moet word, in plaas dat soos gewoonlik gebruik gemaak word van driedimensionale seksies.

HITTE

Hittegeleiding

'n Beskrywing van die toepassing van 'n dinamiese metode om die hittegeleidingsvermoë van rotse en soortgelyke materiale te bepaal, is vir publikasie ingestuur.

'n Groter apparaat vir bepalinge op isoleerstowwe is gebou en nadat sekere verbeterings aan die eerste model aangebring is, het gebleek dat daar veel van verwag kan word.

FISIKA VAN MATERIE

Vasstelling van die Graad van Gekraaktheid van 'n

Rotswand in 'n Myn deur middel van Fisiese Metodes

Dit word tans algemeen aanvaar dat die waarskynlikheid van 'n rotsstorting by groot dieptes in myne in noue verband staan met die mate waarin die rotswand ontspan is. Hierdie ontspanning blyk uit die aanwesigheid van 'n groot aantal fyn krakies wat meestal onsigbaar is vir die blote oog; hulle aanwesigheid moet derhalwe op 'n ander manier vasgestel word. In 'n poging om hierdie probleem op te los, word soniese sowel as ultrasoniese metodes in die laboratorium ontwikkel. Hierdie werk geskied in samewerking met die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese.

Trillings in Spoorstawe

Die dinamiese kragte wat deur die beweging van 'n trein op 'n spoorstaaf veroorsaak word, kan die statiese kragte ver oortref, en kan 'n verkorte lewensduur van die spoor meebring, of dit selfs laat breek. 'n Reeks metings word ten behoeve van die Suid-Afrikaanse Spoorweë op spoorseksies in die laboratorium en *in situ* uitgevoer, om meer inligting in hierdie verband te versamel, wat tipies Suid-Afrikaanse spoorstrukture betref.

Visko-elastiese Eienskappe van Bitumen

Die fisiese eienskappe van die bitumen wat gebruik word om paaie mee te bou, hang grootliks af van die samestelling, temperatuur en ouderdom daarvan.

'n Vibrasiemetode wat gebruik maak van 'n impedansiebrug, word ontwikkel om die elastiese en plastiese gedrag van klein monsters van hierdie belangrike padboumateriaal onder verskillende omstandighede te bestudeer.

Photoelasticity

The properties of several transparent plastic substances have been studied to discover whether they are suitable for use on difficult models which must be made and studied in three dimensions instead of using two dimensional sections as is usually done.

HEAT

Thermal Conductivity

A description of the use of a dynamic heatflow method of measuring the thermal conductivity of rocks and similar materials has been submitted for publication.

A larger apparatus has been built for measurements on insulating materials and, after some improvements had been made on the first model, it was found very promising.

PHYSICS OF MATTER

Determination of the Extent of Fracture of a Rock Face in Mine Workings by Physical Methods

It is now generally accepted that the likelihood of a rock burst in mine workings at deep levels is closely related to the extent to which the rock-face is destressed. This de-stressing is evidenced by the existence of a multitude of fine cracks mostly invisible to the naked eye. Their existence must therefore be deduced by other means. The laboratory is developing sonic and ultrasonic methods in an effort to solve this problem.

This work is being done in collaboration with the National Mechanical Engineering Research Institute.

Vibration of Railway Lines

The dynamic forces set up in a rail when a train passes over it can be far in excess of the static forces and can cause a reduced life span, or even failure of the rail. A series of measurements is being carried out on behalf of the South African Railways on rail sections in the laboratory and *in situ*, in order to obtain more information on this matter for typical South African line structures.

Visco-elastic Properties of Bitumen

The physical properties of bitumen, used for road construction, are very dependent on composition, age and temperature. A vibratory method, employing a mechanical impedance bridge, is being developed for studying the elastic and plastic behaviour of small samples of this important road construction material under different conditions.

AKOESTIEK

Meganiese Opname van Hofverrigtinge

Die elektro-meganiese opnamesisteme in die Suid-Afrikaanse geregshowe was baie bevredigend, en is gedurende die afgelope ses maande verder uitgebrei. 'n Versoek is van een van die buurstate ontvang vir uitbreiding van die sisteem na twee van hul hoërhowe.

Rigtingseienskappe van die Menslike Stem

Die rigtingseienskappe van die menslike stem is een van die fundamentele faktore wat in aanmerking moet kom by die ondersoek van die verstaanbaarheid van spraak in gehoorsale. Hierdie eienskappe is direk gemeet met gebruikmaking van 'n nuwe tegniek waarvolgens hulle in 'n vertrek met 'n hoë weerklankeffek gemeet kan word.

PSIGO-AKOESTIEK

Plekbepaling van 'n Klankbron deur die Gehoorsisteam

'n Reeks proefnemings word uitgevoer deur een van die laboratorium se navorsingsbeamptes wat in Göttingen die probleem ondersoek om meer duidelikheid te verkry oor die gehoorseienskappe wat 'n luisteraar in staat stel om tussen klanke wat van voor en dié wat van agter sy hoof kom, te onderskei.

ACOUSTICS

Mechanical Recording of Law Court Proceedings

The electro-mechanical recording systems in South African law courts have proved highly satisfactory and were further extended during the past six months.

A request was received from one of the neighbouring territories for extension of the system to two of its high courts.

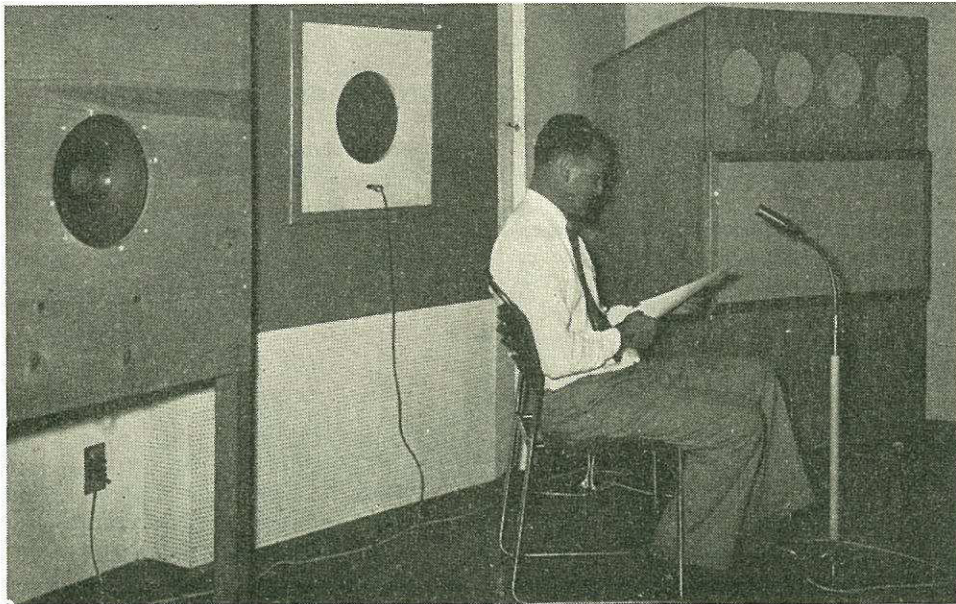
Directional Characteristics of Human Voice

The directional characteristic of the human voice is one of the fundamental factors to be considered when the intelligibility of speech in auditoria is investigated. Direct measurement of this characteristic has been undertaken using a novel technique whereby these characteristics can be measured in a live room.

PSYCHO-ACOUSTICS

Localization of a Sound Source by the Hearing Mechanism

A series of experiments is being conducted by one of the research officers, at present in Göttingen, in order to throw light on the characteristics of hearing which enable a listener to discriminate between sound coming from in front of or behind his head.



'n Opname van woorde in die ateljee van die Akoestiese Laboratorium vir artikulasietoetse.

Articulation test lists being recorded in the studio of the Acoustics Laboratory.

Kwasie Stereofoniese Enkelkanaalweergawe

Op die oomblik word ondersoek hoe noukeurig bepaal kan word wat die vereistes is vir die teruggawe van die „teenwoordigheids“-gevoel by die weergawe van 'n klankopname.

ARGITEKTONIESE AKOESTIEK

Die akoestiek in die Jan Smuts Lughawegebou is verbeter volgens aanbevelings deur die Onderafdeling Akoestiek gedoen. Aankondigings kan nou dwarsdeur die hele gebou goed verstaan word.

Die S.A.U.K.-ateljees in Kaapstad is nou reeds ongeveer agtien maande in gebruik. Tydens nog 'n besoek aan Kaapstad is 'n aantal gebreke in die geboustruktuur opgespoor en herstel. 'n Reeks subjektiewe luistertoetse is uitgevoer om vas te stel of verdere akoestiese veranderinge nodig was, en sodanige veranderinge is aangebring waar nodig.

ELEKTROTEGNOLOGIE

Negatiewe Fasevolgorderelais

'n Ondersoek is ten behoeve van 'n vervaardiger onderneem om 'n spesiale tipe negatiewe fasevolgorderelais te ontwerp.

Elektroniese Instrumentasie

Hierdie afdeling het nog steeds alle laboratoria van die W.N.N.R. as ook 'n paar staatslaboratoria, gehelp.

OUTOMATISASIE

Servomeganismes

Kontrolering van die digtheid van magnetietsuspensies in steenkoolskeiers

In 'n poging om die probleem van noukeurige en gerieflike meting van die digtheid van magnetietsuspensies wat vir die flottasie van steenkool gebruik word, op te los, is 'n dubbeltipe dobber wat 'n differensiaaltransformator insluit, ontwerp. Hierdie toestel word nou deur die werkswinkel vervaardig.

ELEKTRONIESE REKENMASJIENE

Bevredigende vooruitgang is met die bou van die differensiaalontleder „HEIDEN” gemaak. Geslaagde proefnemings met die eerste funksiegenerator van hierdie toestel is voltooi. Die noukeurigheid van die funksiegenerator is ongeveer 0.5 persent.

'n Eksperimentele vermenigvulder is ook gebou wat noukeurig die oombliklike produk van twee funksies van tyd gee wat in 'n honderdste van 'n sekonde deur hulle

Single Channel Quasi Stereophonic Reproduction

An investigation is under way to determine more precisely what the requirements are for the restoration of a feeling of “presence” in reproducing a sound recording.

ARCHITECTURAL ACOUSTICS

Acoustical correction of the Jan Smuts Airport building has been carried out according to recommendations by the Acoustics Subdivision. Intelligibility of the announcements is now high throughout the entire building.

The S.A.B.C. studios in Cape Town have now been in use for approximately eighteen months. During a further visit to Cape Town a number of imperfections in the structure were traced and repaired. A series of subjective tests was carried out in order to determine whether further acoustical adjustments were required and adjustments were carried out where necessary.

ELECTROTECHNOLOGY

Negative Phase Sequence Relay

An investigation was undertaken on behalf of a manufacturing firm on the design of a special type of negative phase sequence relay.

Electronic Instrumentation

This section has continued to assist all laboratories in the C.S.I.R. as well as some government laboratories.

AUTOMATION

Servomechanisms

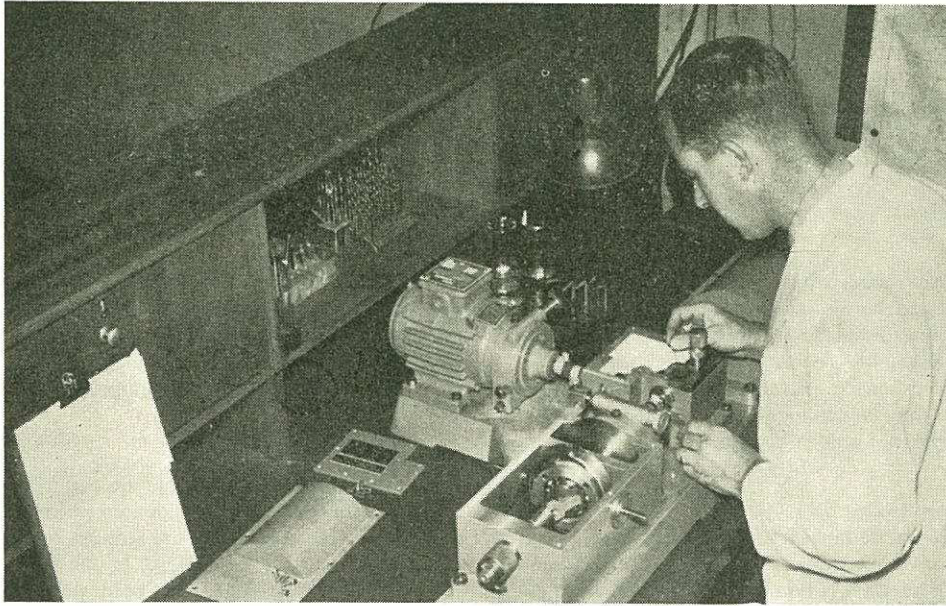
Pulp density control in coal separators

In an effort to solve the problem of accurate and convenient measurement of the density of the magnetite pulp used for coal flotation, a double float type device employing a differential transformer has been designed. This is now being constructed by the Workshop.

ELECTRONIC COMPUTERS

Satisfactory progress on the differential analyser “HEIDEN” has been made. Tests on the first function generator of this computer were satisfactorily completed. The accuracy of the function generator is approximately 0.5 per cent.

In addition, an experimental multiplier has been built which gives accurately the instantaneous product of two functions of time which are going through their complete range of variation in one hundredth of a second.



'n Sinusgolf-ontwikkelaar vir die studie van outomatiese beheerstelsels.

A sine-wave generator for research into automatic control systems.

volle bereik van verandering gaan. Die ontwerp van die vermenigvuldiger is oorspronklik en die toestel skyn heelwat eenvoudiger as ander toestelle van hierdie aard wat tans in gebruik is, te wees.

Die aantal liniêre eenhede van die rekenmasjien is uitgebrei tot 6 integrators en 10 summators.

Die loodsmodel is dus voltooi en is alreeds gebruik vir die oplossing van praktiese probleme binne sy bereik.

STANDAARDISERING

Standaardisering van Radioisotope

Die belangrikheid van radioisotope in die na-oorlogse wêreld, maak dit nodig dat die aktiwiteite van verskillende isotope, absoluut gemeet kan word in terme van die aantal disintegrasies per tydseenheid. Hierdie belangrike plig rus op die Afdeling Toegepaste Radioaktiwiteit en die werk het tans die stadium bereik waar dit moontlik is om aan internasionale standaardisering deel te neem. Monsters van 'n oplossing wat 'n spesifieke isotoop van onbekende aktiwiteit bevat, word aan die verskillende laboratoriums wat aan die onderlinge vergelykings deelneem, verskaf deur die National Physical Laboratory, Engeland, of deur die National Bureau of Standards, Verenigde State van Amerika. Die laboratorium het onlangs vir die eerste keer deelgeneem aan 'n internasionale standaardisasie in die geval van goud-198—'n isotoop wat 'n belangrike rol in kankerterapie speel. Die resultate

The design of the multiplier is novel and seems much simpler than other devices for this purpose currently in use.

The number of "linear" units of the computer has been increased to 6 integrators and 10 adders.

The pilot model has thus been completed and has been used for the solution of practical problems within its capacity.

STANDARDIZATION

Standardization of Radioisotopes

The importance of radioisotopes in the post-war world necessitates the ability to determine the activities of the various isotopes absolutely in terms of the number of disintegrations per unit time. This important task is fulfilled by the Applied Radioactivity Section and the work has now reached the stage where it is possible to participate in international standardizations. Samples of a solution containing a specific isotope but of unknown activity are distributed by the National Physical Laboratory, England, or the National Bureau of Standards, United States of America, to the various laboratories participating in such an intercomparison. The laboratory has recently participated for the first time in the case of gold-198—an isotope which plays an important role in

wat verkry is, het baie goed vergelyk met dié van ander gevestigde laboratoriums.

Standaardisering van X-straaldosisse

Die Onderafdeling Biofisika is besig om 'n primêre vrye-lugionisasiekamer te bou. Ses X-straaldosismeters is vir hospitale en mediese firmas vir verskillende X-straal kwaliteite ge-yk.

Temperatuurstandaardisering

In die verlede is die noukeurigheid van die laboratorium se temperatuurstandaardisering deur gebrek aan druk-beheerde stoom- en swaembaddens beperk. Die nodige baddens en 'n galvanometerversterker vir die Smith-brug is egter tans voltooi waardeur baie noukeuriger temperatuurmetings gedoen kan word.

Lengtestandaardisering

Die 50-cm-interferometer is getoets om vas te stel of die spore waarop die trollies, wat die spieëls dra, loop, reguit genoeg is. Daar is bevind dat hierdie deel van die konstruksie baie bevredigend uitgevoer is.

Apparaat vir die 50-meter-interferometer-komparator vir yking van maatlyne vir landmeters word nou gebou. Die ontwerp van die 50-meter-meetbank met sy anti-vibrering is voltooi.

cancer therapy. The results obtained agreed very well with those from the other well-established laboratories.

Standardization of X-ray Dosage

In the Biophysics Subdivision the construction of a primary free-air ionization chamber is proceeding. Six X-ray dosimeters have been standardized, for various qualities of X-radiation, for hospitals and medical firms.

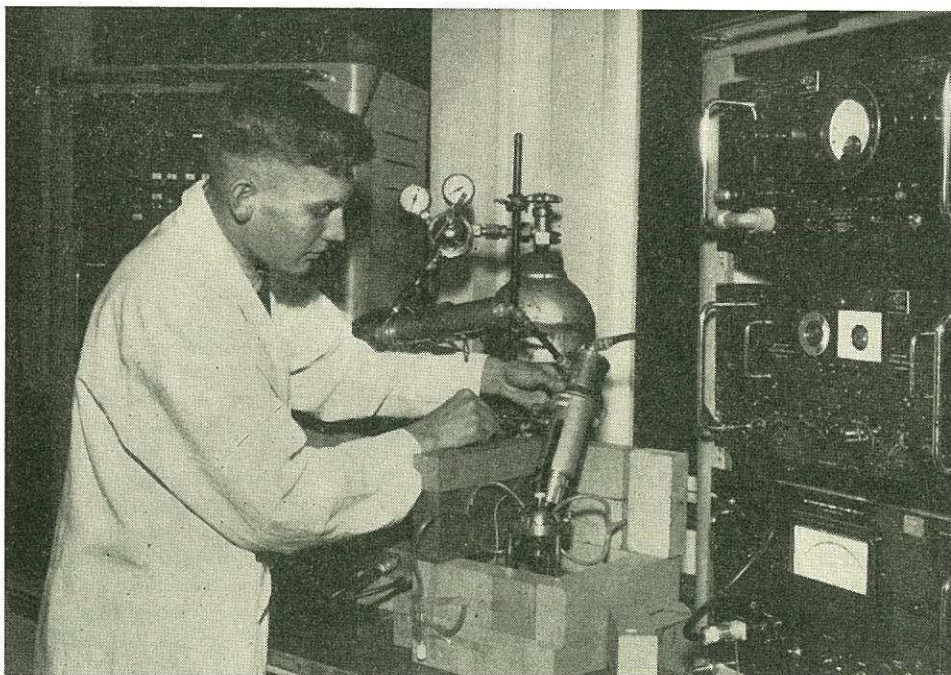
Temperature Standardization

The accuracy of our temperature standardization work has in the past been limited by lack of pressure-controlled steam and sulphur baths. With the construction of these baths and the satisfactory testing of the galvanometer amplifier for the Smith Bridge, a notable improvement in our accuracy of temperature measurement will now be possible.

Length Standardization

A test has been carried out on the fifty centimetre interferometer to see if the guides, on which the carriages carrying the mirrors travel, are straight enough to meet the requirements of the design. It was found that this part of the construction had been very satisfactorily performed.

Apparatus for the fifty metre interferometer comparator, for the calibration of survey tapes, is being built and the design of a fifty metre measuring bench with anti-vibration mountings has been completed.



Absolute standaardisering van radioisotope met die $4\pi\beta\text{-}\gamma$ koïnsidensiemetode.

Absolute standardization of radioisotopes by the $4\pi\beta\text{-}\gamma$ coincidence method.

Elektriese Standaardisering

Die ontvangs van nog twee 1-ohm-standaardweerstande, spesiaal deur die National Bureau of Standards in Washington vir insluiting in ons nasionale standaard, uitgesoek, het 'n gulde geleentheid gebied vir 'n internasionale vergelyking, en dit het geblyk dat die Pretoria-standaard oor 'n tydperk van 7 jaar nie meer as 1.5 dele per miljoen van die Washingtonstandaard verskil het nie.

Akoestiese Standaardisering

Die toerusting vir die resiprositeitsyking van mikrofone is heeltemal opgeknap en verbeterings is daaraan aangebring om die metings minder tydrowend te maak.

Met behulp van 'n resiprositeitstechniek is 'n aantal kristalvibreringsopnemers geyk.

YKING VAN TOERUSTING EN TOETSE OP MATERIALE

Die laboratorium het 'n groot aantal toetse uitgevoer, insluitende:

- Die nasien van stralingstoerusting vir kontrolering van radioisotope;
- Die meet van spektrale refleksie en deurlating van lig vir verskillende monsters;
- Die yk van lig- en kleurtemperatuurmetings;
- Geluidabsorpsiemetings op akoestiese materiaal;
- Bepaling van die rigtingseienskappe van mikrofone en luidsprekers;
- Die yk van elektriese standaarde en meetinstrumente;
- Die toets van warmte-isulerende materiaal, en die yk van termometers.

ALGEMENE DIENSTE

Stralingsbeskerming

Die Filmwapendiens wat ingestel is as 'n beskermingsdiens vir persone wat blootgestel word aan ioniserende straling in hospitale en die nywerheid, is uitgebrei. Die aantal wapens wat uitgestuur is, het toeneem met omtrent 50 persent tot byna 10,000 per jaar. 'n Vereenvoudigde ykingsstelsel vir die Filmwapendiens, waar strontium-90, 'n suiwer beta-straler met 'n lang halveringstyd, in plaas van X-strale gebruik word, is ontwikkel.

Radioisotope

Die laboratorium het regulasies vir die gebruik van radioisotope in die medisyne opgestel. Die regulasies is deur die Radioisotope-Komitee (Medies) van die Raad

Electrical Standardization

The receipt of two further 1 ohm standard resistors specially selected by the National Bureau of Standards in Washington for incorporation in our national standard, has afforded an excellent opportunity for an international check and the conclusion has been drawn that the Pretoria standard has not deviated from the Washington standard by more than 1.5 parts per million over a period of 7 years.

Acoustical Standardization

The equipment for the reciprocity calibration of microphones has been completely overhauled and improvements have been made to it with a view to making measurements less time-consuming.

A number of crystal vibration pick-ups have been calibrated using a reciprocity technique.

TESTING OF EQUIPMENT AND TESTS ON MATERIALS

The laboratory has carried out a large number of tests which included the following:

- Checking of radiation equipment for monitoring radioisotopes;
- measurements of spectral reflection and transmission of light in various samples;
- calibration of light and colour temperature meters;
- sound absorption measurements on acoustic materials;
- directional characteristics of microphones and loudspeakers;
- calibration of electrical standards and measuring instruments;
- testing of heat insulating materials, and calibration of thermometers.

GENERAL SERVICES

Radiation Protection

The Film Badge Service, which was instituted to provide a protection service for persons in hospitals and industry working with ionizing radiation, has been extended and the number of badges sent out has increased by about 50 per cent. to almost 10,000 per year. A simplified calibration system for the Film Badge Service was developed using long-lived Strontium-90, a pure beta emitter, instead of X-rays.

Radioisotopes

The laboratory drew up regulations for the use of radioisotopes in medicine, which were finally modified by the Radioisotope Committee (Medical) of the Atomic

op Atoomkrag verder verwerk en is in Staatskoerant 1650 van 7 September 1956 gepromulgeer. Die toepassing van hierdie regulasies behoort die gebruik van radioisotope vir mediese doeleindes op 'n gesonde grondslag te plaas. Die Raad op Atoomkrag neem vanaf 1 April 1957 die verspreiding van alle radioaktiewe materiaal (behalwe radium en sy vervalprodukte) in Suid-Afrika oor.

WISKUNDE

Die Afdeling Wiskunde voer 'n program van basiese navorsing uit en behandel ook probleme wat deur ander afdelings van die W.N.N.R. of deur buite-organisasies na hom verwys word.

Basiese Navorsing in Wiskunde en Wiskundige Statistiek

Navorsing in verband met die karakters in die groepteorie van moderne algebra is voortgesit en sekere stellings oor meetbare funksies is afgelei. In funksieteorie is weer aandag bestee aan die hipergeometriese reeks met meer as een veranderlike en die toepassing daarvan op die waarskynlikheidsleer.

Verskeie diskrete kansfunksies van die binomiale en negatiewe binomiale tipe is beskou en steekproefverdelings, wat waardevol in praktiese probleme is, is afgelei. Daar is ook aandag bestee aan diskrete kansprosesse wat beskryf word deur 'n parsieële differensievergelyking en dit was moontlik om vir verdere limietgevalle 'n differensiaalvergelyking af te lei. Sommige van hierdie resultate word gepubliseer.

Toegepaste Navorsing in Wiskunde en Statistiek

By die bepaling van die ouderdom van rotse deur gebruikmaking van radioaktiwiteit word veronderstel dat die dogterelement in die rotse agterbly. As die dogterelement uit die rotse uit diffundeer, is korreksies nodig en hierdie korreksies is afgelei en bereken. In Suid-Afrika ontstaan ernstige probleme deur die sakking van grond nadat daarop gebou is. 'n Teorie vir die berekening van hierdie toestand is voorgestel deur Biot, en pogings word aangewend om die teoretiese oplossing vir verskillende gevalle af te lei sodat die teorie prakties getoets kan word. Ten behoeve van die navorsingsgroep oor rotsstortings en stratabeweging van die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese is voortgegaan met die statistiese analise van gegewens oor rotsstortings in myne.

Verskeie inkomsteverdelings is beskou en daar is aangetoon dat 'n wiskundige statistiese model, bestaande uit 'n kombinasie van normale komponente, gebruik kan word om sulke verdelings te beskryf.

'n Statistiese toets is afgelei om te gebruik by die analise van spektrochemiese waarnemings.

Ten behoeve van die Pneumokoniose-navorsingseenheid is 'n verslag wat oor die analise van beskikbare gege-

Energy Board and promulgated in the Government Gazette 1650 of 7th September, 1956. The application of these regulations should place the use of radioisotopes for medical purposes on a sound footing. The Atomic Energy Board is taking over the distribution of all radioactive material (except radium and its daughter products) in South Africa as from 1st April, 1957.

MATHEMATICS

The Mathematics Division carries out a programme of basic research and also deals with problems presented by other sections of the C.S.I.R. or by outside organizations.

Basic Research in Mathematics and Mathematical Statistics

Research into characters in the group theory of modern algebra was continued and certain theorems on measurable functions were derived. In function theory, attention was again given to the multivariable hypergeometric series and its applications to probability theory.

Various discrete probability functions of binomial and negative binomial type were considered and sampling distributions which are valuable in practical problems were derived. Attention was also given to discrete probability processes which are described by a partial difference equation and it was possible to derive a differential equation for certain limiting processes. Some of these results are being published.

Applied Research in Mathematics and Statistics

In the determination of the age of rocks, using radioactive methods, it is assumed that the daughter element remains in the rock. If the daughter element diffuses out of the rock, corrections are necessary, and these are derived and calculated.

In South Africa a serious problem is created by the settlement of soil after it has been built upon. A theory to account for this settlement has been proposed by Biot, and efforts are being made to derive the theoretical solutions for various cases in order that the theory may be experimentally tested.

On behalf of the research group on Rockbursts and Strata Movement of the National Mechanical Engineering Research Institute, the statistical analysis of data on rockbursts in mines was continued.

Various income distributions were considered and it was shown that a mathematical statistical model, consisting of a combination of normal components, can be used to describe such distributions.

A statistical test was derived for use in the analysis of spectrochemical observations.

On behalf of the Pneumoconiosis Research Unit, a report dealing with the analysis of available data

wens in verband met pneumokoniosegevalle handel, voltooi. 'n Begin is gemaak met 'n breedvoerige ondersoek na die produksie van pneumokoniose deur 'n groep lëers vir bestudering uit te kies uit die groot aantal wat beskikbaar is by die Pneumokoniose-Buro. Die standaardisasie van kliniese vorms is onderneem in samewerking met die mediese beamptes van die Pneumokoniose-Buro.

Algemene Dienste

Advies en roetinedienste is gelewer aan die navorsingsinstitute van die Wetenskaplike en Nywerheidsnavorsingsraad, staatsdepartemente en verskeie ander organisasies. Breedvoerige advies oor statistiese onderwerpe is gegee aan 'n regeringskommissie.

bearing on pneumoconiosis incidence was completed. A start was made with a detailed investigation into the production of pneumoconiosis by selecting records from the large number available at the Pneumoconiosis Bureau. The standardization of clinical forms was undertaken in collaboration with the medical officers of the Pneumoconiosis Bureau.

General Service

Advice and routine services were rendered to the research institutes of the Council for Scientific and Industrial Research, government departments and to various other organizations. Extensive advice on statistical matters was given to a government commission.

Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese

Direkteur: DR. A. J. A. ROUX

Gedurende die onderhawige tydperk, was daar 'n voortdurende toename in die Instituut se bedrywighede te bespeur. Hierdie toename geld veral ten opsigte van werk ten behoeve van die nywerheid en ander organisasies gedoen. Daar kan derhalwe met sekerheid beweer word dat die nywerheid in toenemende mate gebruik maak van sowel die raadgevende as die eksperimentele dienste wat die Instituut aanbied. Hierdie bewering word gestaaf deur die feit dat die Instituut se inkomste, afkomstig uit ondersoeke op 'n kontrakbasis, vir die tydperk in oorsig ongeveer £28,500 en vir die boekjaar 1956/57 nagenoeg £37,500 beloop het, dit wil sê, bykans £20,000 meer as in die vorige jaar. Ten spyte egter van die toename in sy personeelsterkte en laboratoriumfasiliteite is dit nog nie vir die Instituut moontlik om te voldoen aan al die versoeke wat van die nywerheid ontvang word nie.



Dr. A. J. A. Roux.

National Mechanical Engineering Research Institute

Director: DR. A. J. A. ROUX

The period under review has seen a continued growth in the activities of the Institute, particularly in regard to work done on behalf of industrial and other organizations. It may confidently be asserted that industry is availing itself of both the consultative and experimental services offered by the Institute to an ever increasing degree. This fact is borne out by the Institute's revenue from contract investigations, which was approximately £28,500 for the period and about £37,000 for the financial year 1956/57, nearly £20,000 more than the previous year. Yet, despite increases in staff and laboratory facilities, it has not been possible to entertain all the requests for assistance received from industry.

An event of particular importance was the completion of the new aeromechanics building adjacent to the existing wind tunnel building. This building, in addition to office space, provides laboratory accommodation for the fan-noise test rig, the model mine-shaft wind tunnel, an instrument wind tunnel, a cascade test rig, a high speed wind tunnel and a pneumatic conveyor. As a temporary measure, the Hydromechanics Division is also being accommodated in the new building.

In view of the progress made by N.M.E.R.I. in their research on aeromechanics, thermodynamics and strength of materials, Council decided to set up a National Advisory Committee for Aeronautical Research (N.A.C.A.R.). The inaugural meeting of this body was held in Pretoria on the 1st of May, 1956.

The functions of N.A.C.A.R. are:

- (a) to plan and co-ordinate research and development in the field of aeronautics in South Africa;
- (b) to serve as a link in aeronautical research between South Africa and other countries;
- (c) to promote co-operation between various bodies in the country having an interest in aeronautical research.

In addition to the C.S.I.R., the following bodies are represented on the Committee: the Defence Department, the Department of Transport, South African Airways, the Universities of the country, and the South African branch of the Royal Aeronautical Society.

Since its inception, the N.A.C.A.R. has been very active. In the period between the inaugural meeting and the Second Annual Meeting held on the 28th of May

Noemenswaardig in die vordering van die Instituut is die voltooiing van die nuwe lugmeganika-gebou langs die reeds bestaande windtonnelgebou. Die gebou bied, benewens kantoorruimte, ook laboratoriumruimte vir die waaiergeraasopstelling, die model-mynskagwindtonnel, 'n instrumentwindtonnel, 'n lemroosterkanaal, 'n hoëspoedwindtonnel en vir die lugvervoertoestel. Die Afdeling Hidromeganika word ook tydelik in hierdie gebou gehuisves.

As gevolg van die vordering wat in die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese gemaak is met navorsing op die gebied van lugmeganika, termodinamika en sterkteleer, het die Raad besluit om 'n Nasionale Advieskomitee vir Lugvaartkundige Navorsing (N.A.K.L.N.) in die lewe te roep. Die stigtingsvergadering van hierdie liggaam is op 1 Mei 1956 in Pretoria gehou.

Die funksies van die N.A.K.L.N. is:

- (a) Om navorsing en ontwikkeling op die gebied van lugvaartkunde in Suid-Afrika te beplan en te koördineer;
- (b) om as skakel te dien insake lugvaartkundige navorsing tussen Suid-Afrika en ander lande; en
- (c) om samewerking te bevorder tussen verskillende liggame in die land wat belang het by lugvaartkundige navorsing.

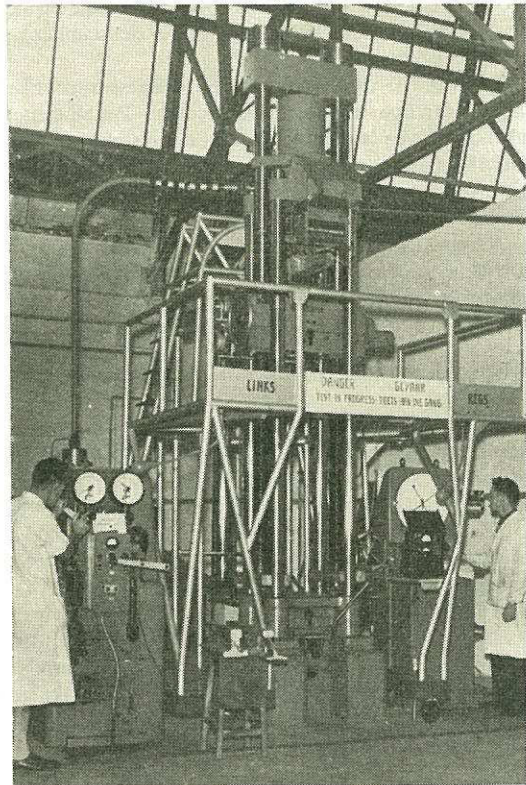
Behalwe die W.N.N.R., word die volgende liggame in die Komitee verteenwoordig: die Departement van Verdediging, die Departement van Vervoer, die Suid-Afrikaanse Lugdiens, die Universiteite van die land, en die Suid-Afrikaanse tak van die Royal Aeronautical Society.

Sedert die stigting daarvan, het die N.A.K.L.N. groot bedrywigheid aan die dag gelê. In die tydperk tussen die Stigtingsvergadering en die Tweede Jaarvergadering, wat op 28 Mei 1957 gehou is, het die Uitvoerende Komitee drie keer vergader. Goeie vordering is gemaak met die koördinasie van navorsing binne die Unie, en met die verstewiging van bande met die Commonwealth Aeronautical Advisory Research Committee (C.A.A.R.C.), waarvan Suid-Afrika 'n lid is. 'n Lugvaartkundige navorsingsprogram is vir die Unie opgestel, en daadwerklike pogings word aangewend om sommige van die projekte wat in die program ingesluit is, gedurende 1958 van stapel te stuur.

METALLURGIE

Voorvervorming en die Plastiese Eienskappe van Metale

Die invloed van voorvervorming op die plastiese eienskappe van metale is van akademiese sowel as praktiese belang, aangesien 'n metaal se plastiese eienskappe 'n aansienlike invloed op metaalvervormingsprosesse



Fatigue testing of rails in a Amsler 100-ton pulsator.

Vermoeidheidstoets op spoorstawe in 'n 100-ton Amsler-pulsator.

1957, the Executive Committee held three meetings. Good progress has been made with the co-ordination of research within the Union and the strengthening of ties with the Commonwealth Aeronautical Advisory Research Committee (C.A.A.R.C.), of which South Africa is a member. A programme for aeronautical research has been drawn up for the Union and endeavours are being made to launch some of the projects included in the programme, during 1958.

METALLURGY

Predeformation and the Plastic Properties of Metals

The influence of predeformation on the plastic properties of metals is of both academic and practical importance, since a metal's plastic properties so greatly influence metal-forming processes. The investigation of

uitoefen. Onderzoek word tans voortgesit na die invloed van voorvervorming op die plastiese eienskappe van metaal-enkelkristalle.

Die tegniek van die kweek van sferiese sink-enkelkristalle van hoë suiwerheid is bemeester. Twaalf sferiese enkelkristalle en 'n aantal bi-kristalle van sink van 'n hoë suiwerheid is tot dusver reeds met welslae vervaardig. Die bi-kristalle sal in 'n latere stadium van die ondersoek gebruik word.

Apparaat vir die chemies-ervormingsvrye masjinerie van die sferiese enkel- en bi-kristalle en 'n apparaat vir die onderwerpings daarvan aan suiwer skuifbelasting is ontwerp en vervaardig en word tans getoets.

Invloed van Spanning op Korrosie in Metale en Legerings

Die gesamentlike werking van spanning en korrosie kan, in bepaalde gevalle, vinnige verswakking of swigting van metale en legerings veroorsaak. 'n Teoretiese studie, wat die ontwikkeling van metodes van ondersoek van die invloed van interkristallyne oriëntasie op 'n materiaal se gevoeligheid vir spanningskorrosie ten doel het, word voortgesit.

'n Begin is gemaak met die bou van apparaat vir die vervaardiging van bi-kristalle van alpha-geelkoper, deur die gebruik van die sogenaamde „Bridgemanmetode”. Voorsiening is gemaak vir die gebruik van sowel vakuumas edelgasatmosfeer vir die beskerming van die bi-kristalle gedurende vervaardiging.

Alkalisiese Verbrossing van Keteldromstaal

Die studie van die betrokke literatuur is voortgesit en 'n groot aantal voorlopige meganiese toetse uitgevoer ten einde vas te stel watter meganiese toetsmetode gebruik kan word en wat die geskikste vir die kwantitatiewe bepaling van die graad van verbrossing sal wees. Die meganiese toetse het bewys dat, in orde van geskiktheid, ware spanningvervormingsbepalings deur die trektoetsmetode, kerfstaaf- en 180°-buigtoetse, met voordeel gebruik kan word vir die meting en opsporing van verbrossing. Verdere toetse word tans uitgevoer.

'n Elektron-mikroskopiese ondersoek na die mikrostruktuur van stoomketelstaal word in medewerking met die N.F.N.L. uitgevoer. Die aard van die korrelgrense van die staal is van besondere belang, aangesien alkalisiese krake altyd in die korrelgrense voorkom.

Etsgaatjies in Koper- en Koper-sink-legerings

As die gepoleerde oppervlakke van sekere metale blootgestel word aan die werking van bepaalde etsmiddels, ontwikkel sogenaamde etsgaatjies op hierdie oppervlakke. Daar bestaan moontlik 'n verhouding tussen die vorm van die etsgaatjies en die kristaloriëntasies van die betrokke metaalkorrels, terwyl hul posisies vermoedelik ooreenstem met dié van die sogenaamde ontwingings wat van submikroskopiese afmetings is. Aangesien die fisiese en meganiese eienskappe van metale sterk beïnvloed word

the effect of predeformation on the plastic properties of metal single crystals is being continued.

The technique of growing spherical single crystals of high-purity zinc for reversed shear testing has been mastered. To date, twelve spherical single crystals of high purity zinc have been successfully produced, as have a number of bi-crystals. The latter will be employed in a later phase of the investigation.

Various pieces of apparatus for the chemical “strain free” machining of the spherical single and bi-crystals and for their reversed shear testing of the single crystals were designed and manufactured and are now being tested.

Influence of Stress on Corrosion Effects in Metals and Alloys

The simultaneous operation of both stress and corrosion can, in certain cases, result in rapid deterioration or failure of metals and alloys. A theoretical study of methods of investigating the influence of intergranular orientation on a material's susceptibility to stress-corrosion cracking has been continued.

A start has been made with the construction of apparatus for the production of bi-crystals of alpha-brass using the so-called “Bridgeman method”. Provision has been made for the use of both vacuum and inert-gas atmospheres for the protection of the bi-crystals during production.

Caustic Embrittlement of Boiler Plate Steel

The study of the relevant literature was continued and a large number of preliminary mechanical tests were carried out. The object of these tests was to determine which method of mechanical testing can best be employed for the quantitative measurement of relatively small degrees of embrittlement. The mechanical tests have shown that, in order of suitability, “true stress-true strain” tensile testing, notched-bar bend testing and 180° bend testing, may be employed with advantage for the measurement and detection of embrittlement. Further tests are being conducted.

An electron-microscopical investigation into the micro-structure of boiler plate steel is being conducted in collaboration with the N.P.R.L. The nature of the grain boundaries of the steel are of particular interest since caustic cracks are invariably situated intergranularly.

Etch Pits in Copper and Copper-Zinc Alloys

When the polished surfaces of certain metals are exposed to the action of certain aggressive chemicals, etch pits develop on these surfaces. The shape of the etch pits are thought to bear some relation to the crystal orientation of the relevant grain of the metal and their positions are thought to correspond to the sites of so-called dislocations, which are of sub-microscopic dimensions. As the physical and mechanical properties

deur die aanwesigheid en verspreiding van ontwingtings, is eksperimentele bevestiging van die aard en verspreiding daarvan dus van besondere belang. Etsgaatjies in koper en 'n reeks koper-sink-legerings word tans bestudeer. Verskeie etsmiddels word ondersoek en die resultate met die voorgeskiedenis, samestelling en struktuur van die materiale gekorreleer.

Swigtings in die Praktyk en Ander Ondersoeke

Verskeie gevalle van swigtings wat in die praktyk voorgekom het, is ten behoewe van die betrokke nywerhede ondersoek. 'n Paar van die meer interessante gevalle word kortliks behandel.

Metallografiese ondersoek het aan die lig gebring dat swigting van geelkoperdraad 'n direkte gevolg van ernstige ontsinking van die geelkoper was en dat lengtekrake in staaldraad vir gewapende beton deur vervaardigingsdefekte veroorsaak is. Uitgebreide metallografiese en hardheidsondersoeke is uitgevoer om die diepte van die harde dop van dopverharde staalwasters te bepaal, en daar is bevind dat die aanwesigheid van haarbarsies en ernstige oppervlakonegalighede aan oorverhitting van die wasters gedurende die hittebehandeling toegeskryf kan word. 'n Ondersoek van geswigte hoeklemme van gesweiste konstruksie het getoon dat swigting deur vermoeidheid veroorsaak is, en dat ruwe oppervlakafwerking en die onegalige dikte van die sweismetaal tot die swigting bygedra het. Vermoeidheidsbreuke is ook gevind in 'n dryfstang en in die aandryf-rat van 'n vliegtuig, waar die vermoeidheidsweerstand van die onderdeel verswak is deur faktore soos ruwe oppervlakafwerking, onsuiver staal en strukturele skade.

Omvangryke ondersoeke na swigtings van 'n groot suikermeulaandryfrat en lokomotiefketels is onlangs begin.

STERKTELEER

Daar was 'n verdere toename in die aantal versoeke van die nywerheid om die bepaling van statiese en vermoeidheidsterkte van materiale en strukture, en in verband met spanningsontledings op strukture en masjienonderdele. Die toerusting van die Sterkteleerlaboratorium, n.l. die vermoeidheidstoetsmasjien (100 ton), die statiese toetsmasjiene (30 ton en 10 ton onderskeidelik), verskeie kleinere wentelbalk-vermoeidheidstoetsmasjiene en die broslak- en rekstrokietoetsroerusting, was gevolglik voortdurend in gebruik. Die laboratorium se fasiliteite is uitgebrei deur die aankoop van 'n „Schenk“-pulsator (20 ton), 'n Amsler Vibrophore (10 ton) met hoë frekwensie en 4 van die R.R. Moore-tipe wentelbalk-vermoeidheidstoetsmasjiene.

Invloed van Spanningssiklusfrekwensie op die

Vermoeidheid van Materiale

Die werk in verband met die invloed van die spanningsiklusfrekwensie op die vermoeidheidslewe van uitge-

of metals depend very largely on the presence and distribution of these dislocations, experimental verification of their nature and distribution is of great interest. Etch pits in copper and a series of copper-zinc alloys are at present being studied. Various etching agents are being investigated and the results correlated with prior history, composition and structure of the materials.

Failures in Service and Other Investigations

Several cases of failures in service were investigated on behalf of industry. A few of the more interesting cases are briefly described below.

Metallographic examination revealed that the failure of brass wire was a direct result of severe dezincification of the brass, and that longitudinal cracks in steel wire for pre-stressed concrete were caused by the presence of manufacturing defects. Extensive metallographic and hardness investigations allowed the measurement of the case-depth of case-hardened steel washers and revealed that the presence of hair-cracks and undue surface roughness could be ascribed to overheating during thermal treatment. Investigation of fractured compressor corner vanes of welded construction revealed that failure had occurred by a fatigue mechanism, rough surface finish and uneven thickness of weld deposit being contributory causes of failure. Fatigue failures were also encountered in a fractured connecting rod and in an aircraft drive gear, the fatigue strength of these components having been impaired by such factors as rough surface finish, "dirty" steel and structural damage.

Extensive investigations into the failures of a large sugar mill drive gear and locomotive boilers have recently been commenced.

STRENGTH OF MATERIALS

There has been a further increase in the number of requests received from industry for the determination of the fatigue and static strength of materials and structures and the conducting of stress analyses on structures and machine parts. Consequently, the facilities of the Strength of Materials Laboratory, namely the 100-ton fatigue testing machine, the 30-ton and the 10-ton static testing machines, various smaller rotating beam fatigue testing machines, and the brittle lacquer and strain gauge testing equipment, were fully engaged. The Laboratory's facilities were, however, augmented by the purchase of a 20-ton Schenck pulsator, a 10-ton Amsler high frequency vibrophore and 4 R.R. Moore rotating beam fatigue testing machines.

Influence of Stress Cycle Frequency on the Fatigue of Metals

Work on the determination of the influence of the stress cycle frequency on the fatigue life of annealed

gloeide EN-45-staal is voortgesit. Toetse is uitgevoer op gepoleerde, gladde silindriese proefstukke wat aan wentelbuiging onderwerp is.

Die bevindinge wat tot op datum deur die toets van ongeveer 50 monsters verkry is, dui aan dat die vermoedheidslewe van 'n monster aanmerklik deur die toetsfrequentie beïnvloed word, mits die spanningsamplitude hoog is. Die aangewende frekwensie was 1, 29, 1,450 en 9,000 siklusse per minuut. Vir 'n spanningsamplitude van 65,000 lb./vk. dm. het identiese monsters wat teen die reedsgenoemde frekwensies getoets is, byvoorbeeld vermoedheidslewes gehad van ongeveer 80,000 (1 siklus per minuut), 150,000 (29 siklusse per minuut), 500,000 (1,450 siklusse per minuut) en 1,500,000 (9,000 siklusse per minuut) siklusse tot swigting. Dit is derhalwe duidelik dat die vermoedheidslewe onder hoë spanning met toenemende frekwensie van belasting heelwat toeneem. Hierdie invloed verminder namate die spanningsamplitude die vermoedheidsgrens nader, dit is, die amplitude wat die materiaal vir 'n feitlik onbepaalde aantal siklusse kan weerstaan sonder om te breek.

Invloed van Vorm en Grootte van Toetsmonster op die Vermoedheidsgrens van Metale

As 'n voorvereiste vir hierdie fundamentele navorsingsprojek is 'n eksperimentele ontleding van die spanning in skerp kerwe uitgevoer op vier trekmonsters waarvan die teoretiese spanningskonsentrasiefaktore, wat deur die kerwe veroorsaak is, 3.80, 4.82, 5.51 en 7.20 is. Die broslaktechniek is vir hierdie doel gebruik. Daar is bepaal dat die broslak wat op die monsters aangewend is, nie bars voordat die spanning die sensitiwiteitswaarde van die broslak oor 'n lengte van ongeveer 0.02 duim oorskry nie.

Toetse is ook uitgevoer op broslakbedekte balke wat aan buiging onderwerp is om sodoende vas te stel of dié verskynsel ook voorkom onder omstandighede waar die spanningsgradiënt laer as in die geval van gekerfde monsters is.

Tot dusver is aangeneem dat broslak reageer asof dit 'n feitlik oneindig klein meetlengte het, terwyl hierdie toetse blykbaar aandui dat die minimum meetlengte om en by 0.02 dm. kan wees.

Vermoedheid in Spoorstawe

Die ondersoek ten behoeve van die Suid-Afrikaanse Spoorweë na die vermoedheid van spoorstawe om draaie word voortgesit. Die ondersoek het ten doel om die vermoedheidslewe van gedeeltes van spoorstawe wat onderwerp word aan wisselende dwarsbuigbelastinge, gesuperponeer op 'n dwarsvoorbelasting, vas te stel. Hierdie belasting boots die werklike toestand in die praktyk na wanneer 'n lokomotief of 'n trok om 'n draai loop. Dit is opgemerk dat daar by 'n bepaalde spanning barsies in die onderste ronding van die spoorstaaf ontstaan. Die spanning in hierdie gebied word deur middel van rekstrokie gemeet. Die geleidelike groei van hierdie barsies word geregistreer en krommes van die spannings-

EN-45 steel was voortgesit. Die toets is uitgevoer op gepoleerde, gladde silindriese proefstukke wat aan wentelbuiging onderwerp is.

The tests were carried out on polished plain cylindrical specimens subjected to rotating bending in an appropriate testing machine. The results obtained from about 50 specimens tested to date, reveal that the fatigue life of a specimen is significantly influenced by the testing frequency, if the stress amplitude is high. The frequencies applied were 1, 29, 1450 and 9000 cycles per minute. As an example, at a stress amplitude of 65,000 lb./sq. inch, identical specimens tested at the previously mentioned frequencies, had fatigue lives of about 80,000 (at 1 cycle per minute), 150,000 (at 29 cycles per minute), 500,000 (at 1,450 cycles per minute) and 1,500,000 (at 9,000 cycles per minute) cycles to failure. Hence, it is apparent that at high stress amplitudes the fatigue life increases considerably with increasing frequency of cycling. This influence diminishes as the stress amplitude decreases and tends to disappear when the stress amplitude approaches the fatigue limit, i.e. the amplitude which the material can withstand for a practically infinite number of cycles without fracture.

Influence of Shape and Size of Specimen on the Fatigue Limit of Metals

As a pre-requisite for this fundamental research project, an experimental analysis of the stress in sharp notches has been carried out on four tension specimens, the theoretical stress concentration factors caused by the notches being 3.80, 4.82, 5.51 and 7.20. The brittle lacquer technique was used for this study. It was established that the lacquer ("stress coat") applied to the specimens, did not crack until it was stressed beyond its threshold sensitivity value over a length exceeding approximately 0.02 inch.

Tests were also carried out on stress-coated beams subjected to bending in order to establish whether the phenomenon also occurs under conditions where the stress gradient is lower than in the case of notched specimens.

Hitherto, it has been accepted that "stress coat" reacts as if it has a practically infinitely small gauge length, whereas the results of these tests would seem to indicate that the limiting gauge length might be of the order of 0.02 inch.

Fatigue in Rails

The investigations into the fatigue of rails in curves being carried out on behalf of the South African Railways, have been continued. The object is to determine the fatigue life of rail sections subjected to alternating lateral bending loads superimposed on a lateral pre-stress. This loading condition simulates the conditions prevailing in practice, when a locomotive or truck negotiates a curve. It was observed that, at a certain magnitude of stress, cracks start in the bottom fillet of the rail. The strain at these points is being measured by means of strain gauges. The propagation of cracks is being

siklus teen swigting word vir verskillende kraaklengtes saamgestel, sodat die spannings wat die krake veroorsaak het, bepaal kan word.

'n Verdere ondersoek handel oor gesweiste spoorstawe onder vermoeidheidsbelastingstoestande. Vir hierdie doel is buigtoetse in 'n 100-ton vermoeidheidstoetsmasjien op 'n groot aantal spoorstaafmonsters uitgevoer, waarby die monster deur pulserende vertikale kragte belas word. Die resultate maak dit moontlik om 'n vergelyking tussen die vermoeidheidslewe van „thermit“-gesweiste spoorstawe en ongebruikte spoorstawe te tref. Onderzoek na die invloed van lasplaatgate op die vermoeidheidslewe van „thermit“-gesweiste spoorstawe is ook ingestel.

'n Derde ondersoek was oor die verdere vermoeidheidslewe van spoorstawe wat reeds in gebruik was. Daar is bevind dat die wat ondersoek is nog veilig gebruik kan word in die gespesifiseerde toestande.

Verbetering van die Sterkte van Lasse met behulp van Hoë Treksterkte Boute

'n Belangrike probleem wat hom in die ingenieurswese voordoet, is die ontwerp van lasse tussen struktuuronderdele. Benewens sweislasse is die konvensionele metodes van las die gebruik van klinknaels en pasboute. 'n Verdere metode is egter ontwikkel wat belowend lyk, nl. die gebruik van bonte met 'n hoë treksterkte. In

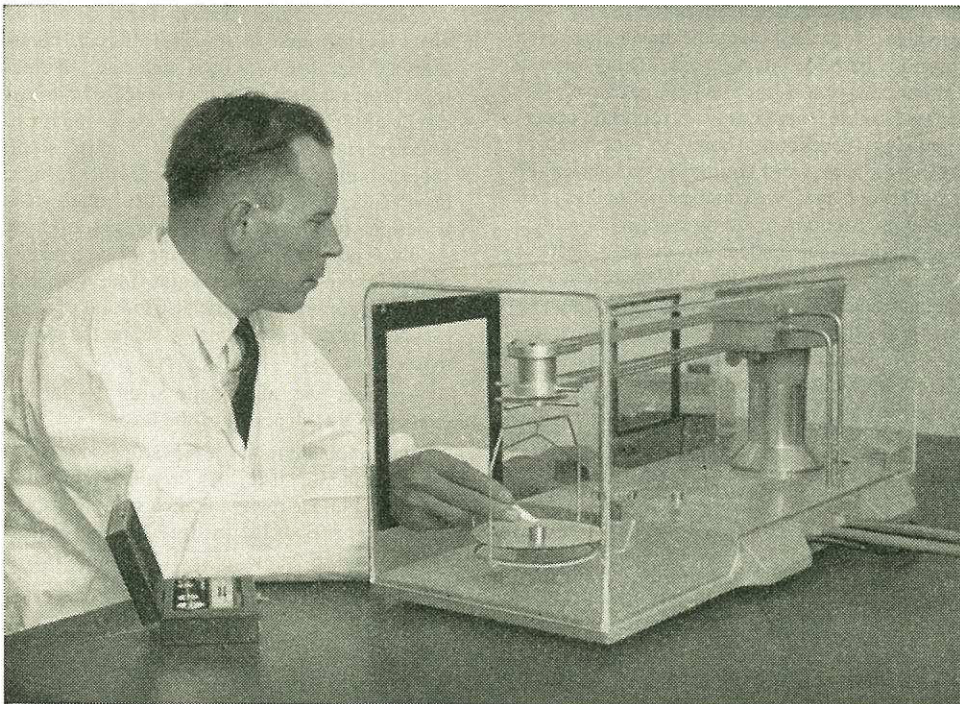
recorded and stress-cycle to failure curves are being plotted for different lengths of crack, in order to allow estimation of the stresses which have initiated the cracks found in the rails during field inspections.

Another investigation deals with the performance of welded rails under fatigue loading conditions. For this purpose, tests under vertical pulsating bending conditions were carried out on a large number of rail sections in a 100-ton fatigue-testing machine. The results enable a comparison of the fatigue life of thermit-welded rails with that of rails in the as-rolled condition. The effect of fishplate holes on the fatigue life of thermit-welded rails was also investigated.

A third group of investigations dealt with the remaining fatigue life of rails which had been in service. It was found that the rails investigated, could still be used safely under the specified conditions.

Improving the Strength of Joints using High Tensile Bolts

One of the problems encountered in structural engineering is the design of joints between structural members. Apart from welding, the conventional methods of joining are riveting and bolting with mild steel bolts which fit neatly in the holes drilled to receive them. However, another method—bolting with high tensile



'n Gevoelige vloeistofmanometer wat deur die Instituut ontwerp is.

A sensitive liquid manometer designed by the Institute.

hierdie metode word boue van staal met 'n hoë treksterkte gebruik in vrypasgate, sodat die volle belasting van die las deur middel van wrywingskragte tussen die lasselemente oorgedra word.

Aangesien hierdie metode nog nie lank in Suid-Afrika bekend is nie, is 'n ondersoek ten behoeve van 'n plaaslike vervaardiger ingestel ten einde meer helderheid oor die aangeleentheid te verkry. Die resultate van die toetse het getoon dat lasse van plaaslik vervaardigde boue met 'n hoë treksterkte in vrypasgate ontwerp kan word wat net so sterk of sterker kan wees as dié wat deur die huidige Britse Standaardspesifikasies vir klinknaellasse voorgeskryf word. Die toetse toon ook dat lasse met boue van 'n hoë treksterkte 'n aansienlik hoër vermoedingssterkte as klinknaellasse het.

Rotstortings in Diep Mynbou

Die navorsingsaktiwiteite op die gebied van rotsstorting in diep mynbou is veral sedert 1956 uitgebrei toe die navorsing ten behoeve van die Transvaalse en Oranje-Vrystaatse Kamer van Mynwese aangegaan is; en die aantal myne waar gegewens in verband met rotsstortings vir eventuele ontleding geboekstaaf word, is uitgebrei na vyf.

'n Skema is opgestel vir die meet van bewegings van rotslae in etlike myne, en reëlins is getref vir die meet van rotslaagbewegings in en om 'n skag waar die skagstut verwyder staan te word.

In gevalle van rotsstortings waar buitengewone toestande aangemeld is, het lede van die navorsingsgroep met ondergrondse besoeke voortgegaan. Talle besoeke is ook afgelê om bewyse te verkry van die bestaan en die omvang van gekraakte rotssones wat rondom ondergrondse uitgrawings voorkom. Teoretiese ondersoek in verband met hierdie saak word voortgesit, en aansienlike welslae is ondervind met wiskundige ontledings van spanningsverdeling rondom mynuitgrawings. Sommige van hierdie resultate is deur middel van die foto-elastiese tegniek gestaaf, met die gevolg dat foto-elastisiteit nou met sekerheid aangewend kan word vir die ontleding van die spanningsverdeling rondom uitgrawings wat te ingewikkeld van vorm is om wiskundig behandel te word. Vordering is ook met die meet van spanning in die rots voor die werksfront gemaak.

'n Toetsdelfplek is in een van die myne uitgesoek en die nodige instrumente was teen die einde van die tydperk in oorsig voltooi en geïnstalleer. Drie vervormingsmeters, ontwikkel in die Instituut se laboratoria, en drie ingevoerde meters word gebruik om veranderinge in die spanning in die rots voor 'n vooruitbewegende werksfront te meet, terwyl 'n stel insakmeters in die ondergrondse werkplekke gebruik word om die geleidelike vernouing te meet.

Die ontwikkelingswerk aan akoestiese instrumente vir die bepaling van die omvang en graad van verbrekings van 'n werksfront deur springstofontploffing is voortgesit en bemoedigende resultate is reeds behaal.

bolts—has been developed and appears promising. In this method, bolts made from high tensile steel fit loosely in the holes so that the full load of the joint is transmitted by friction between the joint elements.

Since this method has only recently been introduced in this country, an exploratory study aimed at throwing more light on the subject was carried out on behalf of a local bolt manufacturer. The results of the tests showed that joints, using locally produced high tensile bolts in clearance holes, can be designed to be as strong as, or stronger than, the current British Standard Specification for riveted joints prescribes. It was demonstrated, in particular, that high tensile bolted joints can exhibit a considerably enhanced fatigue strength compared with riveted joints.

Rock Bursts in Deep Level Mines

From the beginning of 1956, when the Transvaal and Orange Free State Chamber of Mines assumed responsibility for sponsoring the rock burst investigation, the field of research activity was extended, and rock burst data from five mines are now being recorded for eventual statistical analysis.

Plans were drawn up for measuring strata movement on several mines and arrangements have been made for the measurement of strata movement in and around a shaft where the shaft pillar is to be removed.

Members of the research team continued to make visits underground to the sites of rock bursts in which unusual features had been reported. Numerous visits were also made to obtain evidence of the existence and extent of the zone of fractured rock which exists around underground excavations. Theoretical studies of this subject were continued, considerable progress having been made with the mathematical analyses of the distribution of stress around underground excavations. As it was possible to verify some of these results by means of the photo-elastic technique, photo-elasticity will be employed for analysing the distribution of stresses around excavations of more complex shape than can be treated mathematically.

Progress was also made with the measurement of stress in the rock ahead of the face.

In one of the mines a test stope was selected and all the necessary instruments installed towards the end of the period under review. Three strain cells, developed in the laboratories of the Institute, and three imported cells are being used to measure changes in stress in the rock ahead of an advancing stope face, while a battery of sagmeters in the stope are being used to measure the rate of closure in the stope.

Development work on acoustic instruments for determining the extent and degree of fracturing of a rock face due to blasting was continued, and promising progress made.

Ook die program in verband met die bepaling van die druksterkte en elastiese konstante van die verskillende geologiese rotslae wat voorkom, is voortgesit. Meer as 500 monsters is getoets en 'n aansienlike deel van hierdie program nader nou voltooiing.

Die resultate van 'n grootskaalse ontlastingseksperiment in een myn is ontleed en in die vorm van 'n verslag uitgegee. Hierdie ontleding toon dat spanningsontlasting—die eerste praktiese maatreël deur die navorsingsgroep vir die voorkoming van rotsstortings voorgestel—in werklikheid tot gevolg gehad het dat minder rotsstortings voorkom waar spanningsontlasting toegepas word, en dat kwaai stortings, oponthoude en ongevallen afgeneem het, terwyl produksie effens verbeter het. Die sukses van hierdie ontlastingstechniek, soos aangedui deur hierdie eksperiment, het gelei tot die invoering daarvan in 'n ander myn op die Witwatersrand.

Benutting van Plaaslike Hout

'n Opname van die voorrade aan uitheemse houtsoorte wat in Suid-Afrika gekweek word en die benutting daarvan, is voltooi. Die werk is onderneem as voorbereiding tot navorsing in verband met benutting van plaaslike hout vir verpakkingsdoeleindes, 'n projek wat vir die „South African Lumber Millers' and Shook Manufacturers' Association” uitgevoer word. Die opname het 'n moontlikheid aangetoon dat die plaaslike houtproduksie die aanvraag daarvoor binne afsienbare tyd mag oortref. 'n Verslag oor die opname is in boekvorm gepubliseer.

'n Begin is gemaak met 'n ondersoek na die moontlikhede vir verbetering van die ontwerp van houtkissies vervaardig van plaaslike hout. Houtkissies vir die uitvoer van sitrusvrugte sal eerste aandag geniet.

Verskeie Kleiner Ondersoeke

Verskeie kleiner ondersoeke is vir die nywerheid op 'n kontrakbasis onderneem, en sluit in toetse op 'n SARCAST syraam vir die S.A. Spoorweë, 'n ondersoek na die vermoeidheidslewe van gepende turbinelemme vir 'n ingenieursfirma en 'n ondersoek waarby die spanning in die lemme van 'n sentrifugale waaier vir 'n plaaslike waaiervervaardiger gemeet is.

MEGANIKA

Dempingsvermoë van Materiale

Die resultate van vorige toetse is ontleed en het tot die gevolgtrekking gelei dat noukeuriger instrumente nodig is. Nuwe eksperimentele toerusting is derhalwe ontwerp en gebou.

Bereiding van Kompos van Munisipale Afval

Die uitvoerige ontwerp (gebaseer op 'n vorige algemene ontwerp van die Instituut) van 'n proefaanleg in Pretoria vir die bereiding van kompos uit afval, is voltooi, en beramings vir die vervaardigings- en oprigtingskoste

Work was continued on the determination of the compressive strength and elastic constants of the various geological strata encountered. Over 500 specimens were tested and a substantial part of this programme is reaching completion.

The results of a large-scale de-stressing experiment in one mine were analysed and published in report form. This analysis showed that de-stressing—the first practical rockburst preventive measure suggested by the research team—does, in fact, reduce the number of bursts in stopes where it is practised, and that severe bursts, delays and casualties are fewer and that production is slightly improved. The success of the de-stressing technique, as indicated by this experiment, has led to its adoption in other mines on the Witwatersrand.

Utilization of Local Timber

A survey of the locally grown exotic timber resources and utilization was completed. This work was considered a prerequisite to the investigation into the utilization of local timber for packaging purposes, being carried out on behalf of the Lumber Millers' and Shook Manufacturers' Association. The survey revealed a possibility that the local timber supply may exceed the demand in the foreseeable future. The report has been published in book form.

A start of investigations into the possibilities of improving the design of wooden boxes manufactured from local timber has now been made. In the first instance, wooden boxes for citrus fruit export will be dealt with.

Various Smaller Investigations

Various smaller investigations were carried out on behalf of industry. These included tests on a SARCAST sideframe on behalf of the South African Railways, an investigation into the fatigue life of pinned turbine blades on behalf of an engineering firm, and the measurement of stress in the blades of a centrifugal fan on behalf of a local fan manufacturer.

MECHANICS

Damping Capacity of Materials

The results of previous tests conducted were analysed and led to the conclusion that more precise instrumentation was necessary. A new experimental set-up was therefore designed and built.

Composting of Municipal Wastes

The detailed design (based upon a previous general design prepared in the Institute) of a pilot plant for composting municipal waste materials was completed and prices obtained from various interested firms for its

daarvan van verskeie firmas verkry. Dit is slegs 'n eksperimentele aanleg om die moontlikhede te ondersoek om afvalmateriaal wat vir munisipaliteite deur die hele land in toenemende mate 'n probleem skep, in kompos om te sit.

Sleepringontwerp en Spanning in Waaierslemme

Deur die gebruik van 'n sleepring-eenheid wat in die laboratorium ontwerp en in die Sentrale Werkplaas gebou is, is die spanningseienskappe van 'n groot waaierslemme met sukses bepaal voordat dit geïnstalleer is.

HITTEVOORTPLANTING

Hittevoortplanting tussen Vaste Wande en Lug

Die studie van die hitte-oordraging vanaf 'n spesiaal vervaardigde verhitte plaat na die omstromende lugstroom, is voortgesit. Na voltooiing van die reeks toetse onder natuurlike konveksietoestande, is die studie van vlieskoeffisiënte onder geforseerde konveksie-toestande voortgesit. 'n Neusstuk van elliptiese vorm is vir hierdie

manufacture and erection in Pretoria. This will be a purely experimental plant to demonstrate the possibilities of composting materials which municipalities throughout the country are finding more and more embarrassing to dispose of in their as-collected condition.

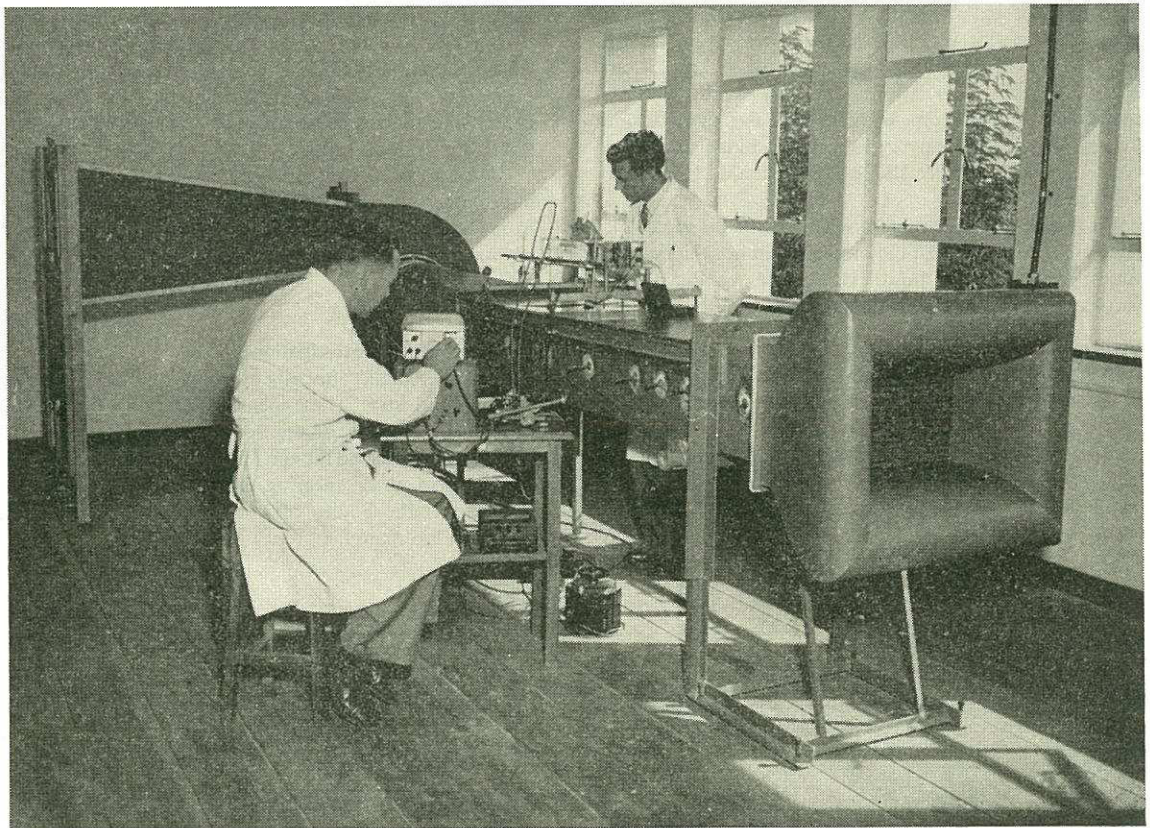
Sleepring Design and Fan-blade Stress

A sleepring unit designed in the laboratory and built in the Central Workshops was used successfully to determine the stress characteristics of a large fan prior to its installation.

HEAT TRANSFER

Heat Transfer Between Solids and Air

The study of the heat exchange between the specially constructed heater plate and the airstream flowing over it was continued. After completing the series of tests under natural convection conditions, the study of the film coefficients for forced convection conditions was



'n Klein windtonnel vir toetsing van windweerstand van modelle van balke voor konstruksie van 'n volledige modelmynskag in 'n groter windtonnel.

A small wind tunnel for testing wind resistance of models of beams prior to construction of a complete model mine-shaft in a larger wind tunnel.

reëks gebruik in plaas van die vierkantige neusstuk wat dusver gebruik is.

Sturende invloede het hulle spoedig laat geld. As gevolg van veranderinge in lugspeed is gevind dat die oorgangspunt van laminêre na turbulente vloei in die grenslaag heen en weer oor die plaat beweeg, en derhalwe is besluit om die toetse op die verhitteplaat uit te stel, hangende die voltooiing van die windtonnel met 'n geslote kringloop waarna hieronder verwys word.

Hitte-oordragingskoeffisiënte van Gevinde Buise

Die aanbou van die lugtemperatuur- en vogbeheerde windtonnel wat vir die bepaling van kernkrommes van hitte-uitruilers met gevinde buise gebruik sal word, nader vinnig voltooiing. 'n Ingenieursfirma het reeds die konstruksie van die staalstruktuur voltooi, terwyl die laboratorium voortgaan met die oprigting van bybehorende toerusting soos die verkoelingseenheid en die stoomketel.

Studie van Hitte-uitruilingskoeffisiënte by Hoë Temperatuur

Ter voortsetting van die werk wat reeds gedoen is op die gebied van hitte-oordraging tussen vaste wande en gesmelte metale, is 'n studie gemaak van die spesiale apparaat wat by sodanige navorsing nodig is. Nadruk is gelê op metodes om die vloei van die gesmelte metaal aan te spoor en te meet met besondere verwysing na elektromagnetiese pompe en vloeimeters.

Verder is 'n aanvang gemaak met die studie van hitte-oordraging tussen 'n suspensie van soliede deeltjies en 'n vloeibare medium in pype. Hierdie onderwerp is van belang by sekere toepassings van homogene kernreaktore waarin 'n suspensie van kernbrandstofdeeltjies in 'n vloeistof, naamlik swaarwater, beide as brandstof en vir die verwydering van hitte gebruik word. Hitte-oordraging wyk in hierdie geval af van die gewone wette van konveksie-hitte-oordraging waar die konsentrasie van soliede deeltjies hoog word, hoofsaaklik as gevolg van die feit dat die viskositeit van 'n suspensie van die Newtonse wette afwyk.

Hittebalans van die Mens

Die werk op die gebied van die fisiologiese reaksies van die mens onder verskillende omgewingstoestande is voortgesit.

Die ontwikkeling van metodes vir die direkte bepaling van die hitte-uitruiling tussen die menslike liggaam en sy omgewing in 'n klimatskamer het gevorder tot 'n stadium waarin die hitteverlies deur konveksie en verdamping by modelle in 'n windtonnel akkuraat tot binne 10 persent bepaal kan word. Konveksie is met behulp van 'n integreerende rooster gemeet, terwyl 'n nuwe tipe doupuntmeter vir die bepaling van hitteverlies deur verdamping gebruik is.

Hulp en advies is ook aan die Laboratorium vir Toegepaste Fisiologie van die Kamer van Mynwese met hul navorsingsprogram verleen. Die werk het hoofsaaklik

continued. A leading edge of elliptical section was used in this series instead of the square section used hitherto.

Disturbing influences soon manifested themselves. As a result of fluctuations in airspeed it was found that the transition point from laminar to turbulent flow in the boundary layer oscillated to and fro, and it was therefore decided to postpone the tests on the heater plate, pending the completion of the closed-circuit windtunnel referred to below.

Heat Transfer Coefficients of Finned Tubes

The construction of the air temperature and humidity-controlled wind tunnel to be used for the rating of finned-tube heat exchangers is rapidly nearing completion. An engineering firm has completed the construction of the steel structure, while the erection of the auxiliary equipment such as refrigerating plant and steam boiler is continuing in the laboratory.

Study of Heat Transfer Coefficients at High Temperatures

In continuation of the work already done in the field of heat exchange between solids and molten metals, a study was made of the special apparatus required in such research. Emphasis was laid on methods of inducing and measuring flow in the molten metal, with particular reference to electromagnetic pumps and flowmeters.

A start was also made with the study of the heat transfer between a suspension of solid particles in a fluid and pipes. This subject is important in certain applications of homogeneous nuclear reactors, in which a suspension of nuclear fuel particles in a liquid, e.g. heavy water, is used both as fuel and heat-removal agent. Heat transfer in this case departs from the usual laws of convection heat exchange at high concentrations of the solid phase, mainly because of the deviation of the viscosity from the Newtonian laws.

Human Heat Balance

The work in the field of physiological reactions of the human being under various external and internal heat loads was continued.

The development of methods for measuring directly the heat exchange between the human body and its surroundings in the climatic chamber has advanced to the stage where the heat loss by convection and evaporation from models in a wind tunnel can be determined to an accuracy of within 10 per cent. Convection was measured with the aid of an integrating grid, while a new type of dewpoint meter was used in the determination of the heat loss by evaporation.

Advice and assistance were given to the Applied Physiology Laboratory of the Chamber of Mines in connection with their research programme. The work

bestaan uit die ontwerp van instrumente vir die noukeurige bepaling van veltemperatuur. Twee stralingsmeters is vir hierdie doel gebou en met goeie gevolge gebruik. Die metings verkry is heelwat noukeuriger as wat dusver met ander instrumente moontlik was.

'n Verdere diens aan genoemde Laboratorium gelewer, was die berekening van die hitteverlies van die liggaam onder toestande met versadigde lug by hoë temperatuur en die ontwikkeling van 'n rektum-termometer vir die bepaling van die binnetemperatuur van die liggaam.

Studie van Sonenergieversamelaars

Verskeie verdere ondersoeke op die gebied van die gebruik van sonenergie is aangepak. Hierdie ondersoek sluit in die toetsing van sonstralingsabsorberende apparate wat vir die verwarming van water vir huishoudelike gebruik en vir bereiding van drinkwater uit brakwater bedoel is.

Vernietiging van Banknote

Verdere ondersoek van metodes vir die vernietiging van uitgediende banknote wat aan sirkulasie onttrek is, het aangetoon dat die mees bevredigende metode sou wees om die note te verpoel en met water te vermeng, waarna dit met veiligheid in die munisipale rioolstelsel afgespoel kan word.

Die hoofprobleem wat hom in hierdie verband voorgedoen het, was om 'n reëlmatige toevoer van die bondels note in die vergruiser te verkry teen die besonder lae tempo wat verlang word. 'n Masjien is ontwikkel om die bondels los te breek sodat 'n gestadige stroom los note in die meul gevoer kan word. Geslaagde toetse is uitgevoer en werkstekeninge van die hele apparaat word tans voorberei.

LUGREÛLING EN VERKOELING

Klimaatskamer

Die kontrak vir die ontwerp, toesighouding tydens oprigting en yking van die klimaatskamer vir die Laboratorium vir Toegepaste Fisiologie van die Kamer van Mynwese is met sukses afgehandel. Die klimaatskamer is op 1 November 1956 amptelik aan die Kamer oorhandig.

TERMODINAMIKA

Die installering van toerusting vir die aflaai, vervoer, berging en verpoelering van steenkool in eenhede van 5 ton elk, is voltooi.

Gasturbinenavorsing

In vorige verslae is herhaaldelik daarop gewys dat die gasturbine as primêre kragbron in Suid-Afrika met ander kragbronne kan konkurrer slegs indien eersgenoemde van steenkool as brandstof gebruik maak. Die doel

was hoofsaaklik met die ontwerp van instrumente vir die akkurate meting van veltemperatures. Twee instrumente, beide van die radiometer tipe, is vir hierdie doel gebou en met goeie gevolge gebruik. Die metings verkry is heelwat noukeuriger as wat dusver met ander instrumente moontlik was.

Verdere diens aan genoemde Laboratorium gelewer, was die berekening van die hitteverlies van die liggaam onder toestande met versadigde lug by hoë temperatuur en die ontwikkeling van 'n rektum-termometer vir die bepaling van die binnetemperatuur van die liggaam.

Study of Solar Heat Collectors

Several further laboratory investigations were initiated in the field of solar energy utilization. These included the testing of solar radiation-absorbing devices intended for domestic water heating and for the distillation of drinking water from brack water.

Destruction of Banknotes

Further studies of methods of disposing of soiled banknotes withdrawn from circulation indicated that the most satisfactory scheme would be to pulverize and pulp them, after which they could safely be flushed into the municipal sewerage.

The principal problem encountered was that of ensuring a uniform feed of the note bundles to the pulverizer at the desired rate, which is extremely low. A machine was developed for stripping the bundles into loose notes, thereby enabling a steady stream of notes to be fed into the mill. Successful tests were conducted and working drawings of the whole plant are being prepared.

AIR CONDITIONING AND REFRIGERATION

Climatic Chamber

The contract for the design, supervision during erection and calibration of a climatic chamber for the Applied Physiology Laboratory of the Chamber of Mines was successfully completed. It was formally handed over to the Chamber on 1st November, 1956.

THERMODYNAMICS

The installation of facilities for the off-loading, transport, storage and pulverizing of coal in 5-ton batches has been completed. Arrangements are now being made for the supply and delivery of the first consignment of coal.

Gas Turbine Research

It has been stressed repeatedly in previous reports that the gas turbine could only compete with other types of prime mover in South Africa if coal were used as fuel.

van hierdie projek is derhalwe om toerusting te ontwikkel vir die hantering en verbranding van verpoeierde steenkool en vir die verwydering van as uit die verbrandingsprodukte met die oog op die gebruik van 'n oop kringloopgasturbine.

Een faktor wat hierdie werk onderskei van soortgelyke werk in die buiteland (Engeland en die V.S.A.) is die feit dat hier gepoog word om die steenkool in 'n intense klankveld te verbrand. Vir die skepping van so 'n klankveld word 'n termo-akoestiese resonator tans ontwikkel.

Twee metodes vir die hantering van verpoeierde steenkool is ondersoek, naamlik 'n vervloeiingsstelsel en 'n geroerde roertenk met vibrerende voerbak wat onder hoë druktoestande kan funksioneer. Aansienlike sukses is met eersgenoemde stelsel behaal, waardeur 'n verpoeierde steenkoollewering van so laag as ongeveer 10 lb/uur nog egalig kan geskied, terwyl laasgenoemde stelsel bevredigend blyk te wees onder toestande van atmosferiese druk.

Van besondere belang in die werking van 'n gasturbine met 'n oop kringloop wat steenkool as brandstof gebruik, is die as-skeiers. Verskeie modifikasies van die sikloontipe as-skeier is getoets met die oog op die bepaling van kriteria vir die optimum werking daarvan.

Die oprigting van toerusting vir die meet van die verbrandingsnelheid van verpoeierde steenkool het 'n gevorderde stadium bereik. Die verbrander wat vir die meet van verbrandingsnelheid ontwerp is, ondergaan tans toetse om te bepaal of egalige snelheid en egalige

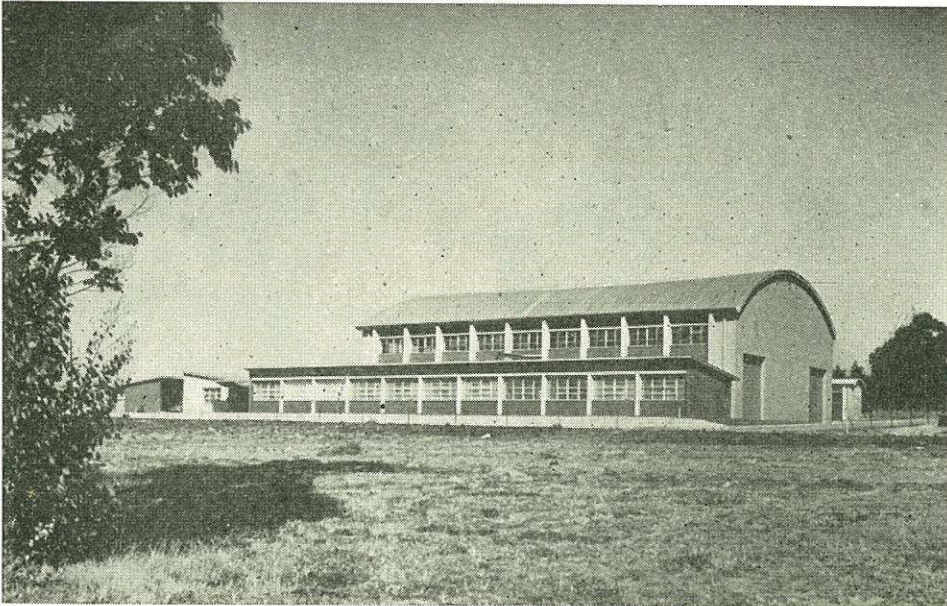
The aim of this project is, therefore, to develop equipment for the handling and combustion of pulverized coal and for the removal of ash from the combustion products. Ash removal should take place to an extent where the products of combustion can be directly passed through an open cycle turbine.

One factor which differentiates between the present work and similar attempts overseas (U.K. and U.S.A.) is the fact that there it is attempted to burn pulverized coal in an intense sound field. To generate such a sound field a thermo-acoustic resonator has been developed and is at present being perfected.

Two systems of handling pulverized coal were investigated: a fluidizing system, and a hopper with vibratory feeding trough type to operate under pressurized conditions. Considerable success was achieved with the former system, steady deliveries of coal as low as 10 lb. per hour being possible, while the latter was proved to be satisfactory under atmospheric pressure conditions.

The separation of ash is of vital importance in the operation of the open cycle coal-burning gas turbine. Several modifications of the cyclone type of ash separator were therefore tested with a view to determining the criteria for optimum operation.

Construction of the equipment for a study of the flame speed of pulverized coal has reached an advanced stage. The burner designed for measuring the flame speeds is undergoing trials to determine the velocity distribution and coal concentration distribution at the test section.



Die gebou wat die klimaatskamer bevat

The building which houses the climatic chamber.

verpoeierde steenkoolkonsentrasie in die vlamsone verkry word.

'n Eksperimentele verbrandingskamer is gebou en hierdie installasie, met uitsondering van die instrumentasie, is voltooi. Voorsiening is gemaak vir 'n vuurvaste ontstekingsone wat gemaklik met een van 'n ander ontwerp vervang kan word indien dit as gevolg van die verskillende eienskappe van die onderskeie steenkoolsoorte nodig blyk.

Verbrandingseienskappe van Brandstowwe

Apparaat vir 'n ondersoek van die verbrandingseienskappe van plaaslik vervaardigde gasvormige of vloeibare brandstowwe is voltooi en toetse word uitgevoer. Die doel van hierdie werk is om vlamsnelhede van sowel gas- as vloeibare brandstowwe te meet en om die uitwerking van druk op die hitte-ontwikkelingstempo in die reaksiesone te bestudeer.

LUGDINAMIKA

Die Meting van Lae Lugsnelhede

Die ontwikkeling van nuwe instrumente vir die meting van lae lugsnelhede en klein drukverskille is voortgesit.

Die luglaermeule met elektroniese omwentelingsteller is getoets en geëyk oor die snelheidsbereik tussen 15 vt./min. en 1,200 vt./min. nadat die aanvanklike probleme in verband met rotasie van die lemwiël onder stillugtoestande oorbrug is. 'n Tweede prototipe word gebou wat na verwagting in staat sal wees om snelhede in die wye

An experimental combustion chamber has been built and the installation is complete except for the instrumentation. Provision has been made for a refractory ignition zone which can easily be exchanged with one of a different design, should this be required by the different characteristics of the various coals to be tested.

The Burning Characteristics of Fuels

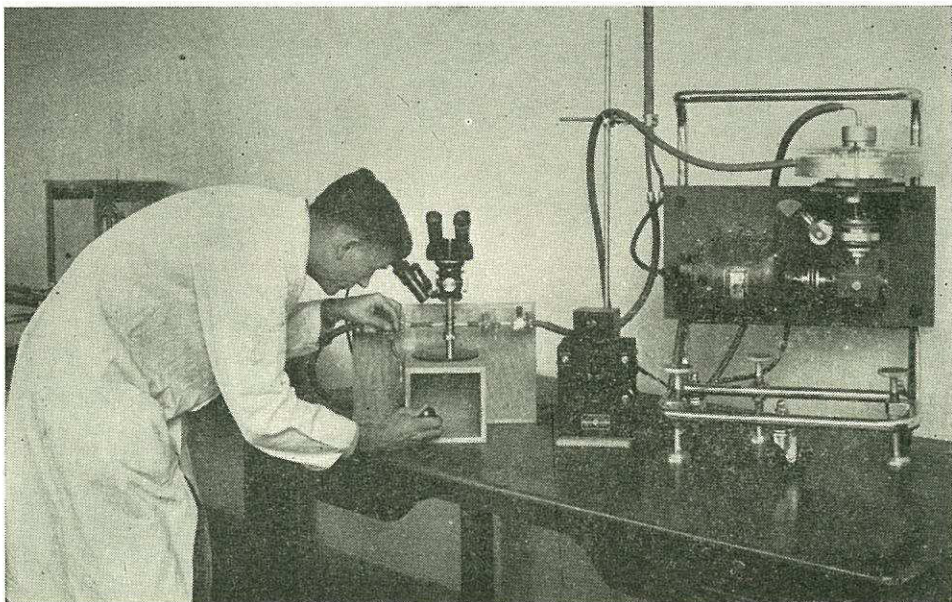
Apparatus for the study of the burning characteristics of locally produced gaseous and liquid fuels was completed and calibration tests are being carried out. The aim of this work is to measure the laminar and turbulent flame speeds of both gaseous and liquid hydrocarbon fuels, and to study the effect of pressure on the heat release rate in the reaction zone.

AERODYNAMICS

The Measurement of Low Velocities

Research was continued on the development of new instruments for the measurement of low air velocities and small differential pressures.

The vane anemometer with compressed-air bearings and electronic revolution counter was tested and calibrated in the range between 15 ft./min. and 1,200 ft./min.; after the initial problems in connection with rotation of the vane wheel under still-air conditions had been over-



Sentrifugale manometer ontwikkel deur die Afdeling Lugmeganika.

Centrifugal manometer developed by the Aeromechanics Division.

bereik van 15 vt./min. tot 6,000 vt./min. te meet. 'n Besondere eienskap van die instrument is die hoë inherente akkuraatheid daarvan wat dit veral geskik maak vir die yking van windtonnels.

Verdere toetse op die lugmanometer het aangedui dat die apparaat onder praktiese toestande 'n gevoeligheid om en by 10^{-6} dm. watersuil besit, 'n waarde wat in ooreenstemming met teoretiese berekeninge is. Ten spyte van hierdie hoë gevoeligheid, is die manometer stewig en maklik hanteerbaar. Die instrument is reeds gebruik om 'n pitot-statiese buis op die wentelarm te yk tot 'n minimum spoed van 1 vt./sek.

'n Tweede gevoelige manometer is ontwerp, gebou en getoets. Hierdie manometer is van die vloeistoftipe en maak gebruik van 'n elektro-magnetiese balansindikator. Dit is só ontwerp dat onbekende drukverskille met behulp van 'n weegproses bepaal word. Die lugmanometer wat hierbo beskryf is, is as yktoestel gebruik ten einde die gevoeligheid, akkuraatheid en reaksietyd van die vloeistofmanometer te bepaal. Die resultate dui daarop dat die akkuraatheid van die nuwe manometer ongeveer twintig maal hoër is as dié van die 13 dm. Chattock-manometer wat tot dusver as standaard vir die meting van baie klein drukverskille gebruik is. Die akkuraatheid van die nuwe instrument is ongeveer 1×10^{-5} dm. watersuil, teenoor 2×10^{-4} dm. watersuil in die geval van die Chattock-manometer.

Ten slotte is die sogenaamde Leon-buis ontwikkel om vloeisnelhede in water „by 'n punt” te meet oor die bereik 1 tot 15 vt./sek. In die ontwerp van die buis is 'n differensiale drukbuis (pitotmeter) en 'n differensiale vloeistofmanometer gekombineer in 'n kompakte, draagbare en stewige instrument wat besonder geskik is om snelheidsverdelings in oop kanale te bepaal.

Lugvervoer van Gekorrelde Materiale

Die voorbereidende teoretiese werk en die beplanning van toetse wat nodig sal wees om 'n basiese teorie vir lugvervoer van materiale daar te stel, is afgehandel. Daar word tans op die voltooiing van eksperimentele toerusting gewag wat ingestel en geïk sal moet word voor 'n aanvang met verdere toetse gemaak kan word. Verskeie nywerheidsondernemings het belangstelling in die projek getoon, sodat 'n aantal toetse vir nywerheidsondernemings op kontrakbasis in die vooruitsig gestel word.

Die werk aan die ontwerp van die onderdele van die toetsaanleg is afgehandel met uitsondering van dié aan die straalpomp wat nog ontwikkel word. Konstruksie van die onderdele word in die Sentrale Werkplaas voortgesit.

Lugweerstand van Mynskagte en -tonnels

'n Spesiale windtonnel is ontwerp wat as model van 'n sirkelvormige mynshagte, volledig toegegerus met interne struktuur, sal dien. Die tonnel het 'n deursnit van 6 vt. 6 dm. en 'n effektiewe toetslengte van ongeveer 60 vt.

come. A second prototype is being constructed which is expected to be capable of measuring over the wide range of speeds between 15 ft./min. and 6,000 ft./min. A noteworthy feature of the instrument is its exceptionally high intrinsic accuracy which makes it particularly suitable for calibration tests of wind tunnels.

Further tests on the air manometer indicated that the theoretically-determined sensitivity, of the order of 10^{-6} inch water gauge, was also attainable under practical conditions. In spite of this high sensitivity, the manometer is robust and easy to manipulate. The instrument has been used to calibrate a pitot-static tube on the whirling arm down to a minimum speed of 1 ft./sec.

A second sensitive manometer has been designed, constructed and tested. This manometer is of the liquid type, utilizes an electromagnetic device for balance indication, and is designed in such a way that unknown differential pressures are determined by a process of weighing. The air manometer described above was used as calibrator in order to determine the sensitivity, the accuracy and the response time of the liquid manometer. The results of these experiments indicated that the new manometer has an accuracy about twenty times higher than that of the 13-inch Chattock gauge, which has been used up to the present as standard for the measurement of minute differential pressures. The accuracy of the new manometer is approximately 1×10^{-5} inch w.g. as against 2×10^{-4} inch w.g. in the case of the Chattock gauge.

Finally, the so-called Leon tube was developed for measuring flow speeds in water “at a point” in the range between 1 and 15 ft./sec. In the design of the tube, a differential pressure probe (pitometer) and a differential liquid manometer were combined to form a compact, portable and robust instrument particularly suited for determining velocity profiles in open channels.

Pneumatic Conveyance of Granular Materials

The preliminary theoretical work and the planning of experiments which will be required to establish a basic theory for the conveyance of materials by means of compressed air, were completed. Completion of the experimental equipment, which will have to be adjusted and calibrated prior to the commencement of further tests, is now awaited. Several industrial undertakings have shown interest in the project so that a number of industrial tests under contract is envisaged.

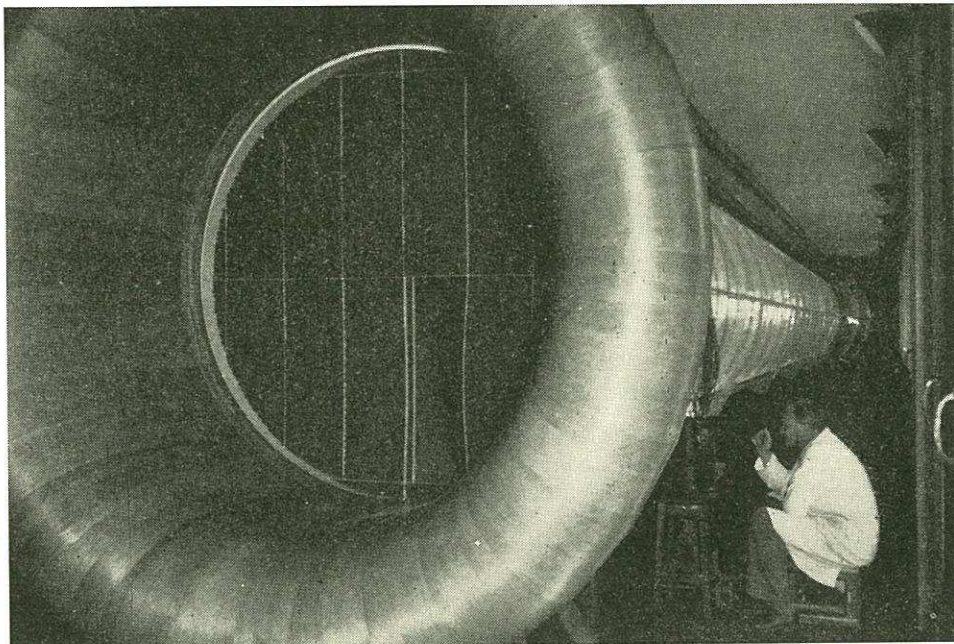
Design work on all the components of the test plant was completed except on the jet pump which is still being developed. Construction of the components is proceeding.

Air-Flow Resistance in Mine Shafts and Tunnels

A special wind tunnel has been designed to serve as the model of a circular mine shaft, complete with internal structure. The tunnel has a diameter of 6 ft. 6 in., and an effective working-section length of approximately 60 ft.

Die windtonnel sal gebruik word vir 'n ondersoek na die lugweerstand in moderne mynsgagte met die uiteinde-like doel om vloeiverliese deur verbeterde lugdinamiese ontwerp van die interne struktuur te verminder. Die invloed van faktore soos die balkvorm, balkspasiëring en Reynoldsgetal op die weerstand van skagte sal ondersoek word. Na voltooiing van die tonnel sal 'n reeks toetse onder kontrak met 'n myngroep uitgevoer word, ten einde die invloed van die stroombelyning van balke in 'n voorgestelde skag te ondersoek.

The tunnel is to be used for an investigation of the aerodynamic resistance of modern mine-shafts, with the ultimate aim of reducing flow losses by virtue of improved aerodynamical design of the internal structures. Factors such as bunton shape, bunton spacing and Reynolds number are to be considered in relation to flow losses. After completion of the tunnel, a series of tests is to be performed under contract with a mining group. The immediate object of the experiments will be to investigate the effect of bunton streamlining in a proposed shaft.



'n Windtonnel vir navorsing in verband met lugweerstand in mynsgagte.

Wind tunnel for research into air resistance in mine shafts.

Windtonnelontwikkeling

Die lugdinamiese fase van die ontwerp van 'n windtonnel met lae turbulensie en 'n geslote kringloop en met 'n 6 vt. toetsruim, is bykans voltooi. Die tonnel word ontwerp met 'n maksimum lugspoed van 400 vt./sek. en 'n beraamde kragverbruik van 1,430 pk. Spoedbeheer moet deurlopend verander kan word en vir dié doel word die gebruik van 'n Ward-Leonardstel oorweeg.

'n Model van hierdie tonnel, op 'n skaal van 1 op 6, word tans ontwerp om die doeltreffendheid daarvan te ondersoek voordat met die uitvoerige meganiese ontwerp begin word. Die model sal later permanent as 'n instrumenttonnel gebruik word, waarin die temperatuur, druk en moontlik ook die stroomrigting ten opsigte van die horisontale vlak veranderbaar gemaak kan word.

'n Supersoniese tonnel van die „afblaas“-tipe vir navorsing op die gebied van hoëspoed-lugdinamika word

Wind Tunnel Development

The aerodynamic phase of the design of a low-turbulence, closed-circuit wind tunnel having a 6-ft. working section, is nearing completion. The tunnel is being designed for a maximum air speed of 400 ft./sec. with an estimated power consumption of 1,430 H.P. Infinitely variable speed control is required and for this purpose a Ward-Leonard system is being considered.

A model of this tunnel, to a scale of 1 in 6, is at present being designed in order to study its performance, before attempting the detailed mechanical design. The model is to be used eventually as an instrument tunnel in which the temperature and pressure, and possibly the direction of flow in relation to the horizontal, are to be made variable.

A supersonic tunnel of the blow-down type is being designed for high speed aerodynamical research. The air

ontwerp. Die druklugopgaartenk wat vir hierdie doel nodig is, sal op so 'n wyse ontwerp en ingerig word, dat dit deel uitmaak van 'n klein druklugtunnel wat teen geringe addisionele koste aangebou sal kan word. Die druklugtenk sal 'n kapasiteit van 2,000 kub. vt. hê, en sal deur die bestaande kompressor van lug tot 'n druk van 200 pd. per vk. dm. voorsien word. Met hierdie lugvoorraad sal die beoogde 18 dm. x 18 dm. hoëspoedtunnel by 'n maksimum ontwerps-Machgetal van 4.5 'n toets van 16 sek. elke twee uur toelaat.

Meesleuring van Lug deur 'n Lugstraal

Hoewel die benaming van hierdie projek die indruk kan skep dat die probleem van 'n baie abstrakte aard is, bestaan daar 'n aantal praktiese toepassings waarby lug deur 'n hoëspoedlugstraal in beweging gesit word. Die werking van die induksietipe supersoniese windtunnel berus byvoorbeeld op hierdie beginsel, terwyl toestande wat gepaard gaan met die sogenaamde straalstrome op groot hoogtes in die atmosfeer, van direkte belang vir die lugvaartkunde is.

Navorsing is begin in verband met die ontwerp en werking van 'n straalpomp om lugvloei in lugvervoerapparate te induseer. 'n Eksperimentele pomp is ontwerp en deur die Sentrale Werkplaas vervaardig. 'n Aantal eksperimente is uitgevoer en uit die resultate is 'n teorie vir die omskrywing van die werkverrigting van die toestel ontwikkel. Hierdie teorie sal as grondslag dien vir die ontwerp van straalpompe in die algemeen, en van die pomp wat vir die lugvervoerapparaat nodig is, in die besonder.

Die Lugweerstand van Gaasskerms

Gaasskerms vind 'n wye toepassing in lugdinamiese navorsing en in ventilasiewerk.

Tegniese word tans ontwikkel waardeur die lugdinamiese weerstand van gaas met 'n hoë mate van akkuraatheid bepaal kan word. Aandag word veral gewy aan metings by lae lugsnelhede, aangesien geeneen van die bestaande metodes op hierdie terrein bevredigend is nie. In hierdie ondersoek word uitvoerig gebruik gemaak van die nuwe instrumente wat in die Instituut ontwikkel is.

Ander Ondersoeke en Dienste

Gedurende die onderhawige tydperk is sewe lugspoedmeters vir private ondernemings en ander laboratoria van die W.N.N.R. geyk.

LUGDINAMIESE WERKTUIG

Toets van Dakventilatore

Na voltooiing van die ontwikkeling van 'n metode vir die bepaling van dakventilator-werkverrigting deur middel van windtonneltoetse, is aandag geskenk aan die oorblywende aspek van die toetsprobleem, naamlik die

receiver required for this tunnel will be designed and equipped in such a manner that it will form part of a small compressed air tunnel, which can be incorporated at little additional cost. This receiver will have a capacity of 2,000 cu. ft., and will be supplied with air from the existing compressor up to pressures of 200 p.s.i.g. When this energy is utilized in conjunction with the proposed 18 inch x 18 inch high-speed tunnel, a test run of 16 seconds duration every two hours will be obtainable at a maximum design Mach-number of 4.5.

Air Entrainment in Air Jets

Although the title of this project suggests that the problem may be of a very abstract nature, there are a number of practical applications in which air is set in motion by means of a high-speed jet. The operation of supersonic tunnels of the induction type, for example, depends on this principle, while the conditions associated with jet streams at high altitudes in the atmosphere have a direct bearing on aeronautics.

Research has been initiated into the design and operation of a jet pump for inducing air flow in compressed-air conveyors. An experimental jet pump was designed and has been constructed in the Central Workshops. A number of experiments have been performed and the results used to develop a theory which elucidates the operation of the pump. This theory will serve as design basis for jet pumps in general, and for the pump required for the pneumatic conveyor in particular.

Air-flow Resistance of Gauze Screens

Gauze screens have a wide field of application in aerodynamic research and in ventilation work.

Techniques are being developed whereby the aerodynamic resistance of gauze materials can be determined with high accuracy. Special consideration is being given to measurements at low air speeds, since none of the existing methods are very satisfactory in this range. In this investigation extensive use is being made of the new instruments which have been developed in the Institute.

Other Investigations and Services

During the period under review, seven anemometers were calibrated on behalf of private firms and other C.S.I.R. laboratories.

AERODYNAMIC MACHINES

Testing of Roof Ventilators

After completing the development of a method for determining roof ventilator performance by means of wind tunnel tests, attention was given to the one remaining aspect of the testing problem, namely that of

bepaling van die mate waarin die ventilatore dig is teen reën.

Eenvoudige apparaat is ontwerp en opgerig om verskillende toestande van nagemaakte reënval te verkry, en 'n tipiese dakventilator is vervolgens getoets. Die resultate dui daarop dat die metode 'n betroubare grondslag vorm vir die vergelyking van die doeltreffendheid van verskillende ventilatore teen reën.

Omvattende verslae oor al die werk wat tot dusver voltooi is, is aan die Suid-Afrikaanse Buro vir Standaardse voorgelê wat nou in staat sal wees om hierdie bevindings te gebruik vir die opstel van 'n dakventilator-toetskode.

'n Studie van Waaierontwerp met Betrekking tot Geraas

Die oprigting van die toetsopstelling wat ontwerp is vir 'n ondersoek na die vermindering van waaiergeraas by die oorsprong daarvan, nader tans voltooiing. Die toetsopstelling is op so 'n wyse ontwerp dat die eksperimentele waaiereenheid van 30 dm. sal aansluit by 'n pypleiding van 20 vt. waarvan die ander end met 'n eksponensiële horing en 'n absorberende uitlaat verbind is. Die horing, met 'n bek van 10 vt. vierkant, en die uitlaat wat oor die bek aansluit, sal dien om klankweerskaatsing, wat pypresonansie-effekte kan veroorsaak, te verhoed. Dit sal dus die uitvoering van geraasmetings binne die lugkanaal moontlik maak.

Die waaiereenheid is reeds geïnstalleer en werk bevestigend, terwyl die finale opstelling van die horing- en uitlaateenheid op voltooiing van die pypleiding wag.

Navorsing op Lemroosters

Die finale stadium van 'n ondersoek na sekere teoretiese aspekte van die vloei deur lemroosters is voltooi, en het gelei tot die aanvaarding van 'n belowende teoretiese benadering van die lemroosterprobleme wat in verband met turbowerktuie staan. Hierdie werk het 'n ontleding van die vloei deur leilemme van 'n tipiese omhulde waaier behels. 'n Begin is nou ook gemaak met 'n sistematiese ontleding van die vloei deur 'n stel tipiese waaierlemprofiere in verskeie samestellings. Beskikbare literatuur word nagegaan met die oog op die verkryging van metodes waarvolgens die teorie uitgebrei kan word om die effek van viskositeit in te sluit. Aangesien so 'n uitbreiding die berekening van grenslae behels, word 'n studie van teoretiese metodes wat vir hierdie doel geskik sou wees, ook onderneem.

'n Begin is gemaak met die ontwerp van 'n laespoed-lemrooster-windtonnel en die werk het so goed gevorder dat dit moontlik was om met besonderhede van die meganiese ontwerp te begin.

Ontwerp en Werkverrigting van Windmeulens

Die voortdurende belangstelling in die gebruik van windmeulens, nie alleen vir landboukundige en huishoudelike kragvoorsiening nie, maar ook op die gebied

determining the degree to which ventilators are proof against rain.

Simple apparatus was designed and erected to produce various conditions of simulated rainfall, and a typical roof ventilator was then tested. The results suggested that the method could constitute a reliable basis for comparing the effectiveness of different ventilators against rain.

Comprehensive reports on all the work so far completed have been submitted to the South African Bureau of Standards, which will now be able to make use of these findings in the preparation of a roof ventilator test code.

A Study of Fan Design in Relation to Noise

Erection of the fan-noise test rig, which was designed for the purpose of an investigation aimed at reducing fan noise at its source, is nearing completion. The test rig was designed in such a way that the 30-inch diameter experimental fan unit would be attached to a 20-ft. long duct having an exponential horn and an absorptive termination at the other end. The horn, which has a 10-ft. square mouth, together with the termination which fits over the mouth, will prevent sound reflections from causing pipe resonance effects, and will therefore enable noise measurements to be made inside the duct.

The fan unit has already been installed and is being run successfully, while final installation of the horn and termination assembly is awaiting the completion of the main duct.

Cascade Research

The final stage of an investigation into some theoretical aspects of flow through cascades was completed, and has resulted in the adoption of a promising theoretical approach to the cascade problems associated with turbomachines. This work involved an analysis of the flow through the inlet guide vanes of a typical ducted fan. A start has now also been made with a systematic analysis of the flow past a set of typical fan-blade profiles in varying cascade configuration. The available literature is being scrutinized for a suitable method of extending the theory to include the effects of viscosity. Since such an extension would involve boundary layer calculation, a study is also being made of theoretical methods available for this purpose.

A start has been made with the aerodynamic design of a low-speed cascade wind tunnel for experimental work, and the work is progressing so satisfactorily that it has been possible to commence the detailed mechanical design.

Design and Performance of Windmills

Continued interest in the use of windmills, not only for the purposes of agricultural and domestic power supply, but also in the realm of aeronautics, has indicated

van die lugvaartkunde, het gedui op 'n behoefte aan verdere ontwikkeling van bestaande windmeulteorië om ontwerp- en werkverrigtingseienskappe te verbeter sonder om toevlug te neem tot probeermetodes. Werk in hierdie verband is derhalwe begin en goeie vordering word gemaak. Die ondersoek sluit windmeulens van die omhulde tipe in.

Intussen is drie windmeulens van 6 vt. van verskillende lemontwerpe vir 'n private onderneming getoets. Die doel van die werk was om die beste lemontwerp vir gebruik in die ontwerp van groter windmeulens te bepaal. 'n Reeks toetse is aanvanklik in die windtonnel van 10 vt. uitgevoer, maar daar is gevind dat tonnelwandsteurings die stromings in so 'n mate beïnvloed dat die toetse in buitelugtoestande herhaal moes word. Die meule is gevolglik op die meer gebruiklike wyse, naamlik op 'n vragmotor, opgestel en getoets. Daar is gevind dat die resultate kwalitatief in terme van windmeulteorië verklaar kon word.

Ontwerp en Werkverrigting van Omhulde Waaiers

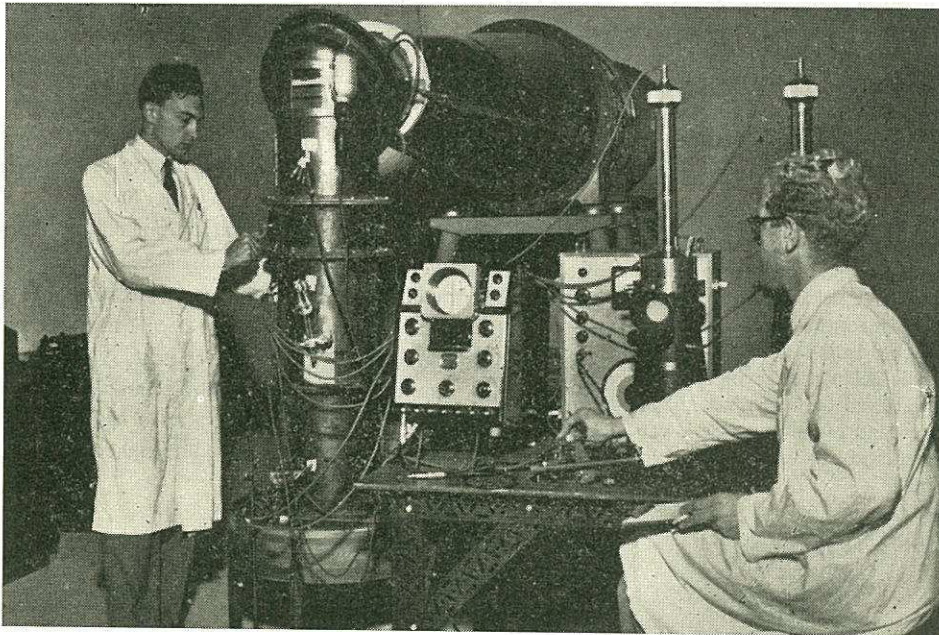
Werk op die projek in verband met waaiergeraas, het aanleiding gegee tot die ontwikkeling van 'n nuwe ontwerpsteorie vir waaiers wat van inlaatlemme voorsien is. Aangesien die teorie belowend lyk en 'n aansienlike vermindering teweeg kan bring in die werk verbonde aan die ontwerp van waaiers, is dit uitgebrei om verskillende gevalle van leilem- en rotorsamestellings te dek.

the need for further development of existing windmill theories in order to improve design and performance characteristics without having to resort to methods of trial and error. Work in this connection has, therefore, been started and good progress is being made. The studies include windmills of the ducted type.

In the meantime, three 6-ft. diameter windmills of different blade design were tested on behalf of a private firm. The purpose of the work was to determine the best blade design for incorporation into larger windmills. A series of tests was first conducted in the 10-ft. wind tunnel, but tunnel interference effects were found to have such a marked influence that the tests had to be repeated under outdoor conditions. It was found that the results obtained could be qualitatively explained in terms of windmill theory.

Design and Performance of Ducted Fans

Work on the fan noise project gave rise to the development of a new fan design theory for fans equipped with inlet guide vanes. Since the theory seemed promising and could result in substantial reduction in the work involved when designing fans, it was extended to cover the cases of various stator-rotor configurations.



Model van die inlaatpype van 'n kompressor vir bestudering van die werking van hoeklemme in 'n elmboogverbinding.

Model of compressor inlet ducting for studying action of corner vanes in an elbow joint.

Verdere ontwikkeling het noodsaaklik geblyk toe die ontwerp van 'n waaier vir die voorgestelde nuwe windtunnel van 6 vt. nodig geword het, aangesien die voorlopige spesifikasies van die spoed- en weerstandsfaktor vir hierdie tunnel die behoefte aan 'n kontraroterende samestelling aangedui het. Die teorie is op so 'n wyse ontwikkel dat dit moontlik was om die geskikste waaier vir werking oor 'n betreklik wye bereik van lugspoede en weerstandsfaktore te ontwerp. 'n Skaalmodel van die waaier is ontwerp ten einde die geskiktheid van die ontwerp, veral met betrekking tot die nodige bereik van bedryfstoeistande te toets. 'n Teoretiese ontleding van die werkverrigting is gemaak en kan met die resultate van eksperimentele studies op die modelwaaier vergelyk word.

Swigting van Hoeklemme

'n Onderzoek word namens 'n myngroep onderneem om die oorsaak van swigting van 'n stel hoeklemme in die uitlaatpyp van 'n turbo-kompressoreenheid vas te stel. 'n Model van die opstelling, bestaande uit 'n boog met hoeklemme, en 'n vleuelklep op 'n kort afstand stroomop, is gebou en met die 30 dm. eksperimentele waaiereenheid van die toetsopstelling vir waaiergeraas verbind. Die vloeitoestande in die omgewing van die hoeklemme word tans ondersoek.

HIDROMEGANIKA

Die vernaamste navorsingswerk van die afdeling Hidromeganika, wat teen middel 1956 in die lewe geroep is, was 'n ondersoek in verband met 'n waterprobleem in verskeie goudmyne in die Wes-Witwatersrandse gebied. Die ondersoek sluit in die gebruik van chemiese spoor-elemente om die vloei van ondergrondse water in die omgewing van die myne na te gaan. In die hooftoets wat dusver afgehandel is, is 40 ton gewone sout by die water wat uit een van die myne gepomp is, gevoeg op 'n punt waar hierdie water 'n sinkgat binnegaan. Watermonsters wat daaglik gedurende die daaropvolgende weke uit verskillende myndelfplekke en uit verskillende plekke op die oppervlakte geneem is, is chemies ontleed om veranderinge in die chloriedinhoud daarvan te bepaal. Hierdie werk het tot die belangrike gevolgtrekking gelei dat ongeveer driekwart van die water wat uit hierdie myn gepomp is, inderdaad binne 'n tydperk van vier maande weer na die werksgebiede van hierdie en 'n aangrensende myn terugvloei.

Die ondersoek word voortgesit.

Further development became necessary when it was required to design a fan for the proposed new 6-ft. wind tunnel, since the preliminary specifications of speed and power factor for this tunnel indicated the need for a contra-rotating fan configuration. The theory was developed in such a way that it became possible to design the best fan for working over a fairly wide range of airspeeds and power factors. In order to test the suitability of the design, especially with regard to the required range of operating conditions, a scale model of the fan was designed. A theoretical performance analysis has been made, and can be compared with the results of experimental studies on the model fan.

Corner Vane Failure

An investigation is being undertaken on behalf of a mining group to determine the cause of failure of a set of corner vanes installed in the intake duct of a turbo-compressor plant. A model of the arrangement, comprising a bend and corner vanes with a butterfly valve a short distance upstream, has been built and attached to the 30-inch diameter experimental fan. The flow conditions in the vicinity of the corner vanes are now being studied.

HYDROMECHANICS

The main research activity of the Hydromechanics Division, established in mid-1956, has been an investigation of a water problem in several gold mines in the West Witwatersrand area of the Transvaal. The work involves the use of tracers to study the movement of sub-surface water in the vicinity of the mines. In the main test completed to date, 40 tons of common salt were added to the water from one of the mines at a point where it enters a sinkhole. Water samples collected daily during succeeding weeks from various mine stopes and surface points, were chemically analysed to detect any change in chloride content. This work led to the important conclusion that about three quarters of the water pumped from this mine actually returns to the working areas of this and a neighbouring mine within a period of four months.

The tests are continuing.

Nasionale Telekommunikasie- navorsingslaboratorium

Direkteur: DR. F. J. HEWITT

Die program gedurende die verslagtydperk was weereens toegespits op die oplossing van probleme waarmee gebruikers van radiogolwe vir burgerlike en militêre dienste in Suid-Afrika te kampe het.

'n Belangrike deel van die program was weereens die studie van die voortplanting van radiogolwe deur die laer en hoër atmosfeer, en navorsingswerk i.v.m. die aard van lugsteurings in radio-ontvangstelsels sover dit radio-kommunikasie en radiohulpmiddels vir navigasie betref. Met die oog op die voorbereidingsprogram vir die Internasionale Geofisiese Jaar het sekere dele van hierdie program besondere aandag geniet.

Die res van die program was gewy aan die ontwikkeling van toerusting om aan spesiale vereistes in Suid-Afrika te voldoen, asook om plaaslike produksieprobleme van sulke toerusting op te los. Radio- en radartoerusting van 'n baie hoë gehalte en gebaseer op ontwerpe wat in die Laboratorium ontwikkel is, word nou deur verskeie firmas in Suid-Afrika vervaardig. Gelisensieerde produksie in die Verenigde Koninkryk is ook aan die gang.

Soos in die verlede, was die Laboratorium gehuisves in 'n gebou wat beskikbaar gestel is deur die Universiteit van die Witwatersrand, Johannesburg. Veldwerk is gedoen by die Universiteit se proefplaas op Frankewald, Jan Smuts-lughawe en by die radio-ontvangstasie van die Suid-Afrikaanse Uitsaaikorporasie by Panorama. Ionosferiese waarnemings word ook vir die Laboratorium deur die Suid-Afrikaanse Departement van Pos- en telegraafwese in Kaapstad gedoen. Die Raad wens die betrokke organisasies te bedank vir die beskikbaarstelling van hierdie fasiliteite.

Die naam van die Laboratorium is verander in Nasionale Telekommunikasienavorsingslaboratorium.

DIE VOORTPLANTING VAN RADIOGOLWE

Ionosferiese Waarnemings en Voorspellings

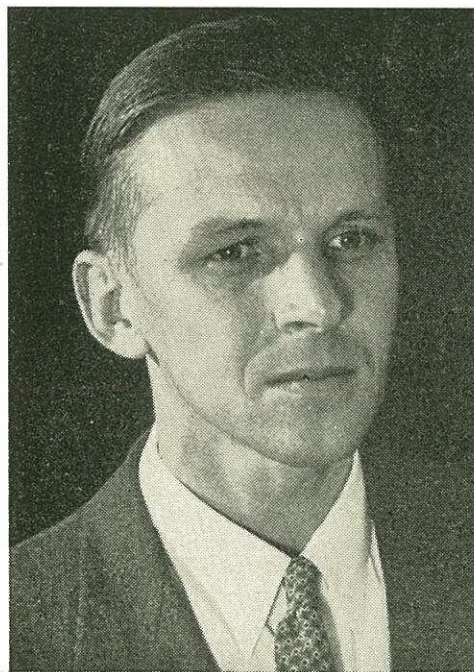
Langafstand-radioverbinding is so te sê geheelal afhanklik van die weerkaatsing van radiogolwe deur 'n geïoniseerde streek van die hoër atmosfeer wat bekend is as die ionosfeer. As gevolg van hierdie weerkaatsienskappe word hoë-frekwensie-radiogolwe, wat andersins in die ruimte sou verdwyn het, na die oppervlakte van die aarde weerkaats en word langafstand-radioverbinding moontlik gemaak. Radiogolwe word nie net alleen deur die ionosfeer weerkaats nie, maar word ook in 'n sekere mate daarin opgeneem. Dit lei tot verminderde sein-

National Telecommunications Research Laboratory

Director: DR. F. J. HEWITT

During the period under review, the programme was again directed towards the solution of problems confronting the users of radio waves in South Africa for civil and military purposes.

The study of the propagation of radio waves through the lower and upper atmosphere and the investigation of the nature of the disturbances caused by atmospheric to radio communication systems and radio aids to navigation has continued as an important part of the programme. Certain aspects of this work have been intensified as part of the world programme of preparations for the International Geophysical Year.



Dr. F. J. Hewitt.

The remainder of the programme has been concerned with the development of equipment to meet special requirements that have arisen in South Africa and with the problems encountered in the production of such equipment by industry in South Africa. Specialized

sterkte of selfs tot algehele verdwyning van die sein. Die omvang van albei gevolge is baie afhanklik van die frekwensie wat gebruik word.

Die weerkaatseienskappe van die ionosfeer verander aansienlik met tyd, seisoen en omgewing en vir goeie radio-verbinding is dit noodsaaklik dat betroubare voorspellings van ionosferiese toestande beskikbaar is sodat die mees geskikte frekwensie vooruit gekies kan word vir enige besondere radio-kommunikasie. Om voorspellings te kan doen, word daar gereelde waarnemings van ionosferiese eienskappe by meer as sewentig ionosferiese waarnemingstasies deur die hele wêreld gedoen. Die Laboratorium is verantwoordelik vir sulke waarnemings te Kaapstad en Johannesburg, waar onderskeidelik 97.2 persent en 94.0 persent van die inligting wat verkry is, bruikbaar was. Die resultate—'n totaal van meer as 30,000 ossillogramme—is in die Laboratorium ontleed en die data is gereeld gepubliseer asook uitgeruil met soortgelyke oorsese organisasies.

Geen resultate van die Ionosfeerstasie by Nairobi is gedurende die verslagtydperk verkry nie. Dit is hoofsaaklik te wyte aan die geweldige steurings wat ondervind is by die oorspronklike terrein en die verskuiwing van die toerusting na die nuwe terrein.

Ten spyte van die oprigting van nuwe ionosferiese waarnemingstasies in verskeie ander dele van Suidelike Afrika deur ander organisasies gedurende die afgelope paar jaar, is daar nog groot gedeeltes in die suidelike half-



*'n Produksiemodel van 'n Tellurometer.
A production model of the Tellurometer.*

radio and radar equipment is now being manufactured by various commercial firms in South Africa, based on designs developed in the Laboratory. Production in the United Kingdom, under licence, is also in progress.

As in the past, the Laboratory has been housed in premises made available by the University of the Witwatersrand, Johannesburg. Field work has been conducted at the University Experimental Farm at Frankenswald, at Jan Smuts Airport and at the Panorama receiving station of the South African Broadcasting Corporation. Ionospheric observations are made at Cape Town on behalf of the Laboratory by the South African Department of Posts and Telegraphs. The Council wishes to accord to the organizations concerned its appreciation of these facilities.

The name of the Laboratory has been changed to the National Telecommunications Research Laboratory.

THE PROPAGATION OF RADIO WAVES

Ionospheric Observations and Forecasts

Long range radio communication is dependent almost entirely on the reflection of radio waves by an ionized region of the upper atmosphere known as the ionosphere. As a result of these reflecting properties high frequency radio waves, which would otherwise escape into space, are returned to the earth's surface, and make long-range radio communication possible. Besides the reflection of the radio waves, absorption can also take place to a varying extent in the ionosphere. This results in decreased signal intensity or even complete loss of signal. The magnitude of both these effects is very much dependent on the frequency used.

The reflection properties of the ionosphere vary considerably with time, season and location and it is essential for good radio communication that reliable forecasts of ionospheric conditions be available, so that the most suitable frequency for any particular communication circuit can be chosen in advance. To enable forecasts to be made, regular measurements of ionospheric characteristics are made at more than seventy ionospheric observatories throughout the world. The Laboratory is responsible for such measurements at Cape Town and Johannesburg, where 97.2 per cent. and 94.0 per cent. respectively of the records obtained have proved to be usable. The records, totalling more than 30,000 oscillograms, have been analyzed and the data published regularly and exchanged with similar overseas organizations.

No results have been obtained from the ionosphere station at Nairobi during the period under review. This has, in the main, been due to severe interference experienced on the original site and the necessity of moving the equipment to a new site.

Despite the establishment of new ionospheric observatories in various other parts of southern Africa by

rond waar die dekking onvoldoende is. Die Laboratorium is besig om reëlings te tref om met die hulp van die Weerburo 'n ionosferiese waarnemingstasie op Marion-eiland op te rig vir waarnemings gedurende die Internasionale Geofisiese Jaar.

Die opstel en uitreiking van maandelikse voorspellings van optimum frekwensies vir gebruik in Suidelike Afrika is voortgesit. Meer as honderd bulletins word maandeliks uitgestuur. Hierdie voorspellings word ook gebruik deur die Departement van Vervoer vir die voorbereiding van hul gunstige werkkrekwensiekaarte wat uitgereik word aan die burgerlike lugvaart.

Op versoek is voorspellings van gunstige frekwensies vir sekere oorsake en voorspellings vir ander spesiale doeleindes ook gedoen.

Ionosferiese Navorsing

Die Laboratorium neem deel aan 'n internasionale poging om die voortplanting van radiogolwe en die struktuur van die ionosfeer meer intens te bestudeer gedurende die Internasionale Geofisiese Jaar.

Die Laboratorium konsentreer veral op die laer streke van die ionosfeer wat hoofsaaklik verantwoordelik is vir die opneem van hoë-frekwensie-radiogolwe. Die invloed van hierdie streke op radiokommunikasies word minder goed verstaan as dié van die hoër streke wat verantwoordelik is vir die weerkaatsing van radiogolwe. Aangesien die golwe voor en na weerkaatsing deur die laer streke moet gaan, is dié streke skynbaar van heelwat praktiese belang.

Die opneem wat plaasvind by vertikale invalshoek sal gereeld gemeet word op twee verskillende frekwensies, en tegelykertyd sal die gedeeltelike weerkaatsing van die laer streke ook bestudeer word om vas te stel hoe die opneem-eienskappe verander op verskillende hoogtes. Hierdie metings sal ook help om die elektronedigheid van die laer streke op verskillende hoogtes vas te stel. Die impulsmodulasie-eksperimente waarvan daar in vorige verslae melding gemaak is, sal voortduur met verbeterde toerusting met dieselfde doel voor oë. Skuins impulsuitstralings tussen Johannesburg en Salisbury sal ook onderneem word om inligting te verkry oor die opneem van radiogolwe in geval van skuins uitstraling.

Voorbereidings vir hierdie en ander meer gespesialiseerde ondersoeke is nou byna voltooi. Die ondersoeke maak 'n deel uit van 'n Suid-Afrikaanse program soos beplan deur die Suid-Afrikaanse Nasionale Komitee vir die Internasionale Geofisiese Jaar. 'n Onderkomitee vir die ionosfeer is in die lewe geroep, met die Direkteur van die Laboratorium as voorsitter.

RADIORUISPEILE EN NAVIGASIEHULPMIDDELS

Die radioruispeil wat bestaan by die ontvang-end van 'n radioverbinding bepaal die minimum seinsterkte wat bevredigende kommunikasie moontlik maak. As gevolg

other organizations during the past few years, there remain large areas of the southern hemisphere where coverage is inadequate. The Laboratory is arranging, with the assistance of the Weather Bureau, the establishment of an ionospheric observatory on Marion Island for operation during the International Geophysical Year.

The preparation and issue of monthly forecasts of optimum frequencies for use over circuits in southern Africa has continued. More than 100 bulletins are distributed each month. These forecasts are also used by the Department of Transport in the preparation of optimum R/T Frequency Charts which are supplied to civil aircraft.

Forecasts of suitable frequencies for particular overseas circuits and other forecasts for special purposes are made on request.

Ionospheric Investigations

The Laboratory is participating in the international effort to make a more intensive study of the propagation of radio waves and the structure of the ionosphere during the International Geophysical Year.

The Laboratory is concentrating, in particular, on the lower regions of the ionosphere, the regions which are responsible in the main for the absorption of high frequency radio waves. The effect on radio communications of these regions, through which the waves have to pass both before and after reflection, is much less well understood than that of the higher regions which are responsible in the main for the reflection of radio waves.

The absorption experienced at vertical incidence will be measured regularly on two different frequencies, and at the same time partial reflections from the lower regions will also be studied to determine how the absorbing properties vary with height. These measurements will also enable the electron density at various heights in the lower regions to be determined. The pulse cross-modulation experiments referred to in previous reports will continue with improved equipment, with the same objective. Oblique incidence pulse transmissions between Johannesburg and Salisbury will also be undertaken to provide information on absorption at oblique incidence.

Preparations for these and other more specialized investigations are now nearing completion. The investigations form part of a programme planned by the South African National Committee for the International Geophysical Year. A Sub-committee for the ionosphere has been established under the chairmanship of the Director of the Laboratory.

RADIO NOISE LEVELS AND NAVIGATIONAL AIDS

The radio noise level prevailing at the receiving terminal of a radio circuit determines the minimum radio

van die hoë invalshoek van plaaslike weerlig gedurende die somermaande en die nabyheid van ewenaarstreke waar weerlig deur die hele jaar kan voorkom, is radio-ruispeile in Suid-Afrika betreklik hoog en gevolglik is radiokommunikasie in hierdie opsig moeiliker as in baie oorsese lande. Die invloed is hoofsaaklik belangrik in die lae-frekwensiebande wat nodig is vir „bodemgolf“-radio-navigasihulpmiddels en die Laboratorium het hom die afgelope jare hoofsaaklik op hierdie aspek toegelê. Gedurende die onderhawige tydperk is hierdie program voltooi deur die ontleding van die lae-frekwensieruis-registrasies wat by Jinja in Uganda gemaak is en van registrasies in die lug wat gemaak is deur toerusting aan boord van 'n Skymaster van die Suid-Afrikaanse Lugdiens vir die studie van hoe dikwels neerslagsteurings voorkom.

Die algemene probleem om radioruispeile te registreer en die invloed van radiogeruis op radiokommunikasiesistelsels te beoordeel is baie ingewikkeld en die metodes wat tot nog toe deur die Laboratorium gebruik is, was toegespits op die oplossing van een besondere probleem, naamlik die skatting van die werkverrigtingsvermoë van sekere gespesifiseerde lae-frekwensie-navigasihulpmiddels. Die onderwerp in breë trekke geniet nou heelwat aandag oor die hele wêreld en die Laboratorium doen mee aan 'n internasionale ondersoek wat deur die Internasionale Wetenskaplike Radio-unie gereël is. Die hoofdoel is om 'n afdoende metode van meting van lugsteurings te vind sodat die steureffekte daarvan op alle tipes radiostelsels akkuraat bepaal kan word. Suid-Afrika is goed geleë vir waarnemings van hierdie aard as gevolg van die afwesigheid van sterk lae-frekwensie-radiosenders en die aanwesigheid van betreklik hoë steuringspeile. Gedurende die onderhawige tydperk het die Laboratorium 'n reeks metings gedoen deur gebruik van toerusting wat beskikbaar gestel is deur die Universiteit van Florida om amplitude-waarskynlikheidsverdeling van atmosferiese geruis by die afvoer van 'n ontvanger te bepaal. Dit skyn moontlik dat die steureffekte van radiogeruis weergegee kan word deur 'n redelik eenvoudige matematiese beskrywing in terme van die waarskynlikheidsverdeling.

Die studie van die golfvorm van lugsteurings oor 'n breë frekwensieband is aan die gang.

KRISTALBEHEER VAN VERANDERLIKE FREKWENSIE

Bestellings vir meer as 700 ontvangers, wat van die „Wadley“-metode van kristalbeheer van veranderlike frekwensie gebruik maak, is ontvang deur Racal Engineering Ltd., die Britse firma aan wie die W.N.N.R. 'n lisensie toegeken het om die ontvangers te vervaardig en te verkoop.

signal intensity which can give satisfactory communication. In South Africa, due to the high incidence of lightning locally during the summer months and the proximity to the equatorial regions where lightning may be experienced throughout the year, the radio noise levels are comparatively high and, as a result, radio communication is in this respect more difficult than in many overseas countries. The effects are particularly serious in such low frequency bands as are necessary for “ground wave” radio aids to navigation, and the Laboratory has during the past years concentrated mainly on this aspect. During the period under review this part of the programme has been completed by the analysis of the low frequency noise records made at Jinja in Uganda and of records from airborne equipment carried in a South African Airways Skymaster for the study of the frequency of occurrence of precipitation static.

The general problem of recording radio noise levels and assessing the effect of radio noise on radio communications systems is extremely complicated and the methods used by the Laboratory to date were directed at solving one particular problem, namely, the estimation of the performance of certain specified low frequency aids to navigation. The broader subject is now receiving much attention throughout the world and the Laboratory is co-operating in an international investigation arranged by the International Scientific Radio Union. The first objective is to find a satisfactory means of measuring atmospheric noise in such a way that its interfering effects on all types of radio systems may be assessed accurately. South Africa is well situated for observations of this nature owing to the absence of low frequency high powered radio transmitters and the presence of relatively high noise levels. During the period under review the Laboratory has conducted a series of measurements using equipment made available by the University of Florida to determine the amplitude probability distribution of atmospheric noise at the output of a receiver. It seems possible that the interfering effects of radio noise may be capable of reasonably simple mathematical description in terms of the probability distribution.

The study of the waveform of atmospheric noise over a wide frequency band is in progress.

VARIABLE FREQUENCY CRYSTAL CONTROL

Orders for more than 700 receivers using the “Wadley” system of variable frequency crystal control have been received by Racal Engineering Limited, the United Kingdom firm licensed by C.S.I.R. to manufacture and sell these receivers.

A South African firm, which has been licensed to

'n Suid-Afrikaanse firma aan wie 'n lisensie uitgereik is om 'n vereenvoudigde tipe van hierdie ontvanger te vervaardig, skyn goeie vordering gemaak te hê by sy pogings om die tegniese probleme in verband daarmee baas te raak, dog die toestel is nog nie in die handel verkrygbaar nie.

Na verstaan word, lewer die generators wat volgens hierdie beginsel gebou is deur die S.A. Uitsaaikorporasie en gebruik word by die kortgolfsentrum te Paradys, bevredigende diens. Die Britse Uitsaaikorporasie is besig om proefnemings met 'n laboratoriummodel te doen.

DIE TELLUROMETER-METODE VAN AFSTANDMETING

Die metode is in die Laboratorium ontwikkel om 'n opmetingsinstrument te verskaf wat in staat is om 'n afstand van tot omtrent 30 myl te meet met 'n akkuraatheid wat aanneemlik is vir geodetiese doeleindes. Daar bestaan 'n aansienlike vraag na 'n instrument van hierdie aard en heelwat moeite is alreeds oorsee gedoen om die probleem op te los.

Veldtoets van die instrument wat in die Laboratorium ontwikkel is, het bewys dat dit in staat is om die oorspronklike spesifikasie van 1 op 100,000 (byvoorbeeld

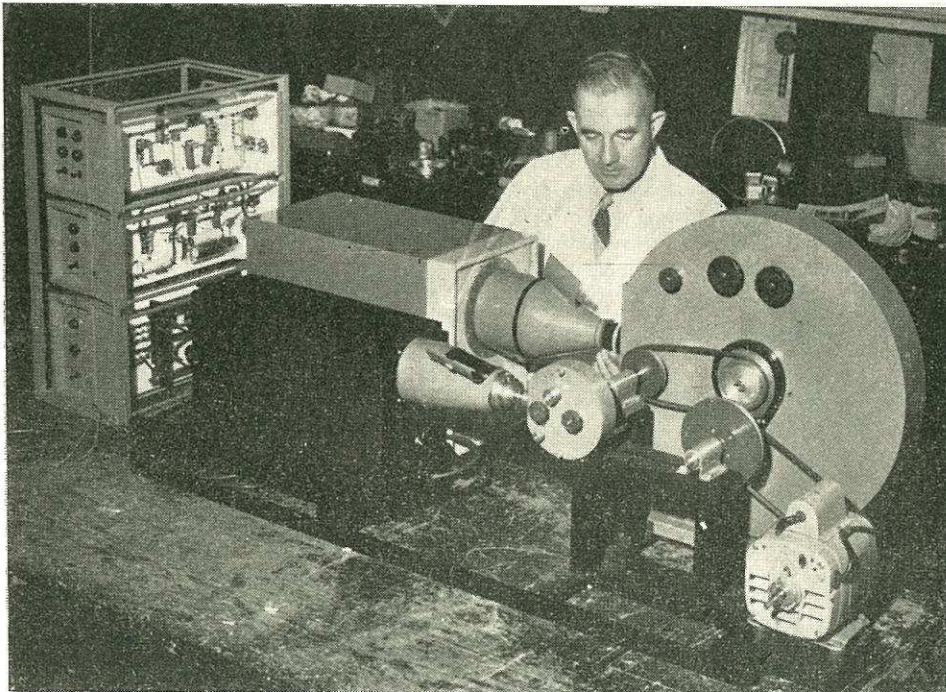
manufacture a simplified version of this receiver, appears to have made very appreciable strides in mastering the technical problems involved, but the set has not yet been placed on the market.

It is understood that the generators operating on this principle, built by the S.A. Broadcasting Corporation and used at the Paradys short-wave centre, are operating satisfactorily. A laboratory model is being tried out by the British Broadcasting Corporation.

THE TELLUROMETER SYSTEM OF DISTANCE MEASUREMENT

This system was developed in the Laboratory to provide a survey instrument capable of measuring distances up to about 30 miles to an accuracy acceptable for geodetic purposes. There is a considerable demand for an instrument of this nature and considerable effort has been devoted to this problem overseas.

Field trials of the laboratory-developed instrument proved it capable of considerably exceeding the original specification of 1 in 100,000 (for example, 1 foot in 20



'n Snelkamera vir gebruik by weerlignavorsing.

A high-speed camera used in lightning research.

1 vt. op 20 myl) heelwat te oorskry. Gedurende die onderhawige tydperk is die werk van die Laboratorium in hierdie rigting toegespits op die oplossing van probleme wat ontstaan het as gevolg van die produksie van hierdie instrumente in Suid-Afrika en die opstel van tegniese artikels in verband met die instrument en manier van gebruik. Produksie is onderneem deur Tellurometer (Edms) Bpk. in samewerking met die W.N.N.R., en die eerste publieke demonstrasies van die produksiemodelle het gedurende Januarie in Kaapstad plaasgevind. Hierdie demonstrasies was 'n volslae sukses en sal binnekort gevolg word deur demonstrasies in die Verenigde Koninkryk en die Verenigde State van Amerika. Die instrument word nou geproduseer en 'n aantal instrumente is alreeds aan verskeie oorsese lande gelever. Voorbereidings is byna voltooi vir 'n intense reeks metings by die Ridgeway-basis in die Verenigde Koninkryk, wat sal dien as 'n finale toets van die moontlike akkuraatheid van die metode en ook om die snelheid van radiogolwe oor 'n verlengde lyn te bepaal.

WEERLIGSTUDIES MET BEHULP VAN RADAR

Daar is voortgegaan met die voorbereiding van nuwe toerusting vir 'n nadere studie van die plaasbepaling en gedrag van verskeie prosesse tydens weerligontlading. Verdere studie van reeds verkreeë resultate is voortgesit en 'n verslag vir publikasie voorberei.

AFDELING VIR VERDEDIGINGSNAVORSING

Gedurende die verslagtydperk is die werk van hierdie Afdeling toegespits op die probleme verbonde aan die plaaslike vervaardiging van radartoerusting wat in die Laboratorium ontwerp is en verdere werkverrigtingsvermoë- en betroubaarheidstoetse. Toetse van die proefmodel wat in die Laboratorium gebou is, het getoon dat die berekende werkverrigtingsvermoë bereik kan word. As gevolg van die betreklike eenvoudigheid word nie veel moeilikheid verwag in die bereiking van ewe goeie resultate met die toerusting wat plaaslik vervaardig word nie.

miles). During the period under review, the work of the Laboratory was directed towards the solution of problems arising in the production of these instruments in South Africa and to the preparation of technical papers on the instrument and its use. A firm, styled Tellurometer (Pty) Ltd., was established to manufacture the instrument in association with the C.S.I.R. and the first public demonstrations of production models were held in Cape Town during January. These demonstrations were completely successful and will be followed shortly by demonstrations in the United Kingdom and in the United States of America. The instrument is now in production and deliveries of a number of instruments to several overseas countries have already been completed. Preparations are nearly complete for an intensive series of measurement on the Ridgeway Base in the United Kingdom. These will be a final check on the potential accuracy of the system and will also constitute a determination of the velocity of radio waves over an extended line.

LIGHTNING STUDIES BY RADAR

Preparation of new equipment for a more detailed study of the location and behaviour of various processes in the lightning discharge has continued. Study of previously obtained results was continued and a paper prepared for publication.

DEFENCE RESEARCH SECTION

During the period under review the work of this section has been concentrated on problems associated with the manufacture of radar equipment by local industry to the Laboratory's design and on further tests of performance and reliability. Tests of the Laboratory-built "pilot" model have shown that the estimated performance can be achieved and, owing to its relative simplicity, no great difficulty is expected in obtaining similar performance with equipment manufactured locally.

Nasionale Bounavorsingsinstituut

Direkteur: MNR. N. STUTTERHEIM

Op versoek van die Nasionale Behuisingskommissie is navorsingswerk onderneem in verband met goedkoop behuising vir blankes. Hierdie navorsingswerk het 'n stadium bereik waar verskeie prototipe huise volgens die ontwerp van die Instituut gebou is; so is byvoorbeeld 2 huise, albei met 'n vloeroppervlakte van 900 vk. vt., maar verskillend afgewerk, ontwerp en onderskeidelik teen 'n koste van minder as £950 en £1,300 gebou. Dit is vanselfsprekend dat die koste van plek tot plek van van tyd tot tyd sal verskil aangesien dit afhanklik is van die ontwerp, plaaslike materiale, pryse en arbeidskoste, sowel as die bekwaamheid van die betrokke bouer.

Die skoolgeboue-navorsingsprogram het sy eerste duidelike praktiese resultate afgewerp in die vorm van 'n lae tenderprys vir 'n laerskoolgebou wat deur die Instituut, in noue samewerking met die Skoolgebouekomitee van die Transvaalse Provinsiale Administrasie en met die Provinsiale Argitek, ontwerp is. Die Onderwysdepartement van die Provinsiale Administrasie van die Vrystaat het tenders aangeneem vir drie laerskole, ontwerp deur private argitekte wat gebruik gemaak het van sommige van die beginsels wat in die loop van hierdie projek ontwikkel is. Vergelyk met die heersende pryse van dergelike skole in die Vrystaat, het hierdie tenders 'n gemiddelde besparing van ongeveer £22,500 per skool aangetoon.

Werk in verband met sement en beton het aansienlik uitgebrei. Die besoek van Dr. Bogue, voormalige Direkteur van die Portland Cement Association Fellowship by die Buro vir Standaarde te Washington en 'n wêreld-deskundige op die gebied van sement, aan hierdie Instituut het as aansporing tot nog groter inspanning gedien. Van buitengewone belang is die sistematiese ondersoek van die toepassingsmoontlikhede van nie-vernietigende toetse, in besonder polsspoedbepalings, om die kwaliteit van beton vas te stel.

Die oorsake van korrosie in gewapende beton, wat lei tot aanmerklike versletting van betonstrukture, hoofsaaklik aan die kus maar ook in sommige industriële omgewings, vorm die onderwerp van 'n grondige ondersoek. Vordering is gemaak en voorlopige aanbevelings om hierdie soort korrosie te verminder, is vir publikasie voorberei.

Fundamentele ondersoeke in verband met die volumeveranderinge wat 'n kenmerk van swellende grondsoorte is, werp reeds vrugte af, as gevolg van die feit dat die meganisme van hierdie verskynsel tans reeds beter verstaan word. Daar word verwag dat dit as gevolg hiervan

National Building Research Institute

Director: MR. N. STUTTERHEIM

At the request of the National Housing Commission, research work was undertaken in respect of low-cost European housing. This work has reached the stage where several prototype houses have been built to the Institute's design; for instance, two houses of the same plan of 900 sq. ft. but with different standards of finish, were designed and built at a cost of less than £950 and £1,300 each; obviously the figure will vary from place to place and time to time, depending on design, local materials, prices and labour costs, as well as on the efficiency of the builder concerned.

The schools research programme has shown its first clear practical results in the form of a low tender price for a primary school building designed by the Institute in close collaboration with the School Buildings Committee of the Transvaal Provincial Administration and



Mnr./Mr. N. Stutterheim.



Meting van die oplossingspotensiaal van korroderende wapeningsstaal in beton.

Measuring of the solution potential of corroding reinforcing steel in concrete.

moontlik sal word om te voorspel wat die swellingstyd-
kurwes vir hierdie grondsoorte sal wees, waardeur die
ontwerp van fondamente vir streke soos die Vrystaatse
goudvelde vergemaklik sal word.

AFDELING ARGITEKTUUR

Minimum Huisplanne

Twee prototipe goedkoop huise vir blankes deur die
Instituut ontwerp as deel van 'n ondersoek wat op versoek
van die Nasionale Behuisingskommissie onderneem is
om die koste van huise vir blankes uit die laer-inkomste-
groepe te verminder, is te Witbank gebou. Een van
hierdie tipes vorm 'n basiese eenheid met baie eenvoudige
afwerking. Die ander is beter afgewerk, alhoewel die
plan dieselfde is. So 'n vierkamerhuis met kombuis-
eetkamer beslaan 'n oppervlakte van omtrent 900 vk. vt.

Die Witbankse Munisipaliteit beplan tans 'n skema
van 50 huise in oorleg met die Instituut. 'n Gewysigde
uitbreiding van die basiese eenheid is vir hierdie groter
skema voorberei en dit sal help om verskeidenheid te
verskaf: voorsiening sal tewens gemaak word vir 'n
eenvoudige metode om die basiese eenheid uit te brei.

with the Provincial Architect. The Education Depart-
ment of the Provincial Administration of the Free State
has accepted tenders for three primary schools designed
by private architects using some of the principles de-
veloped in the course of this project. Compared with the
ruling prices for schools in the Free State, these tenders
have indicated an average saving in the order of £22,500
per school.

Work in connection with cement and concrete has
expanded considerably. It has gained additional stimulus
as a result of a visit to the Institute by Dr. Bogue, former
Director of the Portland Cement Association Fellowship
at the Bureau of Standards, Washington, and a specialist
of world-status on cement. Of special importance are
the systematic studies concerning the application of non-
destructive testing, in particular pulse velocity deter-
minations for assessing quality of concrete.

The causes of corrosion of concrete reinforcement
which result in considerable deterioration in concrete
structures, particularly in coastal but also in other
industrial environments, are the subject of extensive
investigations. Progress is being made and preliminary
recommendations to reduce this type of corrosion have
been prepared for publication.

Fundamental studies of the volume changes which
characterize heaving soils are bearing fruit, in that a
better understanding of the mechanism of this pheno-
menon is being reached. It is expected that by this means
it will become possible to predict heaving-time curves for
these types of soils, which will facilitate the design of
foundations for regions like the Free State Goldfields
area.

ARCHITECTURAL DIVISION

Minimum-house Plans

Two prototype European low-cost houses designed
by the Institute as part of a study undertaken on behalf of
the National Housing Commission to reduce the
costs of housing for the lower income groups of
Europeans, were built at Witbank. One of these types
represents a basic unit which has very simple finishes.
The other has a higher standard of finishes, although it
has the same plan. The areas of both these four-roomed
houses with kitchen-dining room, are about 900 sq. ft.

The Witbank Municipality is now planning a 50
house scheme in consultation with the Institute. A
modified extension to the basic unit has been prepared
for this bigger scheme and it will assist in providing
variety; it will also provide an example of a simple
method of extending the basic unit.

Meubelnavorsing

'n Verslag, „Tests on School Chalkboards”,* is in Januarie 1957 op versoek van die Kaapse en die Transvaalse Provinsiale Administrasies opgestel. Hierdie verslag is ook aan die Provinsiale Administrasies van Natal en die O.V.S., die Uniedepartement van Onderwys, en 'n aantal opvoedkundige inrigtings gestuur.

Nog 'n publikasie, getitel „Report on Experimental Furniture for Nursery Schools”, is gepubliseer maar is slegs aan 'n beperkte aantal instansies ter insae gestuur, aangesien dit gebaseer is op die ondersoek van bestaande meubels en geen vaste aanbevelings bevat nie, alhoewel 'n navorsingsprogram in breë trekke daarin voorgestel word.

Navorsing in verband met Skoolgeboue

'n Begin is gemaak met die bou van 'n engelsmedium laerskool te Waterkloof, Pretoria, nadat die laagste tender wat 'n totaal van £37,470 bedra het, uitgeslote ryanings, speelgronde en fooie, aangeneem is. Die skool, wat 6 kamers vir die grade, 12 klaskamers vir die standaard, en 'n saal het en vir 650 leerlinge bestem is, word gebou volgens 'n ontwerp waaraan die Provinsiale Argitek, die Onderwysdepartement van die Transvaalse Provinsiale Administrasie en die Instituut saamgewerk het.

Daar bestaan 2 vername redes waarom die Waterkloofskool-proefneming van die grootste belang is. Ten eerste is by die ontwerp van die skool veral rekening gebou met die behoeftes van die kinders, en om dit moontlik te maak, is hul gesigsvermoë, gerief, bewegings en algemene welsyn sorgvuldig bestudeer. Ten tweede is, namate die plan ontwikkel het, sekere besparings teweeggebring wat tot 'n vermindering van kapitaalbelegging gelei het in vergelyking met wat op die oomblik vir skole met ruimte vir ongeveer dieselfde aantal leerlinge vereis word. Hierdie besparings is nie bereik ten koste van die kwaliteit van die afwerking nie maar eerder deur die oppervlaktes wat nie direk vir onderwysdoelindes gebruik word nie, tot 'n minimum te beperk sonder om egter afbreuk aan die goeie funksionering te doen, deur ruimtes te voorsien wat vir meer as een doel gebruik kan word, en ook deur sorgvuldige plasing van die geboue en die ontwerp van eenvoudiger fundamente en laer plafonhoogtes. Aangesien dit 'n ontwikkelingsplan is, kan daar nou nog nie vasgestel word of verdere wysigings nodig is nie; waarneming van die skool nadat dit in gebruik geneem is, sal die vuurproef wees.

Op die gebied van hoërskoolgeboue is gewone en spesiale klaskamers deeglik ondersoek, en 'n verslag geskryf en tekeninge voorberei vir publikasie. Hierdie navorsing het getoon dat besparings van tussen £20,000 en £30,000 vir 'n gemiddelde hoërskool teweeggebring kan word.

Met betrekking tot hierdie werk wens die Raad sy waardering uit te spreek vir die samewerking van die

*Beperkte verspreiding.

Furniture Research

A report, “Tests on School Chalkboards”**, was prepared in January, 1957, on behalf of the Cape and Transvaal Provincial Administrations. This report has also been circulated to the Natal and O.F.S. Provincial Administrations and the Union Department of Education, as well as to a number of educational institutions.

Another publication, “Report on Experimental Furniture for Nursery Schools”, was published but given limited circulation as it was based on observations of existing furniture and gave no firm recommendations, though a skeleton research programme was proposed.

Schools Research

The building of the English Medium Primary School, Waterkloof, Pretoria, commenced after acceptance of the lowest tender which totalled £37,470, excluding drives, playing fields and fees. The school, which has six grades classrooms, twelve standard classrooms and a hall, and was designed for 650 pupils, is a development design in which the Provincial Architect, the Education Department of the Transvaal Provincial Administration and the Institute have co-operated.

The importance of the Waterkloof School experiment lies in two main contributions. Firstly, the school is designed around the requirements of the school children and, as a result, their vision, comfort, movements and general well-being have been carefully studied. Secondly, as the plan was developed, certain economies were effected which have reduced the capital investment when compared with that presently required for schools of similar scholar capacity. These savings were not achieved at the expense of the quality of finishes, but rather by reducing non-teaching areas to a minimum compatible with good functioning, by planning for dual-purpose spaces and also by careful siting of the buildings, simplified foundation design and lowering of ceiling heights. As this is a development plan, it cannot yet be stated whether further modification will be required; observation of the occupied school will provide the acid test.

In the field of high-school buildings, normal and special classrooms have been fully investigated and a report has been written and drawings prepared for publication. This research indicates that in high-school buildings savings of between £20,000 and £30,000 per full-range high-school can be achieved.

In regard to this work, the Council wishes to record its appreciation of the co-operation of the Transvaal Provincial Architect and private architects who made

**Limited circulation.

Transvaalse Provinsiale Argitek en van private argitekte wat die oprigting van prototipe spesiale kamers ooreenkomstig die komitee se aanbevelings moontlik gemaak het, waardeur die eksperimentele werk versprei word en die resultate vinniger verkry kan word. Die navorsingswerk i.v.m. skoolgeboue wat deur die Instituut onderneem is, ontvang gedeeltelike geldelike ondersteuning van die Transvaalse en Kaapse Provinsiale Administrasies.

Hospitaalgeboue

Die opnames van die invloedsgesied van klinieke in naturellestadsgesiede is tans voltooi, en daaruit blyk duidelik dat die meeste van die kliniekbesoekers binne 'n radius van 1 myl van die kliniek af woon. Vir 'n gemiddelde digtheid van ontwikkeling van Bantoeorpe, sal dus 14,000 wonings of ongeveer 70,000 inwoners binne die invloedsgesied val. So 'n gemeenskap sal groot genoeg wees om 'n polikliniek van ekonomiese grootte tot sy beskikking te hê wat in staat sal wees om uitstekende diens te lewer.

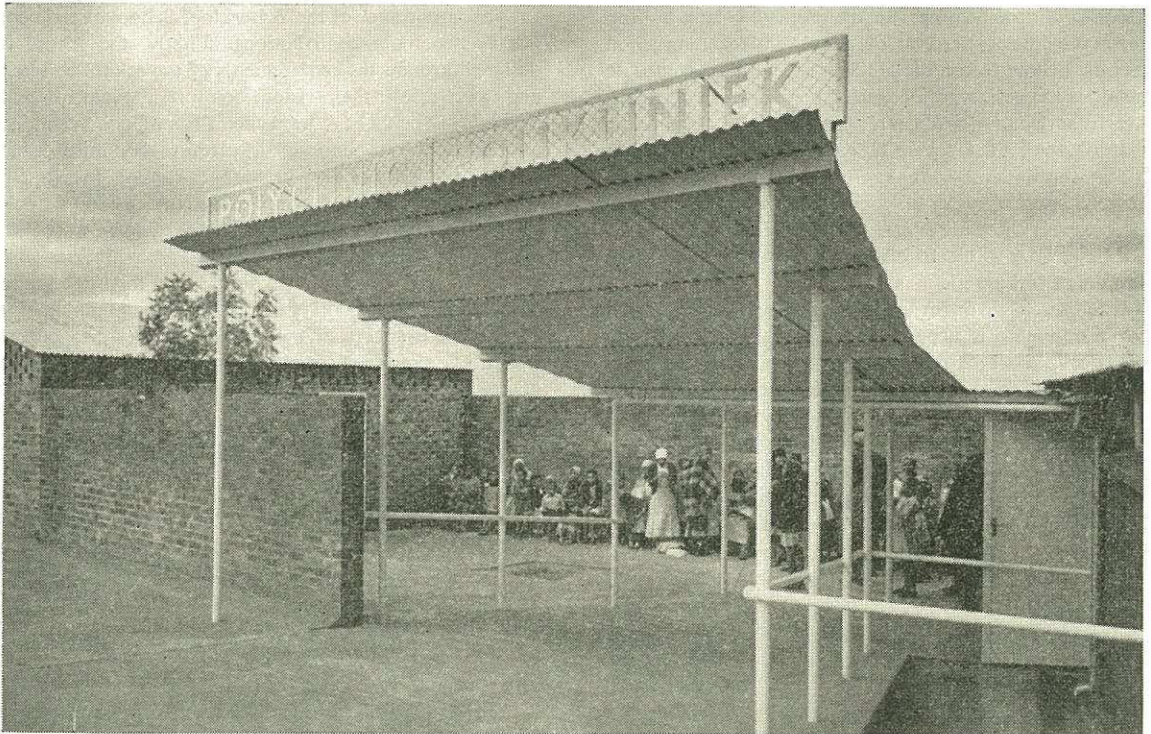
Die kliniek te Meadowlands wat deur die Instituut ontwerp is, is feitlik voltooi en 'n stelsel van gekleurde kaarte en indekskaartjies wat in verband staan met die funksionele aspekte van die beplanning word uitgewerk om sy werking te vergemaklik.

possible the erection of prototype special rooms in accordance with the Committee's recommendations, thus spreading the experimental work and enabling check results to be obtained more quickly. The school buildings research work undertaken by the Institute has been partly sponsored by the Transvaal and Cape Provincial Administrations.

Hospital Buildings

The surveys of the zones of influence of a clinic for urban Bantu areas have now been concluded and have clearly indicated that most visitors to a clinic reside within a mile radius of it. For average densities of development of Bantu townships, therefore, 14,000 dwellings or about 70,000 inhabitants would fall within the zone of influence. Such a community would be sufficiently large to be served by a polyclinic of economical size and capable of rendering excellent service.

The Meadowlands clinic designed by the Institute, is almost completed and a system of coloured cards and card indices related to the functional aspects of the planning is being worked out to facilitate its operation.



Ingang van die Meadowlands-polikliniek wat deur die Instituut ontwerp is.

Entrance to the Meadowlands Polyclinic designed by the Institute.

Die beampte wat vir hospitaalnavorsing verantwoordelik is, het na 'n besoek van ses maande aan die buiteland teruggekeer. Sy waarnemings aldaar het hom tot die volgende gevolgtrekkings laat kom:

- (a) Dit skyn dat 'n hospitaal van ongeveer 500 beddens die mees ekonomiese is van die standpunt van lopende uitgawes; groter sowel as kleiner hospitale kos meer om te bestuur per pasiënt.
- (b) Buigsaamheid van die sieke-sale is nie so belangrik soos spesiale afdelings en toerusting nie, wat gedurig toeneem namate die mediese wetenskap uitbrei. Dit beteken dus dat die afdelings vir behandeling horisontaal beplan moet word, terwyl sale in geboue van meer as een verdieping vertikaal beplan moet word.
- (c) Hospitaaltoerusting moet baie sorgvuldig uitgesoek word om aan die hospitaal se funksionele behoeftes te voldoen.
- (d) Die werk wat tot nog toe deur hierdie Instituut onderneem is met betrekking tot saalbeplanning is bevredigend, maar toekomstige werk moet beperk word tot spesifieke probleme en nie gebaseer word op die beginsel van versameling van al die beskikbare inligting oor elke punt nie.

Met betrekking tot punt (d) hierbo, het die inligting verkry van saalmetings wat reeds gedoen is, die probleemplekke in sale aangetoon en ook hoe 'n verskillende rangskikking van sekere kamers onmiddellik die beplanningsmoelikhede kan oplos, wat 'n aanmerklike vermindering in die afstande deur verpleegsters afgelê, tot gevolg sal hê; verder het daaruit geblyk hoe die rangskikking van sekere toerustingstukke en kaste in aanmerking geneem kan word met betrekking tot die volgorde van die verpleegsters se take en hoe, deur sorgvuldige rangskikking, doeltreffendheid verkry kan word in die uitleë van 'n plan.

Die hospitaalgebounavorsing wat deur die Instituut onderneem is, is geldelik ondersteun deur die Unie-Departement van Gesondheid en deur elk van die vier Provinsiale Administrasies.

AFDELING FUNKSIONELE DOELTREFFENDHEID

Bouklimatologie

As gevolg van die toenemende belangstelling wat gegee word aan die funksionele aspekte van die ontwerp van geboue, het dit noodsaaklik geword om die toepaslike klimaatsfaktore wat die gedrag van geboue beïnvloed ten opsigte van behaaglikheid, gesondheid en ander vereistes van die inwoners, meer noukeurig in aanmerking te neem. 'n Gekonsentreerde poging word tans aangewend om die basiese klimaatsgegevens wat sporadies in die loop van vorige werk versamel is, om te werk ten einde dit in 'n nuttiger vorm vir bounavorsing en -ontwerp aan te bied. 'n Aanvang is gemaak met die versameling van inligting in verband met die frekwensievoorkoms van windspoed

The officer responsible for hospitals research returned from a six months visit overseas. From observations made he has drawn the following conclusions:

- (a) It appears that a hospital of approximately 500 beds is the most economical size from the point of running costs; larger and smaller hospitals cost more to run per patient.
- (b) Flexibility of wards is not as important as special departments and equipment which develop continually with the ever-developing medical science. This would mean that treatment blocks should be planned horizontally whereas wards may be planned vertically in multi-storey blocks.
- (c) Hospital equipment should be very carefully selected to meet functional demands.
- (d) The work undertaken to date at the Institute in respect of ward planning is satisfactory, but future work must be confined to specific problems and not based on the principle of collecting all the available information on every item.

In respect of item (d) above, information extracted from ward measurements already undertaken have indicated the problem spots in wards and shown *either*, how re-location of certain rooms can immediately solve planning difficulties, resulting in a considerable reduction of nurses' journeys, *or*, how the positioning of certain fittings and cupboards can be considered in relation to the sequence of nursing tasks and how, by careful arrangement, efficiency can be achieved in a layout.

The hospital buildings research undertaken at the Institute was sponsored by the Union Department of Health and by each of the four Provincial Administrations.

FUNCTIONAL EFFICIENCY DIVISION

Building Climatology

With the increased attention being given to functional aspects of building design, it has become essential to take into more accurate account the relevant climatic factors affecting the performance of buildings in relation to the comfort, health and other requirements of the occupants. A concentrated effort is now being made to recast basic climatic data collected sporadically in the course of previous work, for presentation in a more useful form for application to building research and design. A start was made with the preparation of information on the prevalence of wind speed for the

vir verskillende rigtings en vir verskillende tye van die dag sowel as seisoene van die jaar. Voorlopig word slegs gekonsentreer op die meer digbevolkte dele van die land. 'n Begin is gemaak met 'n voorlopige studie om geskikte metodes van ontleding te ontwikkel om die frekwensie van herhaling van warm weerstoestande met betrekking tot die termiese gedrag van strukture aan te toon.

Veldstudies in Verband met Plafonisolasie

Die vergelykende veldtoetse op 'n aantal identiese toetshuise om die invloed van plafonmateriaal en plafonisolasie op die binnenshuise termiese toestande vas te stel, is voortgesit. Die resultate toon dat isolasiemateriale soos vermiculiet, mineraalwol en aluminiumfolie die maksimum plafontemperatuur onder sekere omstandighede op warm dae verminder met tussen 15° en 20°F., en die lugtemperatuur op werkhoogte verminder met tussen 2° en 4°F.

Invloed van Stof op Weerkaatsende Isolاسie

Vergelykende toetse wat in die laboratorium uitgevoer is op 'n model van 'n tipiese dak-plafonkombinasie het getoon dat die snelheid waarteen die isolasiedoel-treffendheid van aluminiumfolie gedurende die vroeë stadium van stofversameling afneem, baie groot kan wees maar geleidelik verminder namate die stofneerslag toeneem.

Metings word tans onderneem om die snelheid van stofneerslag op die plafonne van 'n paar huise in verskillende dele van Pretoria te bepaal.

Hitteabsorpsiekoëffisiënt

'n Laboratoriumapparaat word opgestel om die absorpsiekoëffisiënt van oppervlaktes te meet vir sonstrale by verskillende invalshoeke. Dit is 'n belangrike faktor wat bepaal hoeveel sonhitte deur 'n gebou-element wat aan die son blootgestel is, voortgeplant word.

Koolstofmonoksiedvergiftiging

Verdere toetse is uitgevoer in 'n standaard tipe stedelike Bantoehuis om natuurlike ventilasietoestande te bestudeer deur gebruik te maak van verskillende vorms en oppervlaktes van ventilasie-opeeninge met betrekking tot die probleem van koolstofmonoksiedvergiftiging, wat veroorsaak word deur die gebruik van oop konkas vir verwarming en kook. Die resultate van hierdie toetse het bewys dat ventilasieopeeninge in die praktyk nie 'n betroubare oplossing bied vir die veilige kontrole van koolstofmonoksiedkonsentrasies nie. Daar word aan die hand gedoen dat 'n oplossing van die probleem waarskynlik eerder gevind kan word in die voorsiening van 'n spesiale kap en skoorsteen om die rookgasse wat van die konka kom, te verwyder of om voorsiening te maak vir meer geskikte verwarmings- en kooktoestelle. 'n Voorlopige verslag oor die onderwerp is gesirkuleer om die mening van gesondheidsbeamptes en Bantoebehuisingsgesaghebbendes dwarsdeur die land te verneem.

various directions during different periods of the day and seasons of the year for some of the larger population centres in the country. A preliminary study was also initiated to develop suitable methods of analysis to show the frequency of recurrence of hot weather conditions in relation to the thermal behaviour of structures.

Field Studies of Ceiling Insulation

The comparative field experiments using a number of similar test houses to determine the effect of ceiling material and ceiling insulation on indoor thermal conditions were continued. The results show that, for some conditions of test, insulation such as vermiculite, mineral wool and aluminium foil reduced the maximum ceiling temperature by between 15° and 20°F. on a hot day and reduced the air temperature at living level by between 2° and 4°F.

Effect of Dust on Reflective Insulation

Comparative tests conducted in the laboratory with a model of a typical roof-ceiling combination indicate that the rate of loss in insulation efficiency of aluminium foil may be very large during the early stages of dust accumulation, but becomes less and less as the dust deposit increases. Measurements are now being made of the rate of dust accumulation on the ceilings of a few houses in different parts of Pretoria.

Heat Absorptivity

A laboratory apparatus is being set up to measure the absorptivities of surfaces to solar radiation at different angles of incidence. This is an important factor affecting the amount of solar heat transmitted through a building element when exposed to sunlight.

Carbon Monoxide Poisoning

Further tests were conducted in a standard type Native urban house for the purpose of studying natural ventilation conditions, using various forms and areas of ventilation openings in relation to the problem of carbon monoxide poisoning caused by the use of open braziers for heating and cooking. The results of these tests proved that, in practice, ventilation openings do not offer a reliable means for the safe control of carbon monoxide concentrations, and suggest that solutions to the problem should rather be found by the provision of a special hood and flue for removing the fumes from a brazier, or by making provision for more suitable heating and cooking appliances. A preliminary report on the subject has been circulated to ascertain the views of health officials and Native housing authorities throughout the country.

Wind Tunnel Studies on Models

Ventilation studies with models in the 10 ft. wind tunnel of the National Mechanical Engineering Research

Windtonnelstudies op Modelle

Ventilasiestudies op modelle in die 10-voet-windtonnel van N.N.I.M.I. is voortgesit. Talryke toetse is uitgevoer, hoofsaaklik op modelle van klaskamers en skoolgeboue, ten einde die invloed van strukturele eienskappe op die uitwendige en inwendige lugvloeioptrone vas te stel vir verskillende windspeede en -rigtings.

'n Eenvoudige tipe windtonnel is ontwerp en opgerig met die doel om ondersoek in te stel na die uitwerking van die vorm en ontwerp van ventilasie- en vensteropeninge op die hoeveelheid lugvloei deur die opening. Kennis hiervan behoort te lei tot 'n meer rasionele metode van vensterkeuse om aan die ventilasievereistes te voldoen.

Verligting

Uitgebreide toetse is uitgevoer met skaalmodelle van klaskamers in 'n kunsmatige hemel met 'n deursnee van 20 vt. en ook onder natuurlike blootstellingstoestande. Die doel hiervan was om die invloed van sulke faktore soos grondweerkaatsing, venstergrootte en -rangskikking, plafonhoogte en verskeie vorms van uitwendige obstrukties, op die binneverligting vas te stel. Ten einde te voldoen aan die vereistes wat deur weersomstandighede in die verskillende dele van die land genoodsaak word, is sowel modelle met oop as met geslote gange bestudeer.

Onderzoek is ook ingestel om geskikte metodes te vind vir die kunsmatige beligting van krytborde vir aandgebruik of om te dien as aanvulling vir natuurlike beligting gedurende ongunstige weerstoestande.

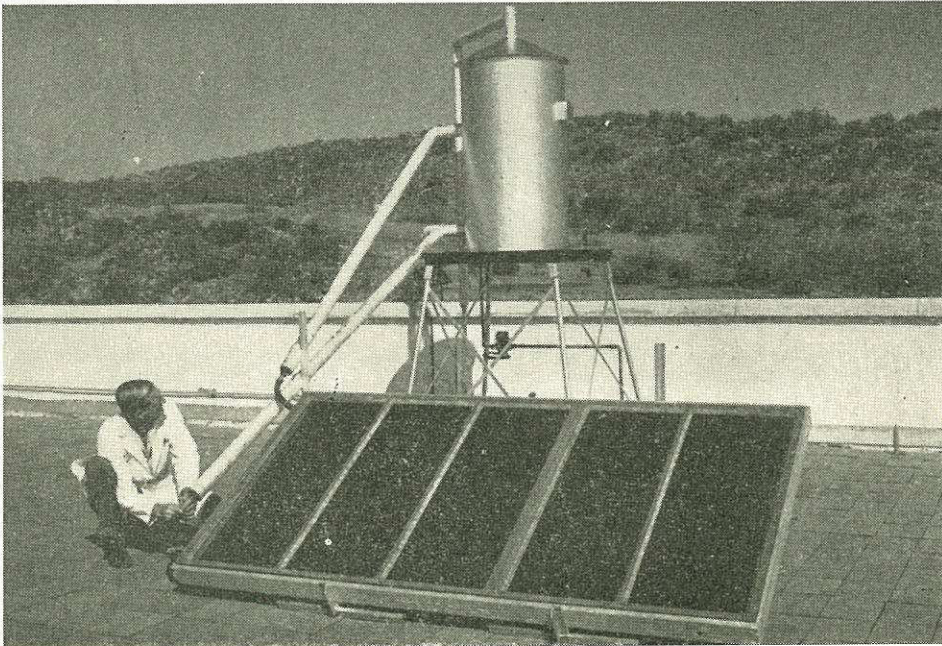
Institute were continued and numerous tests carried out, mainly with models of classrooms and school buildings, in order to determine the effects of structural features on the external and internal air-flow patterns for different conditions of wind speed and direction.

A simple type of wind tunnel was designed and constructed for the purpose of investigating the effects of the shape and design of ventilation and window openings on the rate of flow of air through the opening. A knowledge of these effects should lead to a more rational method of window selection to suit ventilation requirements.

Lighting

Extensive tests were carried out using scale models of classrooms in the 20 ft. diameter artificial sky, and also under natural exposure conditions, to determine the influence of such factors as ground reflection, window size and arrangement, ceiling height and various forms of external obstruction of the interior daylighting conditions. In order to meet requirements dictated by weather conditions in different parts of the country, models with both open and closed corridors were studied.

Investigations were also carried out to develop suitable systems of artificial lighting for chalkboards which could be used at night, or to supplement the natural lighting on the boards during adverse weather conditions.



'n Proefeenheid vir waterverwarming deur sonenergie wat deur die Instituut ontwerp is vir huishoudelike warmwaterstelsels.

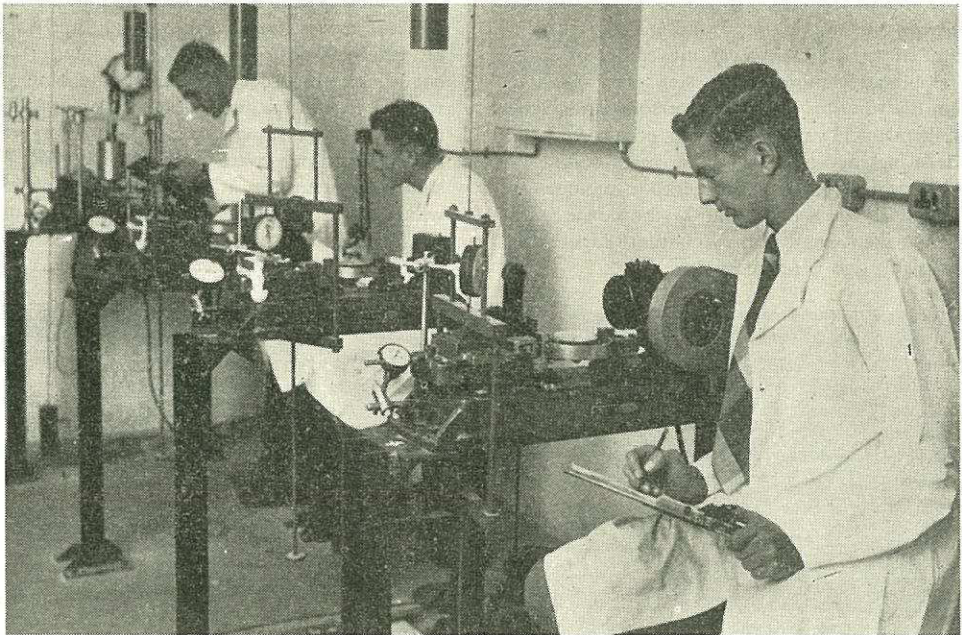
An experimental solar water-heating unit developed by the Institute for domestic hot-water systems.

AFDELING GRONDMEGANIKA

Alhoewel die meeste aandag aan die studie van fundamente in swellende grond gegee is, is nog steeds baie aanvrage van buite-organisasies om laboratoriumtoetse, veldondersoek en monsterneming en om navorsingswerk ontvang. Daarbenewens is ondersoek uitgevoer vir die Raad se nuwe geboue.

Fondamente op Uitsettende Grond

Roetina waarneming van die gedrag van geboue wat op uitsettende grond gebou is, is voortgesit. As gevolg van werk in verband met die glikolmetode vir die meting van kleimineraaloppervlakte en die vasstelling van ewewigsvoginhoud, is voorlopige gevolgtrekkings gemaak vir die uitkenning van uitsettingseienskappe van verskillende grondsoorte.



Skuifweerstand van grond word bepaal deur 'n direkte skuifspanningsmasjien.

SOIL MECHANICS DIVISION

Although the main activity of this division has been connected with foundations on expansive soils, the demand from outside organizations for laboratory testing, field exploration and sampling and for research work continued. In addition, investigations have been carried out for the Council's new buildings.

Foundations on Expansive Soils

Routine observations of the behaviour of buildings founded on expansive soils were continued. As a result of work on the glycol-retention method of measuring surface areas and the determination of equilibrium moisture contents, tentative conclusions have been drawn for recognition of expansive properties in soils.

Shearing strengths of soils being determined in direct shear machines.

Stabiliteit van Slykdamme

Die eksperimentele deel van 'n slykdam wat by 'n myn in die Oranje-Vrystaat gebou is om 'n ontwerp na te gaan wat gebaseer is op navorsingswerk deur die Instituut uitgevoer vir die Kamer van Mynwese, was bevredigend. Die laboratoriumwerk vir die bepaling van die skuifsterkte-eienskappe van slyk is voltooi.

Die S.A. Steenkool-, Olie- en Gasmaatskappy het by die bou van 'n asdam te werk gegaan volgens die aanbevelings van hierdie Laboratorium.

Stability of Slimes Dams

The experimental section of a slimes dam built at a mine in the Orange Free State to check a design based on research carried out by the Institute on behalf of the Chamber of Mines, behaved satisfactorily. The laboratory work on the determination of the shearing characteristics of slimes was completed.

Recommendations made to the South African Coal, Oil and Gas Company for the construction of an ash disposal dam were put into effect.

Druk Uitgeoefen deur Sement wat in Silos

Bewaar Word

Volgens 'n kontrak met 'n sementmaatskappy, is die vertikale en die laterale druk in sirkelvormige silos wat sement bevat, direk gemeet. Die druk-selle wat vir die meting van gronddruk ontwikkel is, is by hierdie werk gebruik en het betroubare aanwysings gegee by temperatuur tot 100°C.

Daar was aanduidings dat die uitwerking van nie-eenvormige ladings en ook die uitwerking van impulsiewe ladings veroorsaak deur groot hoeveelhede sement wat skielik langs die silo afgly terwyl dit leeg gemaak word, van belang sou kan wees.

Verwering van Rotse

Die doel van hierdie navorsing is om die kleimineralen te bepaal wat gevorm word wanneer rotse verweer. Die werk is veral toegespits op die verwering van doleriete onder halfdroë toestande in aanwesigheid van alkaliese waters. Daar is gevind dat die plagioklase veldspate baie min verander, maar wanneer hulle verander, word muskoviet- of hidromika gevorm. Die olivien en piroksien verweer tot chloriet. Die chloriet verweer op sy beurt tot montmorilloniet, soms met 'n tussenstadium van vermiculiet.

Daar is gevind dat daar talk in die verweerde rots aanwesig is, maar dit is nog nie bekend of dit 'n verweringsprodukt is of nie.

Ineensakkende Sand

Navorsing is gedoen in verband met die aanwesigheid en uitkenning van sogenoemde „ineensakkende sand” wat ernstige sakkings ondergaan wanneer dit onder druk met water versadig word.

Al die gevalle wat tot dusver ondersoek is, het voorgekom in Transvaal in gebiede waar daar rooi en bruin ysterhoudende laterietgrond is. Die sand is eenvormig gegradeer en die korrels is van 'n middelmatige grootte met amperhoekige tot amperronde vorm. Klei, gewoonlik kaolinite, en yster- en aluminiumhidroksied werk as 'n swak bindstof wat die korrels aanmekaar bind. Veldondersoek het getoon dat die sand sag en saamdrukbaar is. Laboratoriumtoetse wat gedoen is om sy aard en waarskynlike gedrag te bepaal, omvat die bepaling van die verhouding van druk tot volume in die droë sowel as die nat toestand, en sy digtheid *in situ*.

Geskikte ontwerpmetodes is ontwikkel wat lae draagdruk of die plasing van fondamente op groot diepte insluit.

AFDELING INGENIEURSWESE

Die Eienskappe van Staaldraad met 'n Hoë Treksterkte in Voorgespanne Beton

Na aanleiding van 'n navraag wat van 'n Stadsraad ontvang is, is die relatiewe waardes van koudgetrokke en loodverkoelde draad vir gebruik in 'n pyplyn van voorgespanne beton met 'n lengte van 40 myl ondersoek. Die

Pressures Exerted by Cement Stored in Silos

Under contract with a cement company, direct measurements of the vertical and lateral pressures in a circular silo containing cement were made. The cells developed for measuring earth pressures were used in this work and gave dependable readings at temperatures up to 100°C.

Indications were that the effect of non-uniform loading and also the effect of impulsive loads induced by large masses of cement suddenly sliding down the silo while it is being emptied, may be of importance.

Decomposition of Rocks

The object of this research is to determine the clay minerals that are formed when rocks decompose under weather influences. Work was concentrated on the weathering of dolerites under semi-arid conditions in the presence of alkaline waters. It was found that the plagioclase feldspars alter little but, when they do, muscovite or hydrous mica is formed. The olivines and pyroxenes weather to chlorite. The chlorite in turn weathers to montmorillonite, sometimes with an intermediate stage of vermiculite.

Talc was found to exist in the weathered rock, but it is not known whether it is a weathering product.

Collapsing Sand

Studies have been made on the occurrence and identification of the so-called “collapsing sands” which have undergone severe settlements when loaded and inundated.

All cases so far examined have occurred in the Transvaal in areas where the red and brown ferruginous lateritic soils occur. The sand is uniformly graded and particles are of medium size with sub-angular to sub-rounded shape. Clay, usually kaolinite, and iron and aluminium hydroxides act as a weak binder cementing the particles together. Field examination shows that the sand is soft and compressible. Laboratory tests to identify its nature and probable behaviour consist of the determination of pressure: volume relationships when dry and wet, and its *in situ* density.

Appropriate design procedures involving low bearing pressures or deep founding, have been evolved.

ENGINEERING DIVISION

The Properties of High Tensile Steel Wire in Prestressed Concrete

As a result of an enquiry received from a municipal council, an investigation was carried out to determine the relative merits of cold-drawn and lead-quenched wire for use in a prestressed concrete pipe line over 40

Stadsraad se beslissing met betrekking tot hierdie saak is gebaseer op die Instituut se bevindings.

Verspreiding van Spannings in 'n Spoorbaan

Op versoek van die Administrasie van die S.A. Spoorweë en Hawens is ondersoek of die spasiering van die dwarslêers in 'n spoorbaan verminder kan word. As alternatief is vasgestel of die bestaande bane 'n groter belasting kan dra.

Die navorsing is in twee dele verdeel, die eerste het die bepaling van die draagvermoë en sakkenmerke van die ballas onder belasting behels. Die tweede het die bepaling van die verspreiding van drukkragte en vormverandering in 'n belaste deel van 'n spoorlyn omvat. Die eksperimentele werk is feitlik voltooi.

Voorgespanne Beton

Daar bestaan redes om te glo dat die bryvulling rondom kabelbuise in nagespanne beton nie altyd doeltreffend is nie en aanleiding kan gee tot moontlike korrosie van die voorspankabels. In samewerking met die Nasionale Fisiese Navorsingslaboratorium word radioisotope gebruik by die navorsing wat gedoen word om die eienskappe van voegbrymengsels te bepaal met die doel om vas te stel watter mengsel waarskynlik die beste resultate in die praktyk sal lewer.

Skuifswigting in Gewapende Betonbalke

Die faktore wat die swigting van gewapende betonbalke onder skuifkragte beïnvloed, word bestudeer met

miles in length. The council's decision in this matter was based on the Institute's findings.

Distribution of Stresses in Railway Track

At the request of the S.A. Railways and Harbours Administration, an investigation was carried out with the object of determining whether the spacing of sleepers in railway tracks may be increased or, alternatively, whether existing lines may carry greater loads.

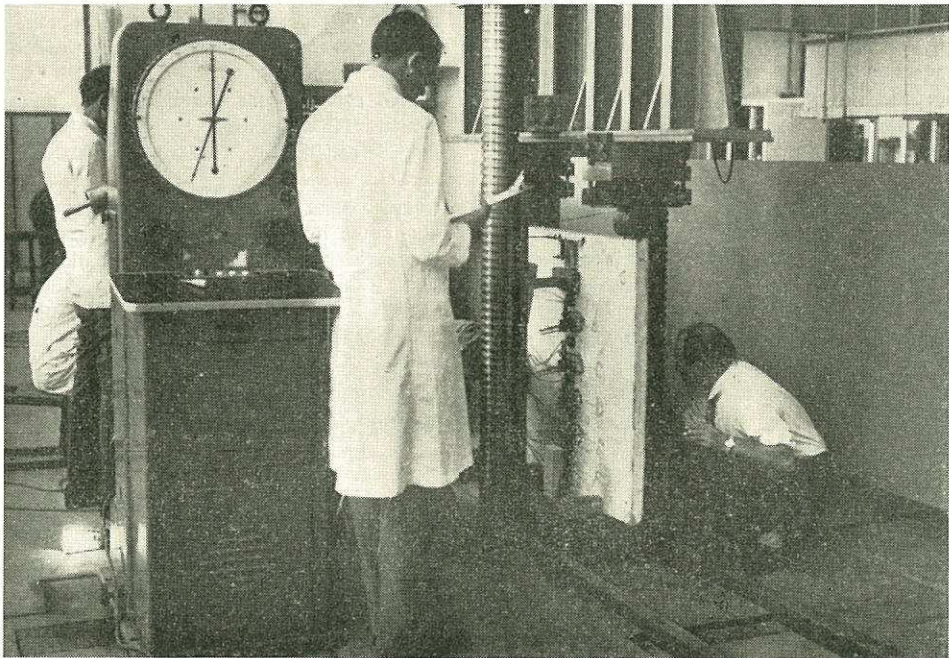
The investigation was divided into two parts, the first of which involved the determination of the load-bearing capacity and load-settlement characteristics of the ballast. The second part involved the determination of the distribution of pressure and deformation in a loaded length of track. The experimental work is almost complete.

Prestressed Concrete

There are reasons to believe that the grouting of cable ducts in post-tensioned prestressed concrete may not always be efficient, leading to possible corrosion of the prestressing cables. In co-operation with the National Physical Research Laboratory, radioisotopes are being used in research being carried out into the properties of grout mixes with a view to determining which are likely to give the best results in practice.

Shear Failure in Reinforced Concrete Beams

The factors affecting the failure of reinforced concrete beams in shear are being studied with a view to developing



'n Beton-modelmuur wat 'n struktuurtoets ondergaan.

Concrete model wall undergoing structural test.

die doel om meer rasionele ontwerpmetodes te ontwikkel. Dit sluit in die invloed van die verhouding van „skuifspan” tot effektiewe balkdiepte op die oorgang van die skuifbreuk na die buigbreuk en die invloed van die betonsterkte op die weerstand van gewapende betonbalke teen skuifkragte.

Krimping in Beton

Die spannings en vormveranderings in gewapende betonbalke as gevolg van die gebruik van toeslag wat buitensporige krimping veroorsaak, word bestudeer. Daar word verwag dat hierdie langtermynprojek waardevolle inligting sal verskaf met betrekking tot die strukturele implikasies van dimensionele veranderings in beton.

Ultrasoniese Toetsing van Beton

Navorsing is gedoen om te bepaal in watter mate drukvastheid en ultrasoniese polsspoed die veranderlikheid en drukvastheid van beton bepaal, soos dit in 'n reeks bestaande kolomme voorkom. Die verkreeë resultate dui daarop dat die polsspoedtegniek 'n beter idee van die variasie van betonkwaliteit, soos dit werklik in die kolomme voorkom, kan gee as die resultate van drukvastheidtoetse op betonkubusse. Na alle waarskynlikheid sal 'n metode ontwikkel kan word waardeur die resultate van ultrasoniese toetse gebruik kan word om met 'n veilige mate van noukeurigheid die sterkte van beton te bepaal soos dit in 'n struktuur voorkom.

Uit vorige werk wat gedoen is by hierdie Instituut is vasgestel dat die verband tussen polsspoed en drukvastheid van beton onafhanklik is van ouderdom en water/ sementverhouding. Navorsing word nou gedoen om die verband te bepaal vir beton wat verskillende mengverhoudings maar dieselfde bewerkbaarheid het.

Kwaliteitskontrole van Beton

'n Uitgebreide en sistematiese toetsprogram is op die beton van die nuwe W.N.N.R.-hoofkantoorgebou uitgevoer met die doel om die vorm van die verspreidingskurve vir die drukvastheid van toetskubusse vas te stel wanneer beton volgens voorgeskrewe kontroletoestande gemaak word. Die geleentheid is ook te baat geneem om die betroubaarheid van die impulshamertoets van Schmidt en die verwantskap tussen impuls en ultrasoniese polsspoed te bepaal. Kwaliteitskontrole van beton is van aansienlike ekonomiese belang, veral as die moderne neiging om afstand te doen van die nominale mengspesifikasie in aanmerking geneem word.

Vliegas in Beton

Toenemende belangstelling word getoon deur die konstruksieïndustrie met betrekking tot die gebruik van vliegas, wat van kragstasies verkry word, in beton. 'n Gesteunde ondersoek is aan die gang na die geskiktheid van hierdie materiaal vir gebruik in beton.

more rational design methods. These include the ratio of “shear span” to the effective depth in relation to the transition from shear to flexural failure and the influence of concrete strength on the shear strength.

Shrinkage in Concrete

The stresses and deformations in reinforced concrete beams due to the use of aggregates which cause excessive shrinkage are being studied. It is anticipated that this long-term project will provide valuable information regarding the structural implications of dimensional changes in concrete.

Ultrasonic Testing of Concrete

Research was carried out to determine to what extent compressive strength and ultrasonic pulse velocity tests indicated the variability and compressive strength of concrete as it existed in a series of columns. The results obtained suggest that the pulse velocity technique enables a better estimate to be obtained of the variation of concrete quality as it actually exists in the columns, than do compressive strength tests on concrete cubes. There is also a possibility of developing a method whereby the results of ultrasonic tests may be used to determine, with a fair degree of accuracy, the strength quality of concrete as it exists in a structure.

Previous work done at the Institute has established that the relationship between pulse velocity and compressive strength of concrete is independent of age and water/cement ratio. Work is now in progress to determine the relationship for concretes having different mix proportions but which have the same workability.

Quality Control of Concrete

A comprehensive and systematic programme of tests has been carried out on the concrete in the new C.S.I.R. Headquarters building, with the object of ascertaining the shape of the distribution curve for the compressive strength of test cubes when the concrete is made under given conditions of control. The opportunity was also taken of studying the validity of the Schmidt rebound hammer test and the relationship between rebound and ultrasonic pulse velocity. Quality control of concrete is of considerable economic importance, particularly when the modern trend of departing from nominal mix specification is taken into account.

Fly-ash in Concrete

Increasing interest is being shown by the construction industry regarding the use in concrete of fly-ash obtained from power stations. A sponsored investigation is in progress regarding the concrete-making properties of this material.

Korrelrige Hoogoodslak

Die moontlikheid om korrelrige hoogoodslak te gebruik as 'n fyn toeslag in beton, vorm die onderwerp van 'n ander gesteunde ondersoek. Met die oog op die potensiele hoeveelhede wat beskikbaar is, kan hierdie ondersoek van groot ekonomiese belang wees.

Brandnavorsing

Gedurende die periode in oënskou, is groot vooruitgang gemaak met hierdie werk. Die ontleding van 23,000 verslae oor brande wat gedurende die afgelope 10 jaar in 10 groot stede in Suid-Afrika ontstaan het, is voltooi. Die eerste vergadering van die onlangs gevormde Adviserende Brandnavorsingskomitee, wat verteenwoordigend is van die meeste van die belangrike liggame wat in brande belangstel, is in Oktober gehou.

'n Brandverslagvorm deur die Instituut opgestel vir landswye gebruik, is goedgekeur en gereelde verslae oor brande word nou van die meeste voltydse brandweerstasies in Suid-Afrika ontvang. 'n Belangrike waarneming is dat die aantal brande waarvan die oorsake as onbekend aangeteken is, van 30 persent tot 15 persent gedaal het sedert die gebruik van hierdie verslagvorm aan die begin van Januarie 1957 ingevoer is.

AFDELING MATERIALE

Sement en Sementprodukte

Een van die vernaamste doelstellings van die werk in verband met die eienskappe van Portland- en hoogoodslakkesement is die verbetering van die semente, veral met betrekking tot hul weerstand teen chemiese aantasting deur sure, sulfate en ander aggressiewe stowwe. Fundamentele studies in verband met sementchemie, die gaafheid van sement, die invloed van opberging van sement op die verslegting daarvan en studies in verband met die hidrasie van sement, het bevredigend verloop. Aktiewe navorsing word gedoen in verband met die verroesting van staal in beton. Dit is 'n ernstige probleem wat hoofsaaklik in die kusgebiede van Suid-Afrika voorkom. As gevolg van hierdie werk is reeds aanbevelings gedoen wat 'n verminderde mate van verslegting tot gevolg kan hê. Die werk word gesteun deur die Administrasie van die S.A. Spoorweë en Hawens, die Departement van Vervoer, die Departement van Waterwese, die Kaapse en die Nattale Provinsiale Administrasies en die Stadsraad van Kaapstad. Dit word uitgevoer in samewerking met die Nasionale Chemiese Navorsingslaboratorium.

Verdere werk in verband met die verslegting van beton in aggressiewe omgewings is voortgesit, en die invloed van sagte water, soos in die Suidwestelike Kaapprovinsie aangetref word, ontvang spesiale aandag.

Aggregate

Die studie van die probleem van abnormale volumeverandering van sekere aggregate in die Unie, het gelei

Granulated Blastfurnace Slag

The possibility of using granulated blastfurnace slag as a fine aggregate in concrete is the subject of another sponsored investigation. In view of the potential quantities available, this could prove of great economic importance.

Fire Research

During the period under review much progress has been made in this work. The analysis of 23,000 reports on fires which occurred in 10 large towns in South Africa during the past 10 years was completed. The first meeting of the newly formed Fire Research Advisory Committee, representative of most of the important organizations interested in fire, was held during October.

A fire-report form drawn up by the Institute for nation-wide use has been approved and regular reports of fires are now being received from most of the full-time fire brigades in South Africa. An interesting observation is that the number of fires in which the cause is recorded as being unknown has dropped from 30 per cent. to 15 per cent. since the introduction of this report form at the beginning of January, 1957.

MATERIALS DIVISION

Cement and Cement Products

Work on the properties of Portland and blastfurnace slag cements is aimed largely at their improvement, particularly in regard to their resistance to chemical attack by acids, sulphates and other aggressive media. Fundamental studies on the chemistry of cement, cement soundness, the effect of cement storage on its deterioration and the hydration of cement have proceeded satisfactorily.

Research on the serious problem of the corrosion of reinforcing steel in concrete, particularly in marine environments in South Africa, has been actively pursued and has already led to the recommendation of measures which can result in reduced deterioration. This work is being sponsored by the S.A. Railways and Harbours Administration, the Department of Transport, the Department of Water Affairs, the Cape and Natal Provincial Administrations and the City of Cape Town, and has been carried out in collaboration with the National Chemical Research Laboratory.

Further work on the deterioration of concrete in aggressive environments has continued, and the effect of soft waters, such as those in the south western Cape Province, is receiving particular attention.

Aggregates

The study of the problem of abnormal volume changes of certain aggregates in the Union has led to the develop-

tot die ontwikkeling van 'n toetsprosedure om sulke aggregate te identifiseer en dit word nou uitgebrei om 'n eenvoudige veldtoets vir hierdie doel te ontwikkel. Daar is al heelwat reklame gemaak vir die beste manier waarop te werk gegaan kan word in verband met hierdie materiale.

Veldopnames om die omvang van die verskynsel te bepaal, is voortgesit en verdere navorsing in verband met die meganisme daarvan het getoon dat waarskynlik sowel die wesenlike dimensionele veranderings van sulke aggregate as hul hoë saamdrukbaarheid vir hul onbevredigende gedrag verantwoordelik is.

Hierdie werk word geldelik gedeeltelik gesteun deur die „Concrete Association of South Africa”.

Boukalk

'n Nuwe metode is ontwikkel om die reaktiwiteit van kalsiumoksied te meet, en fundamentele werk in verband met kalkchemie is aan die gang; ontwikkelings in verband met die vervaardiging van kalk en kalkbevattende semente het plaasgevind. Dit is gebaseer op die praktiese toepassing van werk wat vroeër in hierdie afdeling gedoen is. 'n Studie is aan dié gang om 'n grens vas te stel vir uitsetting, soos bepaal deur 'n outoklaaftoets.

Verwe

Aansienlike belangstelling word sowel van die kant van vervaardigers as van verbruikers van verf getoon in die ontwikkeling deur hierdie Instituut van twee verbeterde tipes dakverf, wat direk aangewend kan word nie alleen op nuwe maar ook op verweerde gegalvaniseerde staal, en wat heelwat duursamer is op nuwe gegalvaniseerde staal as konvensionele verwe in dieselfde prysgroep. Hierdie verwe word nou deur die verfnywerheid vervaardig. 'n Lid van die nywerheid het £100 geskenk ter erkenning van die navorsingsprestasies.

Onlangs is 'n begin gemaak met werk in verband met die ontwikkeling van verbeterde afwitkalken en dergelike verfsorte wat met water aangemaak word.

Bestandheid van Geboue teen Waterdeurdringing

Werk wat die bepaling van die mate van reëndeurdringing deur mure en die vermindering daarvan ten doel het, word voortgesit deur gebruik te maak van 'n verbeterde apparaat; die gedrag van 'n aantal waterdigtingsmateriale is bepaal. Hierdie probleem is van landswyse belang, veral wat hoë geboue in Kaapstad en goedkoop behuising betref.

Gebakte Kleiprodukte

Die studie van bakstene, panne, teëls en soortgelyke keramiese produkte is onderneem hoofsaaklik met die doel om die mineralogiese samestelling van Suid-Afrikaanse kleie te korreleer met hulle geskiktheid vir die vervaardiging van swaar gebakte kleiprodukte. Bevredigende resultate is verkry en 'n gereelde aanvraag om kontrakwerk op hierdie gebied het ontwikkel. Werk is

ment of a test procedure for identifying such aggregates and this is being extended to a simple field test for this purpose. Publicity has been given to the most desirable action to be taken when these materials are involved. Field surveys of the extent of the phenomenon have proceeded and further research into the mechanism of the process has shown that the intrinsic dimensional change of such aggregates and their rather high compressibility are probably both responsible for their unsatisfactory behaviour.

This work is partly financed by the Concrete Association of South Africa.

Building Lime

A novel method of measuring the reactivity of calcium oxide has been developed, and fundamental work on the chemistry of lime is in progress; developments in the manufacture of lime and lime-containing cements have taken place, based on the practical application of earlier work in this Division. A study to find an expansion limit for unsoundness, as determined in an autoclave test, is in progress.

Paints

Considerable interest on the part of both paint manufacturers and consumers has been shown in the development by the Institute of two improved types of roof paint which can be applied directly to both new and weathered galvanized steel, and which are considerably more durable on new galvanized steel than conventional paints in the same price range. These paints are now being manufactured by the paint industry, a member of which has made a donation of £100 in recognition of the research achievements.

Work has recently been commenced on the development of improved limewashes and similar water-based paints.

Water Resistance of Buildings

Work aimed at establishing methods of measuring and reducing the penetration of rain through walls is proceeding, using an improved apparatus; the performance of a number of waterproofers has been evaluated. This problem is of country-wide importance, particularly for tall buildings in Cape Town and for low-cost housing.

Burnt Clay Products

The study of building bricks, tiles and similar ceramic products has been undertaken, the main objective being the correlation of the mineralogical composition of South African clays with their suitability for the manufacture of heavy burnt clay products. Satisfactory trends have been obtained and a steady demand for contract work in this field has developed. Work on the use of



Ondersoek van die duursaamheid van bouklip.

Investigating the durability of building stones.

aan die gang in verband met die gebruik van vliegas, 'n afvalproduk van verskeie Suid-Afrikaanse kragstasies, vir die produksie van vuurvaste bakstene en ander produkte.

Bouklip

As gevolg van die ernstige verslegting van bouklip in Suid-Afrika, veral van die sandsteentipe, is werk onlangs begin in verband met hierdie materiale. Die doel is om toetse te ontwikkel om te onderskei tussen bevredigende en swak bouklipsoorte. Enkele kontrakondersoeke is ook op hierdie gebied onderneem.

Allerlei

Ander projekte wat onderneem is, sluit in 'n ondersoek na die gebruik van sintel en vliegas, die ondersoek van uitslag op marmerbekledings, die verslegting van glasmosaïek, ondersoek in verband met mastikvoegdigtingsmengsels, die beoordeling van verskillende soorte krytborde en die ontwikkeling van spesiale afwitkalkke. In samewerking met die Universiteit van Kaapstad is grootskaalse veldtoetse beplan om die duursaamheid en ander kenmerkende eienskappe van 'n uitgebreide reeks boumateriale te bepaal.

fly-ash, a waste product from several South African power stations; in the production of fired building bricks and other products, is in progress.

Building Stones

Arising from the serious deterioration in South Africa of building stones, particularly of the sandstone type, work has recently commenced on these materials. The aim is to develop tests to distinguish between satisfactory and poor building stones. Some contract investigations in this field have also been undertaken.

Miscellaneous

Other projects undertaken include an investigation of the use of breeze and fly-ash, the examination of efflorescence on marble facings, the failure of glass mosaics, the investigation of mastic joint filling compounds, the evaluation of various types of chalkboard and the development of special limewashes. In collaboration with the University of Cape Town, a large-scale field evaluation of the durability and other characteristics of a wide range of building materials has been initiated.

Nasionale Instituut vir Personeelnavorsing

Direkteur: DR. S. BIESHEUVEL

Die vinnige industrialisasie van Suid-Afrika het baie personeelprobleme meegebring. In die beginstadium van nywerheidsontwikkeling, wanneer klem hoofsaaklik gelê word op finansiële aspekte, oprigting van fabriekke, die ontwikkeling van afsetgebiede en die stigting van verkoopsorganisasies, bestaan daar 'n neiging om personeelprobleme laag op die ranglys te plaas. Namate nywerheids- en handelondernemings koers kry, dring personeelprobleme al hoe meer op die voorgrond en word relatief steeds belangriker. Dikwels word hulle selfs die belangrikste bepalende faktor in die vasstelling van suksesvolle winsgewende kapitale belegging. Wanneer 'n bestuur dus ernstige aandag aan personeelsake begin te skenk, is dit 'n teken dat hy opgroei, en te oordeel na die aantal aanvrae om hulp deur die Instituut ontvang, sowel as die aard van sulke aanvrae, is hierdie ontwikkelingsstadium tans bereik.

'n Besonder betekenisvolle aspek is die toenemende besef dat personeelsake as sulks aandag vereis van persone



Dr. S. Biesheuvel.

National Institute for Personnel Research

Director: DR. S. BIESHEUVEL

The rapid industrialization of South Africa has brought many problems in the field of personnel. In the early stages of industrial development, when emphasis is primarily on the financing of projects, the erection of plant, the development of markets and the creation of sales organizations, personnel problems tend to receive a low priority. As industrial and commercial enterprises get under way, personnel problems tend to obtrude themselves and to become relatively more important. In many instances they become the principal determinants of the successful exploitation of capital investment. It is, therefore, a sign of the maturity of managements when they begin to pay serious attention to personnel matters and, judging by the number and kind of demands being made on the services of the Institute, this period is now well under way.

A most significant aspect is the growing awareness that personnel matters require attention as such, by persons specially appointed and trained for this purpose, and that these matters have become too many-sided, complicated and important to be handled incidentally by persons whose main concern is production, administration or sales organization. Personnel management is gradually coming into its own in the Union, and the Institute is frequently consulted about the functions of personnel departments, the manner in which they can be integrated in the organization of industrial enterprises, and how they should be staffed. Assistance has been rendered on a number of occasions in the selection of personnel management staff. A first training course in personnel management was held to which members of the Institute's staff contributed specialist lectures, and the next course will be held partly under its auspices.

In keeping with this development, there is an increasing demand for attitude studies, which indicate what factors influence job satisfaction, and how industrial morale, and with it productivity, can be improved. Incentive systems are being looked upon as much from the point of view of human relations as from that of production. There is, in fact, an all-round readiness to find out what the employee is thinking, and to turn this knowledge to advantage in enhancing work motivation. These efforts are by no means confined to European labour. If anything, the Native labour force comes in for more attention. Less is known about it, and the time is long past when Natives' wages accounted for a minor part of the cost of production. Their goodwill and efficiency have become important and hence a suitable object for the attention of personnel scientists.

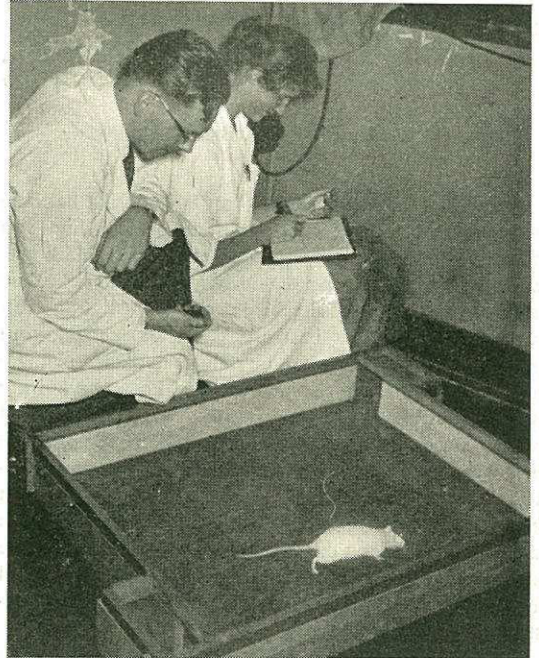
wat spesiaal vir dié doel aangestel en opgelei is, en dat hierdie probleme te veelsydig, ingewikkeld en belangrik geword het om terloops behartig te word deur persone wat hoofsaaklik belang stel in produksie, administrasie en verkoopsorganisasie. Personeelbestuur is geleidelik besig om tot sy reg te kom in die Unie, en die Instituut word dikwels geraadpleeg omtrent die funksies van personeelafdelings, die manier waarop hulle ingeskakel kan word in die organisasie van nywerheidsondernemings, en hoe hulle beman behoort te wees. By 'n aantal geleenthede is hulp verleen met die keuring van personeel vir personeelbestuur. 'n Eerste opleidingskursus in personeelbestuur, waartoe lede van die Instituut spesialiteitslesings bygedra het, is gehou. Die volgende kursus sal gedeeltelik onder die Instituut se beskerming gehou word.

In ooreenstemming met hierdie ontwikkeling is daar 'n toenemende aanvraag na houdingstudies wat aandui watter faktore werktevredenheid beïnvloed, en hoe industriële moraal, en daarmee produktiwiteit, verbeter kan word. Aansporingsloonskemas geniet eweveel aandag van die oogpunt van menslike verhoudings as van dié van produksie. Daar bestaan inderdaad 'n algemene gereedheid om vas te stel wat die werknemer dink en om hierdie kennis tot voordeel vir die verhoging van werkmotivering te gebruik. Hierdie pogings is geensins slegs tot blanke arbeid beperk nie. Die naturellearbeidsmag geniet inderdaad selfs meer aandag. Minder is omtrent hulle bekend en die tyd toe hul lone verantwoordelik was vir 'n kleiner gedeelte van die produksiekoste is lankal verby. Hul welwillendheid en bekwaamheid het belangrik geword en derhalwe 'n geskikte onderwerp vir die aandag van personeelwetenskaplikes. Van die dertien projekte wat onder kontrak met nywerhede en plaaslike besture deur die Instituut onderneem is, het minstens tien gedurende die jaar geheel of gedeeltelik met naturellearbeid in verband gestaan.

MANNEKRAGOPNAME

Werk in verband met hierdie opname is voortgesit. 'n Totaal van 19,000 vraelyste is voltooi en 4,000 manne het 'n reeks aanlegtoets afgeleë. Laasgenoemde groep is nie ten volle verteenwoordigend nie, daar dit moeilik was om toetsresultate te verkry van vrygestelde gevalle en van gevalle wat wel geloot is maar nie vir diensplig opgeroep is nie. Met die hulp van die Departement van Verdediging is stappe gedoen om die aanlegtoetsgegewens i.v.m. hierdie jaar se opname te voltooi. 'n Idee van die omvang van die opname en van die besonderhede daaraan verbonde word gegee deur die feit dat die vraelysgegewens tot dusver op 139,000 kaarte deurgeslaan is en dat die finale aantal waarskynlik 160,000 sal beloop teen die tyd dat die veldwerk voltooi is.

Interessante bevindings is reeds beskikbaar na ontleding van die opvoedkundige peil en aspirasies van die



Exploratory behaviour of rats being tested.

Verkenningsgedrag van rotte word ondersoek.

Of the thirteen projects which the Institute undertook during the year on contract with industry and public authorities, no less than ten were wholly or partly concerned with Native labour.

MANPOWER SURVEY

Work has continued on this survey. A total of 19,000 questionnaires has been completed, and 4,000 men have undergone a series of aptitude tests. The latter group is not fully representative, as it has been difficult to obtain test results on exempted cases, or on those who, although drawn by ballot, were not called up for service. With the assistance of the Department of Defence, steps have been taken to complete the aptitude test data on this year's intake. An idea of the magnitude of the survey and of the detail involved is conveyed by the fact that so far the questionnaire data have been punched on 139,000 cards, and that the final number will probably amount to 160,000 by the time the field work has been completed.

Some interesting findings are already available from an analysis of the educational level and aspirations of

steekproef wat 'n bevolking van 20,985 blanke mans, van die ouderdom van 18 jaar, verteenwoordig. Slegs 18 per sent van hierdie bevolking het std. X of 'n gelykstaande eksamen deurgekom het, terwyl 19 per sent std. VI of 'n laer standaard deurloop het. Van laasgenoemde het 75 per sent geen verdere vak- of aanvullende onderrig ontvang, of die voorneme gehad om sulke onderrig te bekom nie. Met inbegrip van diegene wat std. VII deurloop het, vind ons dat ten minste 21 per sent van die manlike bevolking, indien die huidige neiging volgehou word, geen kwalifikasie bo hierdie standaard sal besit nie. Om onderrig tot en met std. VII te voltooi, word geen publieke eksamen afgelê nie, en skoliere gaan outomaties na die volgende klas oor nadat hulle twee jaar in dieselfde standaard was. 'n Aansienlike gedeelte van dié wat std. VII voltooi het, het dit dus net in naam gedoen. Van dié wat op 18-jarige leeftyd nog die een of ander kursus volg (65 per sent van die manlike blanke bevolking), probeer 49 per sent 'n hoër skoolstandaard bereik, terwyl 26 per sent trag om 'n elementêre of ander Nasionale Tegniese Sertifikaat te behaal, 8 per sent 'n sertifikaat van diverse aard en 17 per sent 'n hoër sertifikaat, diploma of Universiteitsgraad. Ses per sent van alle manlike blanke agtienjarige studeer aan 'n universiteit. Indien die voornemens van diegene wat nog skoolgaan, saamgetel word dan styg laasgenoemde syfer tot 18 per sent, hoewel hierdie syfer klaarblyklik nooit bereik sal word nie. Natuurkunde was in die leerplan van 71 per sent van die bevolking ingesluit.

OORSIG VAN FINANSIËLE AANSPORINGSKEMAS

Die doel van hierdie studie, wat van die aard van 'n ondersoek is, is om vas te stel wat die effek is van aansporingslone op produktiwiteit, die gebruike i.v.m. toesighouding, die onderlinge verhoudings tussen persone, ongelukke en afwesigheid. Uiteindelik het 2,634 werkgewers in die geheel, uit 'n totaal van 6,241 wat genader is, die vraelys voltooi. Van hierdie firmas maak 361 (13 per sent) wat 'n totaal van 179,533 werknemers in diens het, gebruik van finansiële aansporing terwyl nog 208 firmas (8 per sent) voornemens het om so 'n skema in te voer. Baie werkgewers uit laasgenoemde groep het inligting omtrent die invoering van aansporingskemas gevra. Sowat 330 firmas het te kenne gegee dat hulle gewillig is om saam te werk in die tweede stadium van die ondersoek waarin fabriek besoek sal word om die opinies van sowel werkgewers as werknemers in te win omtrent die uitwerking van aansporingslone.

MOTIVERING EN MORAAL IN DIE NYWERHEID

Houdingstudies is nuttige middele om vas te stel watter faktore invloed het op die gewilligheid van 'n werker om hom met hart en siel aan sy taak te wy, die bestendigheid

the sample, representing a population of 20,985 European men at the age level of 18 years. Only 18 per cent. of this population had passed Std. X or its equivalent, whilst 19 per cent. had reached Std. VI or a lower standard. Of the latter, 75 per cent. had obtained no other vocational or supplementary education nor had they any intention of undertaking such training. When those who have passed Std. VII are included, we find that at least 21 per cent. of the male population, if the present trend is maintained, will not possess any qualifications beyond this level. To complete Std. VII it is not necessary to pass any public examination, and scholars are automatically promoted after having spent two years in any one standard. A considerable proportion of those who have completed Std. VII have, therefore, done so in name only. Of those, who at age 18 were still pursuing some course of study (65 per cent. of the male White population), 49 per cent. were trying to reach a higher school standard, 26 per cent. were taking elementary or other National Technical Certificates, 8 per cent. certificates of a miscellaneous kind, and 17 per cent. higher certificates, diplomas, or University degrees. University study involved 6 per cent. of all European males aged eighteen. If we take into account the intentions of those still at school, the latter figure rises to 18 per cent., though this percentage will obviously never be reached. Physical sciences were included in the curriculum of 71 per cent of the population.

SURVEY OF FINANCIAL INCENTIVE SCHEMES

The purpose of this study, which is of an exploratory nature, is to determine the effects of incentive bonus earnings on productivity, supervisory practices, interpersonal relations, accidents and absenteeism. Eventually a total of 2,634 employers out of the 6,241 approached completed the questionnaire. Of these firms, 361 (13 per cent.), employing a total of 179,533 workers, make use of financial incentives, while another 208 firms (8 per cent.) intend introducing such schemes. Many employers in the latter group sought information and advice about the introduction of incentive schemes. Some 330 firms have indicated that they are willing to co-operate in the second stage of the investigation, in which factories will be visited in order to obtain the opinions of both employers and employees about the effects of wage incentives.

MOTIVATION AND MORALE IN INDUSTRY

Attitude studies are a useful means of determining what factors influence the worker's willingness to apply himself wholeheartedly to his task, the stability of a labour force and the quality of the relations that obtain

van 'n arbeidsmag en die gehalte van die verhouding wat daar heers tussen bestuur en werkers. Twee sulke studies is voltooi, een in 'n ingenieursfirma met takke in verskillende dele van die Unie en die ander in 'n ingenieursfabriek op die Witwatersrand. 'n Derde studie, wat beperk is tot blanke werkers, is aan die gang in een van die grootste nywerheidsondernemings in die Unie. Al hierdie studies dui op die belangrikheid van genoegsame verbindingskanale tussen bestuur en werkers, en op die behoefte aan keuring en opleiding van opsigters. Die houding wat opsigters teenoor werkers aanslaan, kan veel daartoe bydra om personeelbeleid te maak of te breek, veral wanneer die opsigter terselfdertyd die kanaal is waardeur inligting omtrent die maatskappy se beleid en voornemens, of omtrent personeelverhoudings, van bestuur na werkers of andersom beweeg.

Ontevredenheid van Naturellearbeiders met hul werk was meesal die gevolg van lae lone, onreëlmatighede by betaling en gebrek aan sekuriteit. Vrees vir ontslag was 'n algemene verskynsel. Naturellearbeiders het oor die algemeen nie geweet hoeveel van hul weeklikse loon basies was, of hoeveel die aansporingsbonus of oortyd-betaling was nie. Die implikasies van doeltreffende toepassing van aansporingslone op hierdie begrippeel is duidelik. Sulke omstandighede lei ook dikwels tot misverstand en klagtes omtrent loonsake, wat 'n verslegtende uitwerking op werkmoraal het.

PERSONEELNAVORSING VIR DIE DEPARTEMENT VAN VERDEDIGING

Gedurende die agt maande wat deur die verslag gedek word, is byna 1,000 manspersone aan aanlegtoetse onderwerp vir verskeie vertakkings van die Unie-Verdedigingsmag, en opvolgstudies omtrent die doeltreffendheid van hierdie toetsprogram is voortgesit. Juiste indeling is besonder belangrik vir Lugmagginnasiumleerlinge, van wie verlang word dat hulle die beginsels van die een of ander tegniese ambag binne die kort tydperk van een jaar leer. Die toets wat vir hierdie doel opgestel is, het suksesvol geblyk in die indeling van leerlinge in vyf hoofambags-groepe. Dit het ook sukses met eksamenuitslae in elke groep voorspel.

'n Ontleding van die taak van die navigator in militêre vliegtuie het gelei tot die opstel van toetse, wat reeds bruikbaar gevind is by die keuring van kandidate met beter kans op sukses na opleiding. In moderne lugoorlog sal die bewegings van vliegtuie en projektele al hoe meer van die grond af beheer word en die rol van diegene wat vir bemanning van die kontroles verantwoordelik is, sal waarskynlik baie belangrik word. Eksperimentele werk in verband met die keuring van Grondbeheerde Onderskeppers het gelei tot toetse wat noukeurig die nodige vernuf vir onderskeppingswerk bepaal. Hulle is nou verkrygbaar vir roetinegebruik. Daar is ook bevind

between management and the workers. Two such studies have been completed, one in an engineering firm with interests in various parts of the Union and another in an engineering works on the Witwatersrand. A third study, confined to European operatives, is in progress in one of the largest industrial undertakings in the Union. All these studies point to the importance of adequate channels of communication between management and the workers and to the need for selection and training of supervisors. The attitude adopted by supervisors towards operatives can do much to make or mar personnel policies, particularly when the supervisor is at the same time the channel through which information on the company's policies and intentions or on staff attitudes moves down or up the line.

Job dissatisfaction amongst Native labourers was most frequently found to derive from low wages, pay irregularities and insecurity. Fear of dismissal was found to be a common preoccupation. Native labourers generally did not know how much of their weekly pay was basic, how much was incentive bonus or overtime pay. The implications for the effectiveness of wage incentives at this level of understanding are obvious. Such circumstances also lead to frequent misunderstandings and complaints concerning wage matters, which adversely affect working morale.

PERSONNEL RESEARCH FOR THE DEPARTMENT OF DEFENCE

During the eight months covered by the report, nearly 1,000 men were given aptitude tests for various branches of the Union Defence Force, and follow-up studies were continued on the effectiveness of this testing programme. Correct classification is particularly important for Air Force Gymnasium trainees, who are required to learn the elements of one or other technical trade within the short period of a year. The test designed for this purpose was found successful in classifying trainees into five primary trade groups. It also predicted examination success within each group.

An analysis of the task of the navigator in military aircraft has led to the construction of tests which have already been found useful in selecting candidates with the better chances of success in training. In modern aerial warfare, the movements of aircraft and of missiles will to an increasing extent be controlled from the ground and the role of those responsible for manning the control devices is likely to become a very important one. Experimental work on the selection of Ground Control Interceptors has produced tests which accurately measure the skills involved in interceptor work, and which are now available for routine use. The tests have also been



Instruksietoetse vir onder-offisiere.

Instructional tests for non-commissioned officers.

dat die toetse geskik is vir die personeel wat die beweging van vliegtuie by burgerlike lughawens beheer.

Die roetinetoetse wat gebruik word vir die keuring van leerlingloodse vir die S.A.L.M. word deurgaans hersien. Deur middel van 'n toets van lugvaartkennis wat onlangs opgestel is, het dit moontlik geblyk om in die vroeë stadiums van vliegopleiding te voorspel of die leerling geskik vir die soort werk sal wees. Diegene wat sulke kennis opgedoen het, sal waarskynlik altyd belang in vliëgsake bly stel, wat een van die belangrikste van die talryke bepalende faktore van sukses in vliegopleiding is. Die toets sal 'n deel uitmaak van die roetine-aanlegtoets-program as 'n motiveringsmaatstaf.

Werk i.v.m. die keuring van offisierkadette en die indeling en opleiding van ambagsvakeerlinge word voortgesit.

PERSONEELKEURING

As 'n diens aan werkgewende organisasies is personeelkeuringstoetse toegepas op kandidate vir 'n groot verskeidenheid beroepe insluitende personeelbestuurders, vakeerlinge, ambagsmanne, administratiewe kwekelinge, stereokarteerders en aanlegtoetsers. Die toets van applikante vir poste in die W.N.N.R. is voortdurend aan die toeneem; 'n gemiddelde van 65 per maand word getoets. Daar word dikwels gedink dat die gebruik van personeelkeuringstoetse beperk is tot die laer beroepsgroepe of tot beroepe waarvoor 'n hoë graad van handigheid of

found applicable to personnel controlling aircraft movements at civil airports.

The routine tests used for the selection of pupil-pilots for the S.A.A.F. are constantly under review. A test of aviation knowledge recently designed was found predictive of success in the early phases of flying training. It is probable that those who have acquired such knowledge have a sustained interest in flying matters, which is one of the most important of the many determinants of success in pilot training. The test will form part of the routine aptitude examination as a measure of motivation.

Work is continuing on the selection of officer cadets and on the classification and training of artisan apprentices.

PERSONNEL SELECTION

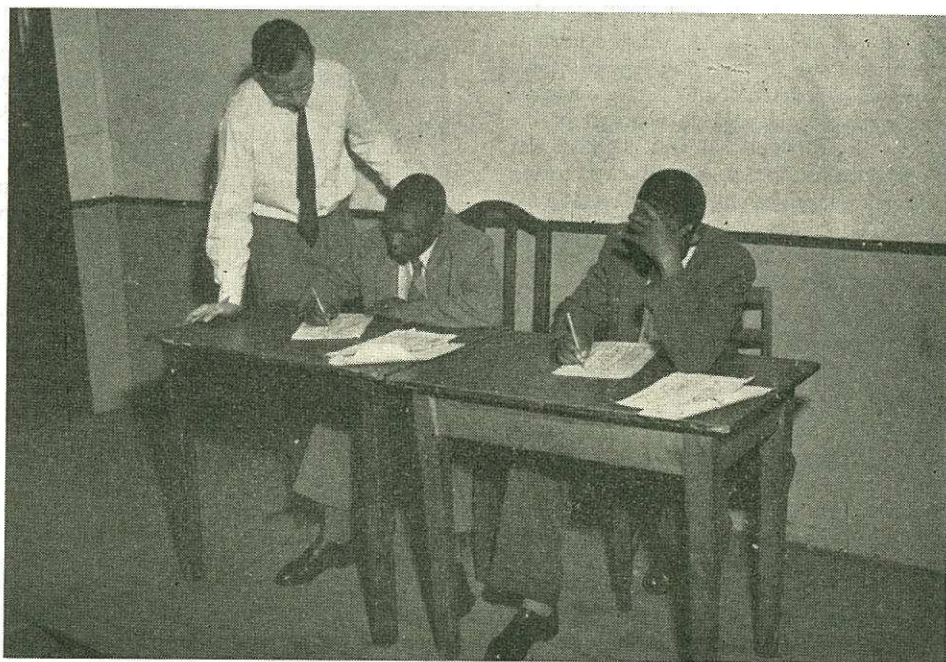
As a service to employing organizations, personnel selection tests were applied to candidates for a wide variety of occupations, including personnel managers, apprentices, artisans, administrative trainees, stereoplotters and aptitude testers. Testing of applicants for posts in the C.S.I.R. is constantly increasing in volume, an average of 65 being tested per month. It is often thought that the use of personnel selection tests is confined to lower employment categories or to occupations in which some high-grade manual or sensory

sintuiglike vaardigheid nodig is. Keuring van W.N.N.R.-personeel het getoon dat toetse baie nuttig kan wees in gevalle van senior navorsings- en administratiewe personeel, veral as gevolg van die bykomstige lig wat op persoonlikheidsienskappe gewerp word.

Die aanvraag na indelings-toetse vir naturellearbeid het geleidelik toegeneem. Die toetse wat oorspronklik vir die mynwese ontwikkel is en wat vroeër reeds toegepas is in chemiese-, ingenieurs-, pottelbakkers-, bouers- en vervoerondernemings, is nou ook nuttig gevind in tabak-, tekstiel- en houtbehandelingsfabrieke. Toetsers is vir sommige van hierdie firmas opgelei. Opvolggegewens wat van Ghana en Kenia verkry is, dui daarop dat die toetse daar selfs meer onderskeidend is as in die Unie. Baie navrae is ontvang uit die Federasie en Oeganda en ook van so ver as Brits Guyana en Nederlands Nieu-Guinea. Gewoonlik word navrae van ander lande gehanteer deur middel van tussenpersone of deur 'n verteenwoordiger van die organisasie op te lei, soos gedoen is vir die Kenia-regering en vir 'n fabriek in Salisbury. 'n Uitsondering is gemaak in die geval van 'n kopermyn in Oeganda waar 'n beampete van die Instituut die toetsprogram opgestel het en van die geleentheid gebruik gemaak het om baie van die ander navrae van hierdie gebied op te volg. Werk i.v.m. toetse vir hoër peile van naturelledienste waarby sulke persoonlikheidsienskappe soos betroubaarheid, eerlikheid en bekwaamheid as opsigter 'n oorheersende rol speel, is nog aan die gang.

skill is involved. Selection of C.S.I.R. staff has shown that tests can be very helpful in the case of senior research and administrative personnel, particularly in the additional light which they throw on personality factors.

The demand for classification tests for Native labour has steadily increased. The tests originally developed for the mining industry and previously tried out in chemical, engineering, ceramics, building and transportation concerns have now also been found useful in tobacco, textiles and wood-processing factories. Test administration officers have been trained for some of these firms. Follow-up data obtained from Ghana and Kenya indicate that the tests have proved even more discriminative in these countries than in the Union. Many enquiries were received from the Federation and Uganda, and also from as far afield as British Guiana and Dutch New Guinea. As a rule, enquiries from abroad are handled through intermediaries or by training a representative of the organization concerned, as was done for the Kenya Government and for a factory in Salisbury. An exception was made in the case of a copper mine in Uganda, where an officer of the Institute established the testing programme and utilized the opportunity to follow up the many other enquiries received from this territory. Work is still in progress on tests for higher levels of Native employment, in which such personality attributes as dependability, integrity and supervisory ability play a predominant part.



Skriftelike toetse vir die seleksie van Bantoeklerke.

Paper and pencil tests for the selection of Bantu clerical workers.

BEROEPSVOORLICHTING

Die personeelkeuringsdepartement bied ook 'n beroepsvoorligtingsdiens aan. Dit is beperk tot diegene wat op die punt staan om die skool te verlaat of om na 'n Universiteit te gaan en wat onseker is omtrent hul keuse van beroep of studiekursus, en tot jongmense wat 'n onsuksesvolle begin gemaak het in 'n beroep of op die Universiteit. Gemiddeld is tien gevalle per maand behandel. Hierdie getal kon baie groter gewees het, indien die personeel van die departement van meer belangrike werk onthef sou kon gewees het.

'n Belangrike psigometriese opdrag wat die Instituut ontvang het, is die opstelling van 'n reeks beroepsvoorligtingstoetse vir gebruik deur die Werkverskaffings- en Beroepsvoorligtingsafdeling van die Departement van Arbeid. Hierdie toetse moet geskik wees vir enige persoon wat die skool verlaat en as werksoeker die wettige verantwoordelikheid word van die Departement se werkverskaffingsbeamptes wat onder die Jeugrade werk. Die werk is in November 1956 begin. Na verwagting sal die opstelling van hierdie toetse, wat algemene intelligensie, woord- en syferbeheer, waarnemingsbekwaamheid, geleerdheid en beroepsbelangstelling sal dek, drie jaar in beslag neem.

Die Departement van Arbeid wil ook graag 'n toets hê wat hulle sal kan help met die plasing van volwassenes in beroepe. Die beroepsvoorligting van volwassenes, waarvan heelwat 'n geskiedenis van beroepsmislukkings agter die rug het, kan die beste uitgevoer word met gebruik van die Wechsler-Bellevue Intelligensietoets vir Volwassenes wat persoonlikheidseienskappe sowel as bekwaamheid meet en wat ook die effek van ouderdom op toetsprestasie in aanmerking neem. Die taak om hierdie welbekende internasionale maatstaf te standaardiseer vir gebruik in Suid-Afrika wat 'n aantal jare gelede deur die Instituut op hom geneem is, vorder stadig vanweë die moeilikheid om 'n proefgroep vrywilligers te kry wat verteenwoordigend is van al die ouderdomsgroepe tussen 18 en 60, en van alle beroepsgroepe van professioneel tot ongeskoold, vir albei geslagte en vir albei taalgroepe. Die helfte van die oorspronklike mikpunt van 5,800 persone is klaar getoets. Daar die aanvraag vir 'n toets van hierdie aard die grootste is vir die leeftydsgroep van 20 tot 39 jaar, is besluit om te konsentreer op voorlopige toetsstandaarde vir hierdie ouderdomsgroepe, gebaseer op kleiner proefgroepe. Nog 230 persone moet getoets word voordat hierdie beperkte mikpunt bereik word. Indien die gebruik van die kleiner proefgroepe statisties toelaatbaar blyk te wees, sal die toets in die loop van 1958 vir gebruik gereed wees. 'n Verkorte weergawe word voorberei om aan die vereistes van die Departement van Arbeid te voldoen.

MERIEETBEOORDELING EN TAAKWAARDERING IN DIE STAATSDIENS

Advies insake die vereenvoudiging van die meriete-

VOCATIONAL GUIDANCE

The personnel selection department also offers a vocational guidance service. It is restricted to those about to leave school or to enter a University and who are uncertain about their choice of occupation or study course, and to young persons who have made an unsuccessful start in their chosen careers or at University. An average of ten cases a month was seen, which could have been greatly increased if the staff of the department could have been spared from more important duties.

An important psychometric assignment received by the Institute was the construction of a series of vocational guidance tests for use by the Employment and Vocational Services Section of the Department of Labour. These tests must be applicable to any school-leaver who, as a work-seeker, becomes the legal responsibility of the Department's employment officers functioning at the Juvenile Affairs Boards. Work was started in November, 1956. It is expected that the construction of these tests, which will cover general intelligence, verbal, numerical and perceptual skills, educational achievement and vocational interests, will take three years.

The Department of Labour also needs a test to assist in the occupational placement of adults. The vocational guidance of adults, many of whom have a history of occupational failure, can best be met by the use of the Wechsler Adult Intelligence Test, which appraises personality attributes as well as abilities, and which also makes allowance for the effects of age on test performance. The task of standardizing this well-known international instrument for use in South Africa, which was undertaken by the Institute some years ago, is progressing slowly, because of the difficulty of obtaining a sample of volunteer subjects representative of all age levels between 18 and 60, and of all levels of employment from professional to unskilled, for both sexes and for both language groups. Half the original target of 5,800 cases has now been tested. As the demand for a test of this kind is greatest in the 20 to 39 age range, it was decided to concentrate on preliminary test standards for these age groups, based on smaller samples. Another 230 cases have to be tested before this limited target is reached. If the use of the smaller samples turns out to be statistically justifiable, the test will be ready for use during 1958. A shortened version is being prepared to meet the requirements of the Department of Labour.

MERIT RATING AND JOB EVALUATION IN THE PUBLIC SERVICE

Advice was given to the Public Service Commission on the simplification of merit rating procedures which

beoordelingsprosedure, wat onder andere in Staatsdepartemente gebruik word om oor bevordering te beslis, is aan die Staatsdienskommissie gegee. Daar is aan die hand gedoen dat vyf eienskappe, wat op 'n sewepuntskaal beoordeel word, dieselfde uitslae sou gee as die meer ingewikkelde skaal wat tans in gebruik is. Advies is ook gegee oor hoe die betroubaarheid van die skaal verbeter sou kan word. Omskrywings is gegee van die eienskappe op die voorgestelde skaal en van gedrag wat op groot afwyking van die normale standarde dui. 'n Ontleding van die beoordelingsyfers wat deur die Kommissie gegee is aan 24 eienskappe wat gebruik is om take te waardeer dui aan dat drie omvattende faktore geneig is om hierdie beoordelings te oorheers. Hulle is: „duur van diens en ondervinding”, „beplanning teenoor praktiese (uitvoerende) aksie”, „onderwyskwalifikasies”. 'n Tweede ontleding word gedoen ter bevestiging van hierdie standpunt.

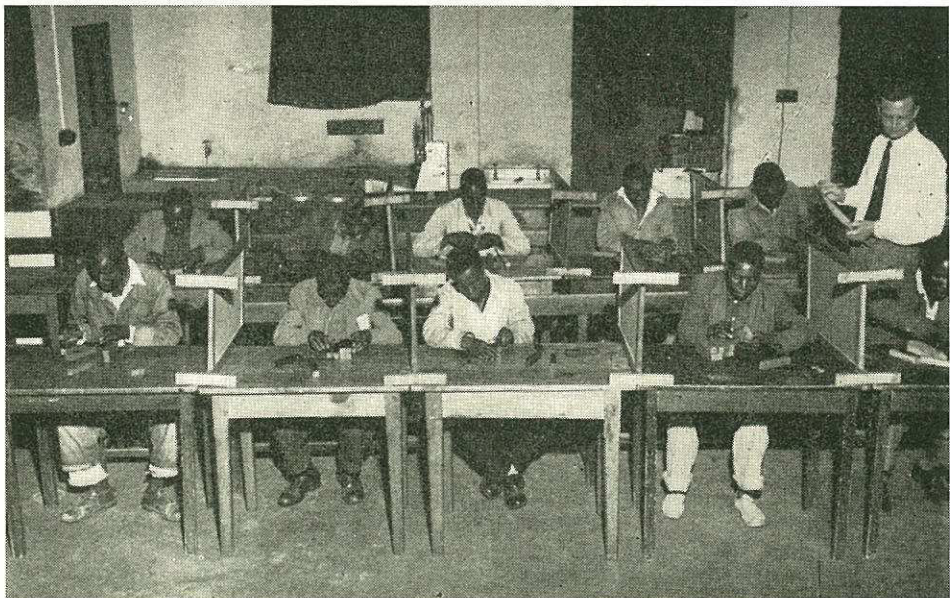
DIE BEKWAAMHEID VAN 'N MUNISIPALE NATURELLE ARBEIDSMAG

Die eerste stap deur 'n plaaslike bestuur om groot-skaalse gebruik van personeelnavorsing te maak, het van die Stad Johannesburg gekom wat die Instituut versoek het om 'n ondersoek in te stel na die doeltreffendheid van sy naturellearbeidsmag van sowat 18,000 man. Aspekte van die gebruik van naturellearbeid wat nagegaan word, omvat: die wyse waarop arbeiders gewerf en take aan hulle toegewys word; die hoeveelheid tyd en onder-

partly determine promotions in Public Service Departments. It was suggested that five qualities, rated on a seven-point scale, would give the same results as the more elaborate scale at present in use. Advice was also given on how the reliability of the scale could be improved. Definitions were provided for the qualities on the proposed scale and for behaviour indicative of extreme deviation from normal standards. An analysis of the weights assigned by the Commission to 24 attributes used for evaluating jobs shows that three broad factors tend to dominate these weightings. They are: “length of service and experience”, “planning versus practical (executive) action”, “educational qualifications”. Confirmation for this view is being sought in a second analysis.

THE EFFICIENCY OF A MUNICIPAL NATIVE LABOUR FORCE

The first move from a local authority to make large-scale use of personnel research has come from the City of Johannesburg, which has requested the Institute to undertake an enquiry into the efficiency of its Native labour force numbering about 18,000 men. Aspects of Native labour utilization that are being reviewed are the methods whereby labourers are recruited and assigned to their jobs; the amount of time and experience lost



'n Aanlegtoets vir Bantowerkers ten behoewe van 'n groot munisipaliteit.

Aptitude testing of Bantu workers for a large municipality.

vinding wat verlore gaan weens verhuising, arbeidsomset en afwesigheid; die uitwerking van finansiële aansporingslone op motivering, betaling in natura, en van 'n standvastige betalingstelsel soos vasgestel deur taakwaardering; die toepaslikheid van opleiding op die taak vir verskillende arbeidskategorieë; die doeltreffendheid van toesig; die vereenvoudiging van werkroetine en die uitwerking van lewens toestande en menslike verhoudings op werksmoraal binne die diens van die Raad. Op hierdie stadium bestaan die ondersoek uit die vasstelling van feite met die doel om belangrike natuurlike personeelprobleme te onthul en om aan te dui hoe arbeid meer ekonomies gebruik kan word.

BEHUISINGSBEHOEFTE VAN BLANKE MYNWERKERS

Die uitbreiding van die goudvelde na die Vrystaat en Oos-Transvaal het dorpsaanleërs geleentheid gegee om heeltemal nuwe woonbuurtes te ontwikkel, wat so ontwerp kon word dat hulle beantwoord aan die behoeftes van die persone vir wie dit bestem is. Om vas te stel wat hierdie behoeftes is, vir sover dit individuele behuising betref, is die Instituut gevra om ondersoek in te stel na die lewensgewoontes en behuisingsvoorkeur van daaglikse-betaalde blanke mynwerkers en hul vrouens. Die opname is gedoen op 'n verteenwoordigende groep van die werknemers van ses myne. Hul mening is gevra omtrent verskeie punte, soos die aantal kamers wat nodig is in 'n huis en die gebruik van elkeen van hierdie kamers, grootte van standplaas, rigting van uitsig van die huis, tipe kombuisstoom en die noodsaaklikheid van ingeboude vaste uitrusting. Hoewel baie gevalle van persoonlike voorkeur teengekom is, was dit nogtans moontlik om aan te toon watter basiese kenmerke die meeste families tevrede sal stel.

MOTORFIETSONGELUKKE

Verdere vooruitgang is gemaak in die studie van motorfietsongelukke. Wanneer ongeluksyfers vir elke tipe voertuig aangegee word, nie per duisend voertuie nie, maar per duisend myle, wat blootstelling aan die risiko van 'n ongeluk in ag neem, staan die motorfiets uit as die mees ongeluksvatbare voertuig. Van 'n vraelysondersoek waarby 400 motorfietsenaars betrokke was en die vergelyking van diegene wat in motorfietsongelukke betrokke was met diegene wat dit nie was nie, het die volgende faktore betekenisvolle voorspellers van motorfietsongelukke geblyk te wees: (1) 'n blootstellingsrisiko van 10,000 myl of meer per jaar tesame met daaglikse gebruik van 'n motorfiets werk toe en terug, en dikwels ry na donker; (2) 'n aggressiewe houding teenoor ander padgebruikers soos aangedui deur die neiging om die ander bestuurders te blameer en om eie gebrek aan sorgsaamheid gering te ag; (3) 'n onbevredigende houding teenoor

due to migration, labour turnover and absenteeism; the effects on motivation of wage incentives, remuneration in kind, and of a consistent wage system as established by means of job evaluation; the applicability of training on the job for various categories of labour; the adequacy of supervision; the simplification of work routines and the effect on working morale of living conditions and human relations within the Council's service. At this stage, the study is of a fact-finding nature, designed to disclose significant Native personnel problems and to indicate how labour could be more economically used.

HOUSING REQUIREMENTS OF EUROPEAN MINEWORKERS

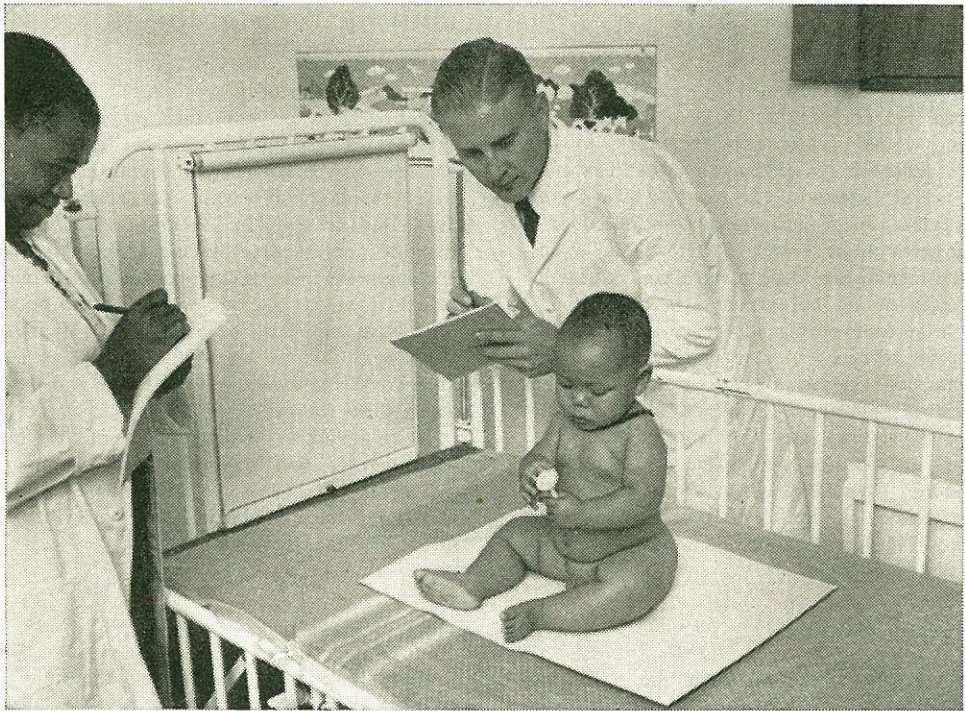
The extension of gold mining to the Free State and Eastern Transvaal gave town planners scope for the development of entirely new residential areas, which could be designed to meet the specific needs of the people who were to inhabit them. To determine these needs, in so far as individual housing was concerned, the Institute was asked to investigate the living habits and housing preferences of daily-paid European mineworkers and their wives. The survey was carried out on a representative sample of the employees of six mines, whose views were obtained on a variety of topics, such as the number of rooms required per house and the functions which these rooms had to serve, size of plot, direction in which the house should face, type of kitchen stove and the necessity for built-in fixtures. Although many individual preferences were encountered, it was nevertheless possible to indicate what basic features would satisfy the majority of families.

MOTOR CYCLE ACCIDENTS

Further progress was made in the study of motor cycle accidents. When accident rates for each type of vehicle are expressed not per thousand vehicles, but per thousand miles, which takes exposure to the risk of an accident into account, the motor cycle emerges as the most accident-prone vehicle. From a questionnaire study, involving 400 motor cyclists, and from a comparison of those who had been involved in motor cycle accidents with those who had not, the following factors appear to be significant determinants of motor cycle accidents: (1) an exposure risk of 10,000 miles or more per annum, together with daily use of motor cycle to and from work, and driving frequently after dark; (2) an aggressive attitude towards other road users, as shown by a tendency to blame the other driver and to minimise one's own lack of consideration; (3) an unsatisfactory attitude towards traffic control and towards safety

verkeersbeheer en teenoor veiligheidsmaatreëls waarvan die verpligte dra van 'n valhelm, die betaling van 'n fooi vir padvaardigheidstoetse en die dra van 'n helm op pad werk toe, verwerp word. Van die groep wat ondervra is, was 53.7 persent ten gunste van vrywillige dra van valhelms, 30.6 persent ten gunste van vrywillige aanbring van beenskerms aan motorfiets. Respektiewelik 38.3 persent en 55.8 persent was ten gunste van wetlike verpligting i.v.m. hierdie twee veiligheidsmaatreëls. Of jeug as sulks 'n rol speel in motorfietsongelukke kan nog nie met sekerheid gesê word van die gegewens wat op die oomblik beskikbaar is nie. Verdere ontleding in verband hiermee word voortgesit.

measures, in which the compulsory wearing of a crash helmet, the paying of a fee for roadworthiness tests, and the wearing of a helmet when riding to work are rejected. Of the group questioned, 53.7 per cent. were in favour of voluntary wearing of crash helmets, 30.6 per cent. in favour of voluntary fitting of crash bars. Those in favour of legislative compulsion in respect of these two safety measures numbered 38.3 per cent. and 55.8 per cent. respectively. Whether youth, as such, is a factor in motor cycle accidents cannot yet be decisively answered from the data available at present. Further analyses bearing on this factor are proceeding.



'n Toets wat gebruik word vir die studie van die verstandelike ontwikkeling van jong kinders.

A test used in the study of the mental development of infants.

ONTWIKKELINGSTUDIES VAN NATURELLE-KINDERS

In 'n vorige rapport is melding gemaak van 'n studie om die invloed van 'n aantal ongewingsomstandighede op die liggaamlike en verstandelike ontwikkeling van naturellekinders na te gaan. Onder die invloede wat bestudeer moes word, was die dieet van die moeder gedurende swangerskap en die soogperiode, die voedingsomstandighede van die baba vanaf geboorte, lewens-

DEVELOPMENTAL STUDIES OF NATIVE INFANTS

Mention was made in a previous report of a study to determine the effects of a number of environmental circumstances on the physical and mental maturation of Native infants. Amongst the influences to be studied were the diet of the mother during pregnancy and the nursing period, the nutritional condition of the baby from birth onwards, living conditions, parental education

omstandighede, die opvoeding en houding van die ouers, kulturele gewoontes en gesondheidstoestand. Verhuisings onder die bevolking van die lokasie naby Pretoria waar hierdie studie begin is, was so hoog dat die beoogde opvolgstudie oor 'n periode van ses jaar onmoontlik was. Aan die einde van 8 maande was slegs 12 persent oor van die groep moeders wat medies, volgens voeding, sielkundig en sosiologies bestudeer is. Die onderneming is toe oorgeplaas na Orlando-dorpsgebied, Johannesburg, waar fasiliteite beskikbaar gestel is by die kliniek van die Munisipale Gesondheidsdepartement. Die bevolking van hierdie dorpsgebied is bestendig genoeg om 'n langtermyn-opvolging moontlik te maak.

'n Noodsaaklike stap in hierdie onderneming was die vasstelling van standaarde vir die psigofisiese ontwikkeling van naturelle kinders vanaf geboorte tot hul sesde jaar. Met behulp van 'n toekenning van die Carnegie-Korporasie is 'n Amerikaanse deskundige op die gebied van ontwikkelingsbeoordeling aangestel op die personeel van die Instituut vir 'n periode van ses maande. Werk is begin by die Alexandra-Gesondheidskliniek waar daar 'n genoegsame standvastige toestroming van naturelle babas was om 'n intensiewe studie moontlik te maak. 'n Ontwikkelingskediule is opgestel om beweging, waarneming, verstandelike en sosiale reaksies te dek. Toetsers is opgelei en standaarde vir die ouderdomme 1 tot 6 maande is nou beskikbaar. Gegewens vir die groep van 7 tot 12 maande word versamel. Om 'n moontlike verskil tussen stedelike en plattelandse bevolkings na te gaan is 'n groep babas van 1 tot 6 maande by die Jane Furse Hospitaal, Sekoekoenieland, getoets. In vergelyking met blanke standaarde is naturelle babas baie meer gevorderd in motoriese ontwikkeling gedurende die eerste 6 maande van hul lewe. Hulle staan op hul bene, hou hul koppe op, maak hul rugge reguit en vat voorwerpe baie gouer. Daarteenoor is hul waarnemingsreaksies (staar na voorwerpe en die volg met hul oë) vertraag. Op hierdie tyd-stip is dit nog nie moontlik om te sê of hierdie verskille oorerflik of van 'n omgewingsoorsprong is nie.

ELEKTRO-ENSEFALOGRAFIE

Die elektriese uitstralings van die brein word bestudeer in 'n spesiale departement van die Instituut wat vir hierdie doel opgerig en toegerus is, om lig te werp op die fisiologiese bepalingsfaktore van sekere funksies van die brein. Hoewel die grootste deel van hierdie werk van 'n streng teoretiese aard is, is daar ook praktiese toepassings. In die loop van 'n ondersoek na die bekwaamheid van werkers in 'n ingenieursfirma, is elektro-ensefalogramme (EEG) met behulp van die Carnegie mobiele-laboratorium geneem van 100 naturelle- en 25 blanke fabriekswerkers. Die doel van die studie was om lig te werp op temperamentele faktore wat invloed uitoefen op die bekwaamheid waarmee sekere herhalende take verrig

and attitudes, cultural practices and state of health. Population mobility in the Native township near Pretoria where this study was started was so high that the planned follow-up of cases over a period of six years proved impossible. At the end of 8 months, only about 12 per cent. of a group of mothers who had been studied medically, nutritionally, psychologically and sociologically were left. The project was thereupon transferred to Orlando Township, Johannesburg, where facilities were made available at the Clinic of the Municipality's Public Health Department. The population in this township is sufficiently stable to make a long-term follow-up feasible.

An essential step in this project was to establish standards for the psychophysical development of Native infants from birth to the sixth year. With the aid of a grant from the Carnegie Corporation, an American expert in developmental testing was appointed on the staff of the Institute for a period of six months. Work was started at the Alexandra Health Clinic where there was a sufficiently stable supply of Native babies to make intensive work possible. A developmental schedule was prepared, covering movement, perceptual, intellectual and social responses. Testers were trained and standards are now available for the period from 1 to 6 months. Items for the 7 to 12 months period are being collected. To check on a possible difference between rural and urban populations, a group of 1 to 6 month old babies was tested at the Jane Furse Hospital, Sekukuniland. By European standards, Native babies are very far advanced in motor development during the first 6 months of life. They support their weight, hold up their head, straighten their back and grasp objects far sooner. On the other hand, their visual reactions (fixating objects, following them with their eyes) are retarded. It is not possible to say at this stage whether these differences are of genetic or of environmental origin.

ELECTROENCEPHALOGRAPHY

The electrical potentials generated by the brain are studied in a special department of the Institute set up and equipped for this purpose, in order to throw light on the physiological determinants of certain mental functions.

Although most of this work is of a strictly theoretical kind, there are also practical applications. In the course of a study on the efficiency of operatives in an engineering concern, electroencephalograms (E.E.G.) were taken from 100 Native and 25 European industrial workers, use being made of the Carnegie mobile laboratory to obtain these records. The purpose of the study was to throw light on temperamental factors which influence

word. Veranderinge in die EEG gelyktydig met die uitbreek van gebreksiektes by natuurleke babas word ook bestudeer om vas te stel of ondervoeding permanente gevolge kan haa op enige van die funksies van die sentrale senuweestelsel. Vertolking van die gegewens van hierdie en ander studies verg kennis omtrent die ontwikkeling van elektriese breingolwe in Bantoerasse. Om veranderinge in EEG's vanaf geboorte tot volwassenheid vas te stel, word EEG's van normale natuurleke, tussen die ouderdomme van 1 maand en 21 jaar, verkry.

In die studie van die rol van breinritme in waarnemings- en bewegingsreaksies, wat temperamentele verskille aandui, is 'n interessante ontdekking gedoen. In 'n klein groep goedopgevoede blankes is gevind dat verskille in die EEG's verbonde is aan verskille in prestasie op die Wechsler-Bellevue Intelligensietoets vir Volwassenes. Dit dui die moontlikheid aan dat prestasie op hierdie toets behalwe intellek 'n temperamentsfaktor insluit. Hierdie veronderstelling word nou verder in besonderhede bestudeer.

STUDIES OMTRENT DIE AARD EN MEET VAN PERSOONLIKHEID

Die studie van die „wylskrag“-aspek van persoonlikheid deur middel van die Pauli-toets (werkskurwe afgelei van aanhoudende optelsomme) het weer waardevolle resultate gelever. Uitgesoekte groepe kandidate wat geklassifiseer is as „suksesvol“, (byvoorbeeld gegradeerdes, sportmense en -vroue met erkende prestasies) en „onsuksesvol“ (byvoorbeeld alkoholiste in inrigtings, studente wat nie geslaag het nie) is duidelik onderskei deur sekere Pauli-toetsresultate. Dranksugtiges, histeriese persone en studente wat in hul eerstejaarsskemens gedruip het, het betekenisvolle laer prestasies behaal in die veranderlike wat „werktempo“ meet; alkoholiste en histeriek het ook laer prestasie behaal in faktore wat „aanpassing“ en „bestendigheids“ meet.

Dit is 'n raaiselagtige feit dat die verhouding tussen intelligensiekwasiënt (I.K.) en eksamenuitslae van eerstejaarstudente aan Universiteite gewoonlik laag is. Die rede skyn te wees dat persone wat by 'n Universiteit inskryf, reeds 'n hoogsuitgesoekte groep is, daar die Matriek-eksamen verseker dat suksesvolle kandidate die nodige vermoë en kennis besit om 'n gemiddelde Universiteitskursus te volg. Sukses in eksamens word derhalwe eerder afhanklik van persoonlikheidsienskappe as van vermoë. 'n Verband is tussen party van hierdie veronderstelde faktore en Pauli-toetsprestasie gevind. In 'n groep van sowat 50 studente is geen korrelasie gevind tussen I.K.'s en eerstejaarsskemensuitslae nie. Diegene met 'n lae I.K. en hoë punte het 'n hoër gemiddelde prestasie gehad as ander groepe in die energie-, uithouvermoë-, spoed-, akkuraatheid- en bestendigheidsfaktore soos deur die Pauli-toets gemeet, en die laagste gemiddelde prestasie

the efficiency with which certain repetitive tasks are performed. Changes in the E.E.G. concurrent with deficiency diseases in Native babies are also being studied, to determine whether malnutrition can leave permanent effects on any of the functions of the central nervous system. Interpretation of data from these and other studies requires knowledge concerning the development of electrical brain rhythms in Native races. In order to plot E.E.G. growth changes from birth to maturity, records are being obtained from normal Natives from the first month of life to 21 years.

In the studies of the role of brain rhythms in perceptual and movement responses, indicative of temperamental differences, an interesting discovery has been made. In a small group of well-educated Europeans, differences in the E.E.G. were found to be associated with differences in performance on the Wechsler Adult Intelligence Test. This indicates the possibility that scores on the test may involve a temperamental factor in addition to intelligence, a hypothesis which is now being subjected to detailed study.

STUDIES ON THE NATURE AND MEASUREMENT OF PERSONALITY

The study of the „will power“ aspects of personality by means of the Pauli Test (curve of work, derived from continuous addition) again rendered some valuable results. Selected groups of subjects classified as „successful“ (for example graduates, sports people with recognized achievements) and „unsuccessful“ (for example institutionalized alcoholics, students failing their examinations) were clearly differentiated by certain Pauli test scores. Alcoholics, hysterics and students who had failed first year examinations were found to have significantly lower scores in variables measuring „speed of work“; alcoholics and hysterics also had lower scores in measures of the factors „adaptability“ and „steadiness“.

It is a puzzling fact that the relationship between intelligence quotient (I.Q.) and first year examination results at University is generally low. The reason would appear to be that those entering a University are already a highly selected group, the Matriculation examination having assured that successful candidates possess sufficient ability and knowledge to follow the average University course. Success in examinations therefore becomes dependent on personality factors rather than on ability. Some of these postulated factors were found to be involved in Pauli test scores. In a group of about 50 students, a zero correlation was found between I.Q.'s and first year examination marks. Those with low I.Q.'s and high marks had a higher mean score than other groups on the energy, endurance, speed, accuracy and steadiness factors measured by the Pauli test, and the lowest mean scores for the temperament factor which

vir die temperamentsfaktor wat impulsiwiteit, veranderlikheid en 'n onbesorgde gees aan die ander kant aandui. Diegene met hoë I.K.'s en lae punte het baie hoë punte behaal in laasgenoemde faktor. Hulle het die laagste punte behaal in energie en uithouvermoë en het ook die sterkste neiging getoon om nie begaan te wees oor verbeterings nie. Die Pauli-toets hou dus die belofte van 'n voorspelmaatreeël van sukses in Universiteitseksamens in.

In nog 'n studie in verband met emosie is vraelyste, beoordelings deur waarnemers, 'n inkkladprojeksietoets en fisiologiese instrumente gebruik om te toon dat sulke aspekte van emosie soos intensiteit, sensitiwiteit, kwaliteit en graad van beheersing as aparte faktore onderskei kan word. Party belangrike verwantskappe tussen hierdie faktore en ander temperamentseienskappe, en sosiale aanpassing, huislike aanpassing en gesondheid is ook aan die lig gebring.

PUBLIKASIES EN RAPPORTE

Gedurende die agt maande wat deur hierdie rapport gedek word, het die personeel van die Nasionale Instituut vir Personeelnavorsing 15 artikels in wetenskaplike tydskrifte gepubliseer, 23 rapporte en memoranda vir ondersteuners, kongresse en vir sekere interne behoeftes opgestel, en 51 lesings gegee vir verenigings van geleerdes of vir onderrigdoeleindes.

induces impulsiveness, variability and a carefree spirit on the other hand. Those with high I.Q. and low marks scored very highly on the latter factor. They were lowest on energy and endurance and also displayed the strongest tendency not to bother about corrections. The Pauli test therefore has some promise as a predictor of success in University examinations.

Another study in the sphere of emotionality, using questionnaires, ratings by observers, an ink-blot projection test and physiological measures showed that such aspects of emotion as intensity, sensitivity, quality and degree of control can be distinguished as separate factors. Some important relationships between these factors and other temperamental qualities, and to social adjustment, home adjustment and health were also brought to light.

PUBLICATIONS AND REPORTS

During the eight months covered by the report, the staff of the National Institute for Personnel Research published 15 papers in scientific journals, prepared 23 reports and memoranda for sponsors, congresses and for certain internal requirements, and delivered 51 lectures to learned societies or for instructional purposes.

Nasionale Voeding- navorsingsinstituut

Direkteur: DR. F. W. QUASS

Die integrasie van alle aspekte van voedsel en voeding bly die hoofmerk van die Instituut. Die Afdeling Mikrobiologie wat verlede jaar tot stand gekom het, het alreeds belangrike bydraes gelewer as deel van die werksaamhede van die Instituut, terwyl die Afdeling Proteïenchemie nou volledig ingerig is om 'n uitgebreide werksprogram te onderneem. Ook word die Departement van Voeding steeds bygestaan met tegniese advies en ondersoekwerk om die land se voeding te help bevorder. Vir die Nasionale Voedingsraad word ook vraagstukke ondersoek, en vir die nywerheid word kleinere projekte kragtens kontrak uitgevoer. Navorsingswerk om die voedingswaarde van koring- en mielieprodukte te verhoog, word in twee rigtings uitgevoer: die prosessering van grane, en die verryking van die voedingstowwe deur geskikte byvoegings.

Die Instituut is ten nouste betrokke by die ondersoek na die invloed van voeding op die voorkoms en voorkoming van hartkwalie en is 'n aktiewe deelnemer in die navorsingsprojek op dieet en metabolisme wat op vrywilligers onder langtermyn-gevangenes uitgevoer word. Die Instituut sal ook poog om hierdie ondersoek na skoolgaande kinders uit te brei waardeur belangrike nuwe gesigspunte openbaar mag word.

Die eerste Tegniese Bulletin oor die droging van afgeroomde melk is gepubliseer, terwyl 'n bulletin oor magou opgestel is. Deur middel van hierdie bulletins word die navorsingsresultate van die Instituut aan die nywerheid beskikbaar gestel.

DIE GEBREKSIEKTE : KWASHIORKOR

Die kliniese, biochemiese en hematologiese studies in verband met die voeding van kwashiorkorpatiënte is voortgesit. Stikstofretensie- en absorpsiestudies is gereeld uitgevoer en die resultate word gebruik om die doeltreffendheid van verskillende voedings te probeer bepaal. Die ondersoek na die uitwerking van byvoeging van proteïenaanvullings en carobboontjemeel op diarree en die snelheid van herstel daarvan is voortgesit. Ontledings en beskikbare resultate dui daarop dat die gebruik in baie hospitale en klinieke om duur proteïenaanvullings by afgeroomde melk te voeg waarskynlik nie nodig is nie.

Proewe is aan die gang om die terapeutiese vermoë van rollergedroogde afgeroomde melkpoeier te vergelyk met die van die sproeigedroogde produk. Aangesien die vervaardiging van eersgenoemde goedkoper is as dié van sproeigedroogde melkpoeier is dit om ekonomiese redes

National Nutrition Research Institute

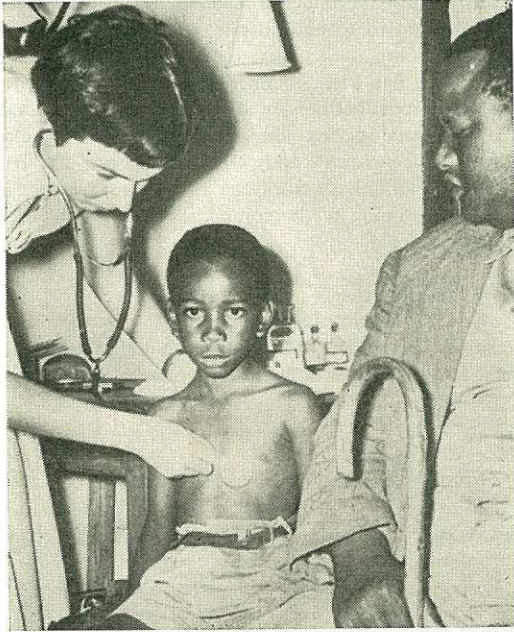
Director: DR. F. W. QUASS

The integration of all the aspects of food and nutrition remains the chief concern of the Institute. The Division of Microbiology which came into being last year has already made important contributions to the activities of the Institute while the Protein Chemistry Division is now fully equipped to undertake an extensive programme of work. The Department of Nutrition is constantly assisted with technical advice and research to assist in improving the country's nutrition. Problems are also examined for the National Nutrition Council and minor projects are executed on contract for industry. Research work to enhance the nutritive value of wheat and maize products is being pursued in two directions: the processing of different types of cereals and the enriching of foods by suitable additives.

The Institute is closely associated with investigations in respect of the influence of diet on the incidence and prevention of heart disease and it plays an active part in the research project on diet and metabolism which is being carried out on volunteers among long-term prisoners. The Institute is also attempting to extend this



Dr. F. W. Quass.



Die Kaptein van die stam kyk toe hoe 'n jong vrywilliger medies ondersoek word tydens die Instituut se veldstudie oor die voedingsstatus van die verskillende bevolkingsgroepe.

The Headman of the tribe looks on while a young volunteer is medically examined during the Institute's field survey of the nutritional status of the various racial groups.

noodsaaklik om vas te stel of dit net so doeltreffend is. In die soektog na goedkoper proteïenvoedsels om wanvoeding te genees en te voorkom, word ook 'n verwerkte visproteïenmeel uitgetoets. Die terapeutiese vermoë van aminosuurmengsels word steeds in samewerking met prof. J. F. Brock en dr. J. D. L. Hansen van die Universiteit van Kaapstad uitgetoets.

VOEDING EN DEGENERATIEWE HART- EN BLOEDVATSIEKTES

Daar bestaan vandag nie meer twyfel nie dat sterftes aan kroonslagaarverstoping in die meeste lande van die wêreld, insluitende Suid-Afrika, onrusbarend toeneem. Die styging in die Unie is vinniger onder die Blankes as onder die Nie-blankes: Suid-Afrika se veelrassige land leen homself dus baie goed vir hierdie studie. Baie navorsingswerk oor hierdie vraagstuk word dus deur hierdie Instituut uitgevoer.

Gevangenisnavorsingsprojek oor Dieet en Metabolisme

Met die finansiële steun van die Departement van Voeding, is 'n Loodskomitee van die W.N.N.R. saamgestel om die verskille in die uitwerking van dieet op die bloedcholesterol van Blankes en Bantoes te ondersoek,

research to include children of school-going age, by which it is hoped new and important aspects may be revealed.

The first Technical Bulletin on the drying of skimmed milk has been published, while a bulletin on mahewu (magou) has been prepared, thus providing a means of making the results of research undertaken by the Institute available to industry.

THE DEFICIENCY DISEASE : KWASHIORKOR

Clinical, biochemical and haematological studies in connection with the nutrition of kwashiorkor patients were continued. Nitrogen retention and absorption studies were carried out regularly and the results used to assess the therapeutic effect of different formulae. The study to assess the effect of protein supplements and carob flour on diarrhoea and the progression of the disease, continues. Analyses and other available data suggest that the practice, followed by many hospitals and clinics, of adding expensive protein supplements to skimmed milk may be unnecessary.

Investigations to compare the therapeutic effect of a roller-dried skimmed milk with a spray-dried product are under way. As roller-drying is a cheaper process than spray-drying it is economically important to determine whether roller-dried milk is as effective as spray-dried skimmed milk. In order to assess the value of cheaper protein foodstuffs in the cure and prevention of malnutrition, a processed fish flour is at present being tried out. In collaboration with Prof. J. F. Brock and Dr. J. D. L. Hansen of the University of Cape Town, the therapeutic effect of certain amino-acid mixtures is still being investigated.

NUTRITION AND DEGENERATIVE CARDIOVASCULAR DISEASES

There can be no doubt that the number of deaths due to coronary artery thrombosis in most countries of the world, including South Africa, show an alarming increase. The rate of increase in the Union is greater among Europeans than among non-Europeans; multi-racial South Africa is thus eminently suitable for the study of this disease, consequently much research work on this question is being done at this Institute.

Prison Research Project on Diet and Metabolism

A Steering Committee of the C.S.I.R. was established with the financial aid of the Department of Nutrition in order to investigate the difference in the influence of European and Bantu diets on their blood-cholesterol

asook om die uitwerking in hierdie verband van kommersieel gehidrogeneerde vette teenoor natuurlike olies en 'n hoë teenoor 'n lae veselinhoud van dieet oor lang tydperke te bepaal. Vir hierdie doel is toestemming verkry van die Departement van Gevangeniswese om dieetstudies uit te voer op vrywilligers onder langtermyngevangenes. Hematologiese, endokriene en ander biochemiese en kliniese aspekte word bestudeer. Voorlopige werk is reeds afgehandel en die beplanning van die omvattende proef is voltooi.

Aorta-onderzoek

Tot hiertoe is die chemiese analise en die histopatologiese ondersoek van 60 aortas van manlike en vroulike Blankes en Nie-blankes van verskillende ouderdomme reeds gedoen.

Cholesterolhoogtes

Cholesterolbepalings op die bloed van die verskillende ouderdoms- en rassegroepe is voortgesit op soek na die oorsaak van aterosklerose en trombose. Hierdie werk word ook uitgebrei om kindergroepe in te sluit, en die toestemming van die Transvaalse Onderwysdepartement is verkry om die ouers van skoolkinders te nader vir monsters bloed van hul kinders. Cholesterolbepalings op volwassenes is al gedoen op oor die 1,300 Blankes en 800 Bantoes: die gemiddelde waardes vir die Blankes word gestel op 227 mg./100 ml. serum (uiterste grense 159 en 289), terwyl dié van die hoofsaaklik verstedelike Bantoes op 180 mg./100 ml. serum (uiterste grense 122 en 267) bereken word.

MIKRO- EN MAKRO-ELEMENTE

Koper

Die kennis oor die kopermetabolisme van die Bantoe is nog gering, en dus is baie tyd gewy aan die standaardisering van 'n chemiese metode vir die bepaling van die serum koperkonsentrasie. Bepalings is op 45 normale volwasse Blanke mans en vrouens uitgevoer en die waardes wat verkry is in hierdie kontrolegroepe vergelyk baie goed met oorsese resultate. Verder is bepalinge gemaak van die koperkonsentrasie in die bloed van 36 swanger Bantoevroue, 8 normale volwasse Bantoevroue en 12 normale Bantoevroue onder die ouderdom van 5 jaar. Die resultate dui aan dat die gemiddelde koperkonsentrasie in die serum in hierdie groepe Bantoes $1\frac{1}{2}$ tot tweemaal hoër is as die gemiddelde konsentrasie in die Blankes. Verdere bepalinge word uitgevoer.

Yster

Eksperimentele werk oor die invloed van piridoksien (vitamien B₆) op die ystermetabolisme van die Bantoe is afgehandel. Die werk het aangetoon dat die toediening van piridoksien die absorpsie van yster vanuit die maagdermkanaal onderdruk. Die moontlik praktiese toepassing van hierdie bevinding in die behandeling van

levels, and also the influence of commercially hydrogenated fats as opposed to natural oils, and a high as opposed to a low fibre (bulk) diet, over long periods of time. Permission has been obtained from the Department of Prisons to conduct dietary studies on volunteers among the prisoners serving long-term sentences. Haematological, biochemical and clinical aspects are being studied. Preliminary work has already been carried out and the planning of the comprehensive experiment has been completed.

Aorta Investigation

To date, chemical analysis and the histopathological examination of 60 aortas of European and non-European men and women of different ages have been completed.

Cholesterol Levels

Cholesterol determinations on the blood of the different age and racial groups were continued in the search for the cause of atherosclerosis and coronary thrombosis. The work is being extended to include the lower age-groups, and permission has been obtained from the Transvaal Department of Education to approach the parents of school children for leave to take samples of their children's blood. Cholesterol determinations were done on over 1,300 European and 800 Bantu adults. In Europeans the average level was found to be 227 mg./100 ml. serum (extreme range 159 to 289), whereas in the urbanized Bantu the level was 180/mg./100 ml. serum (extreme range 122 to 267).

MIKRO- AND MACRO-ELEMENTS

Copper

Knowledge of the copper metabolism of the Bantu is still limited. Much time was therefore spent on the standardization of a chemical method for determining the serum copper concentration. Determinations were done on 45 normal adult European males and females. The values obtained in this control group compare favourably with overseas results. The copper concentration was then determined on the blood of 36 pregnant Bantu females, 8 normal adult Bantu males, and 12 normal Bantu children under the age of 5 years. The results indicated that the average serum copper concentration in this group of Bantu is $1\frac{1}{2}$ times to twice as high as the average concentration in Europeans. Further determinations are being carried out.

Iron

Experimental work on the influence of pyridoxine (vitamin B₆) on the iron metabolism of the Bantu was concluded. The work showed that administration of pyridoxine suppresses the absorption of iron from the digestive tract. The possible practical application of this finding in the treatment of clinical conditions characterised

kliniese toestande wat gekenmerk word deur die neerlegging van groot hoeveelhede yster in die weefsels (bv. hemokromatose) moet nog ondersoek word.

VELDSTUDIES

Die Instituut se laboratoriums het nou die stadium van ontwikkeling bereik dat meer aandag bestee kan word aan veldwerk. Die vernaamste vraagstuk wat in hierdie verband aandag vereis, is om die voedingstatus van die verskillende bevolkingsgroepe te bepaal. Aansienlike vordering is reeds gemaak met die opstel van praktiese kriteriums in hierdie verband.

Veldvoedingsproewe

'n Geïsoleerde gebied word gesoek waar die aanvullingswaarde van voedsels, soos verwerkte visproteïenmeel, bone, melkpoeiers en ander produkte, in die veld uitgetoets kan word. Gebiede wat reeds besoek is in Wes-Transvaal en Sekoekoenieland blyk baie geskik te wees. Sodra die nodige voorlopige opnames oor voedingstatus gedoen is, sal 'n finale keuse gemaak word.

Tandkaries

Veldstudies oor die patogenese en voorkoming van tandkaries in die Unie word in medewerking met die Departement van Voeding en 'n Loodskomitee van die W.N.N.R. uitgevoer. 'n Gebied waar die tandtoestand baie sleg is, sal vergelyk word met een of meer gebiede waar die toestand gesond is. Volledige landboukundige, dieetkundige, mediese, tandheelkundige en voedingstatusstudies word beplan. Hierdie Instituut sal hom veral op laasgenoemde ondersoek toespits.

Pre- en Postnatale Studies op Kinders

Weens die wisselende bevolking van die Lady Selborne-lokasie ten weste van Pretoria waar hierdie studie begin is, kon die postnatale ontwikkeling van die kinders nie gevolg word nie. Derhalwe sal hierdie gedeelte van die studie voortaan op Vlakfontein ten ooste van Pretoria uitgevoer word. Die prenatale studies het egter voortgegaan, in samewerking met die Pretoriase Mediese Skool en die Departement van Voeding. Van die 124 swanger Bantoevroue wat volledig ondersoek is, het slegs 'n dosyn geringe fisiese tekens van ondervoeding getoon, en hierby kan nog 'n paar met biochemiese afwykings getel word. Begryperlikerwys kon geen duidelike verband tussen ondervoeding en prematuriteit of kongenitale abnormaliteite vasgestel word nie.

Met die hulp van die Buro vir Sensus en Statistiek is 'n vergelykende studie gemaak van die aantal Bantoes en Blankes wat gedurende die periode 1926 tot 1954 dood is as gevolg van kongenitale abnormaliteite. Voorlopige berekeninge dui aan dat daar geen noemenswaardige verskille is in die aantal sterfgevalle as gevolg van kongenitale abnormaliteite onder hierdie twee bevolkingsgroepe nie.

by the deposition of large amounts of iron in the tissues (e.g. hemochromatosis) requires further investigation.

FIELD STUDIES

The Institute's laboratories have now reached a stage in their development where more attention can be paid to field work. Of primary importance in this work is the determination of the nutritional status of the various racial groups. Significant progress has already been made in the establishment of practical criteria in this connection.

Field Nutrition Studies

A search for an isolated area is being conducted to assess the supplementary value of foodstuffs such as processed fish, flour, beans, milk powders and other products in the field. Areas visited in Western Transvaal and Sekukuniland appear eminently suitable. When a preliminary nutritional status survey has been concluded, a final choice will be made.

Dental Caries

Field studies on the pathogenesis and prevention of dental caries are being conducted in co-operation with the Department of Nutrition and a Steering Committee of the C.S.I.R. An area where dental caries is prevalent will be compared with one or several others where teeth are sound. Complete agricultural, dietary, medical, dental and nutritional status studies are planned. This Institute will concentrate particularly on the last named.

Pre- and Postnatal Studies on Children

Owing to the fluctuating nature of the population of the Lady Selborne Location, West of Pretoria, where this study was initiated, the postnatal development of the children could not be followed up, and therefore this part of the study will in future be conducted at Vlakfontein, East of Pretoria. The prenatal studies have, however, been continued with the collaboration of the Pretoria Medical School and the Department of Nutrition. Of the 124 pregnant Bantu females thoroughly examined, only a dozen showed slight physical signs of malnutrition. To these can be added a few with biochemical abnormalities. Obviously no clear connection could be established between malnutrition on the one hand, and prematurity or congenital abnormalities on the other.

With the aid of the Bureau of Census and Statistics a comparative study was made of the number of Bantu and Europeans who died during the period 1926-1954 as a result of congenital abnormalities. Preliminary calculations have already indicated that the two racial groups show no significant differences in the number of deaths due to congenital abnormalities.

METODIEK

Waardebepalings van Proteïene

Proteïentekorte by die laagbesoldigde bevolkingsgroepe het in die afgelope jare sterk onder die aandag van die Departement van Voeding gekom, en baie ondersoekte het voortgespruit uit die algemene belangstelling in die verskeidenheid van beskikbare goedkoop proteïenestowwe.

Besluite moes geneem word—dikwels binne 'n geringe tydsbestek—oor die mees geskikte proteïenestowwe vir broodverryking, die invloed van tegnologiese prosessering op sulke stowwe en die finale waarde van die toevoeging van sulke stowwe by die graanprodukt wat verryk moet word. 'n Noodsaaklike stap in werk van hierdie aard is die bepaling van die verteerbaarheid en assimileerbaarheid van die proteïene in die lewende organisme. Vir hierdie doel word gewoonlik proteïenbalansstudies op diere of mense uitgevoer, maar hulle is uiters tyd- en arbeidsrowend, en alle moontlike pogings is sedert die ontstaan van die Instituut aangewend om sneller en makliker metodes te ondersoek waardeur die werk vereenvoudig kan word. Intussen is 'n korter metode met rotte ontwikkel wat belowend blyk te wees en waardeur die werk verbonde aan proteïenwaardebepalings met ongeveer twee-derdes verminder sal kan word.

Cholesterolbepaling

Heelwat aandag is bestee aan die standaardisering van 'n roetine metode vir die bepaling van cholesterol. Drie metodes is met mekaar vergelyk, nl. die ferrichloriedmetode, soos oorspronklik opgestel deur Zak en medewerkers, dieselfde ferrichloriedmetode na verseping en digitonienpresipitering, en die Liebermann-Burchardreaksie volgens die modifikasies van Mertens en Albers, en Colman en McPhee. Weens sy groter sensitiwiteit en die kleiner volumes serum wat nodig is, word die Zakmetode aanbeveel, met dien verstande dat die serumverdunding van 1 tot 25 in die ekstraksiemengsel noodsaaklik is. Die waardes wat met hierdie metode verkry word, is ongeveer 20 mg./100 ml. serum hoër as met die Liebermann-Burchardmetode.

HISTOCHEMIE

Daar is hoofsaaklik gekonsentreer op die histochemiese ondersoek van die witbloedselle van kwashiorkorgevalle. Die glikogeen-, nukleoproteïene-, mukoproteïene- en neutrale vetinhoud, en die peroksidase en alkaliese fosfatase-aktiwiteit van die witbloedselle van 45 kwashiorkorpatiënte is aan die begin van behandeling bepaal en dan weer periodiek gedurende behandeling. Hieruit blyk dat die glikogeen-, nukleoproteïene- en mukoproteïene-inhoud konstant bly gedurende behandeling; die neutrale vetinhoud styg geleidelik in 'n sekere persentasie van gevalle; die alkaliese fosfatase-aktiwiteit daal aan die begin en styg weer later in die behandelings-

METHODOLOGY

Protein Evaluations

Protein deficiencies among the lower income groups have received a great deal of attention from the Department of Nutrition during recent years, and many investigations have resulted from the general interest shown in the variety of cheap protein foodstuffs available.

Decisions had to be taken—often within a limited time—about the most suitable protein material for the enrichment of bread, the influence of technological processing on such material, and the final value of adding such protein matter to the cereal product to be enriched. A necessary step in work of this nature is the determination of the digestibility and assimilability of the protein in the living organism. For this purpose protein balance studies are usually performed on animals or humans, but they take up a great deal of work and time, and since the establishment of the Institute all possible efforts have been made to evolve shorter and easier methods in order to simplify the work. A shorter method using rats has been developed which appears promising and which will reduce the work attached to protein evaluation by approximately two-thirds.

Determination of Cholesterol

The standardization of a routine method for the determination of cholesterol in serum received considerable attention. Three methods were compared, viz: the ferrichloride method as originally compiled by Zak and co-workers; the same ferrichloride method used after saponification and digitonin precipitation and the Liebermann-Burchard reaction according to the modifications of Mertens and Albers and Colman and McPhee. Preference is given to the Zak method on account of its greater sensitivity and consequently the smaller volume of serum required. However, when extraction is accomplished, the ratio of serum to extraction mixture should be 1:25. The serum cholesterol values obtained with these methods are approximately 20 mg./100 ml. serum higher than those obtained with the Liebermann-Burchard method.

HISTOCHEMISTRY

Special attention was paid to the histochemical examination of the white blood cells of kwashiorkor cases. The glycogen, nucleoprotein, mucoprotein and neutral fat content and the peroxidase and alkaline phosphatase activity of the white blood cells of 45 kwashiorkor patients were determined at the beginning of treatment and periodically during treatment. From this it appears that the glycogen, nucleoprotein, and mucoprotein contents remain constant during treatment; the neutral fat content gradually increases in a certain percentage of the cases; the alkaline phosphatase activity drops at first to rise again later during the course of

periode, terwyl peroksidase-aktiwiteit geen konstante patroon vertoon nie. Die moontlike praktiese toepassing van die histochemiese metode vir die kleuring van neutrale vet in witbloedselle as 'n eenvoudige lewerfunksietoets in hierdie pasiënte, word tans ondersoek.

GRAAN EN GRAANPRODUKTE

Mielieprodukte

Verskeie aspekte van die gebruik van mielieprodukte is intensief bestudeer. Sonder enige byvoeging van ander stowwe is mielies 'n betreklike swak stapelvoedsel. Mielies vervul egter 'n verneme rol in die Unie se ekonomie en is ook die stapelvoedsel van die Bantoe. Enige verbetering wat teweeggebring word wat betref die kwaliteit van mielieprodukte dien die tweeledige doel, naamlik dat dit die voeding van die Bantoe sal verbeter en ook 'n groter afset vir mielies mag skep. Goeie oeste gedurende die afgelope paar seisoene het gelei tot 'n oorproduksie—gemeet teen plaaslike verbruik.

Verhoging van Voedingswaarde van Mieliemeel

'n Proses om die voedingswaarde van mielies te verbeter, word in die Instituut ontwikkel. Hierdeur word die fitynsuur gehidroliseer, ongewenste mikroflora (bakterieë) vernietig en die beskikbare niasien ('n vitamien van

treatment, while the peroxidase activity shows no constant pattern. The possible practical application of the histochemical method for the staining of neutral fat in white blood cells as a simple liver function test in these patients, is being investigated.

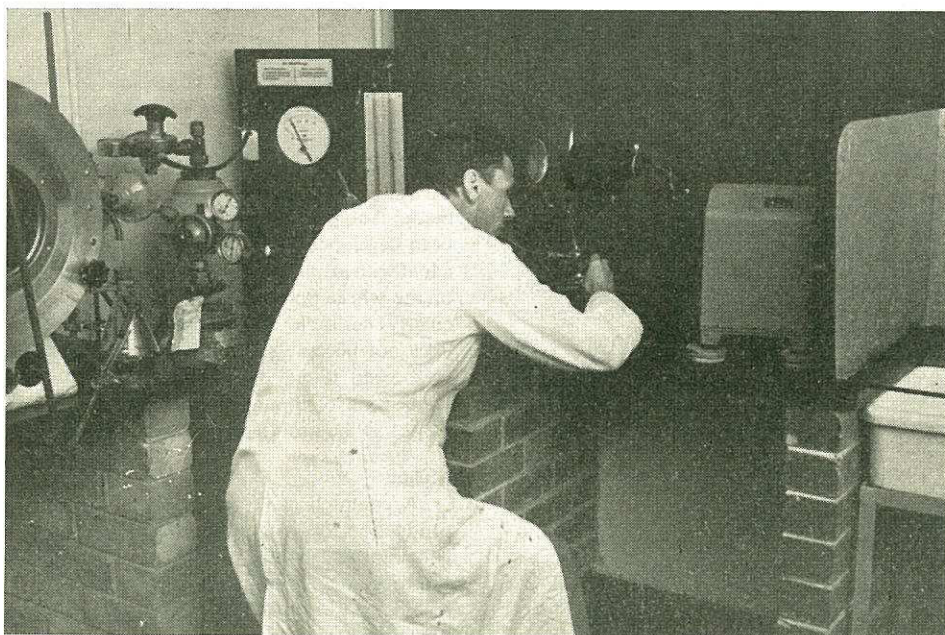
CEREALS AND CEREAL PRODUCTS

Maize Products

Various aspects of the utilization of maize products were intensively studied. Without addition of other substances maize is a relatively inferior staple food. It plays an important role in the economy of the Union, however, and also forms the staple diet of the Bantu. Any improvement in the quality of maize which may be achieved will have the dual advantage of improving the nutrition of the Bantu and of creating a larger market for maize. Good harvests during recent seasons have resulted in overproduction in terms of local requirements.

Improvement of the Nutritional Value of Maize Meal

A process for improving the nutritive value of maize is being developed in the Institute. By this process the phytic acid is hydrolysed, deleterious micro-organisms destroyed, the nutritionally available niacin (a vitamin



Vlamfotometriese analise van minerale in voedingsstowwe.

Flame photometric analysis of minerals in foodstuffs.

die B-kompleks) verhoog, en die biologiese waarde van die mielieproteïene moontlik verbeter. Die proses word vanuit verskeie aspekte ondersoek, en waar dit nog slegs op klein laboratoriumskaal bestudeer is, word baie navorsingswerk op tegniese en ekonomiese gebied vereis.

Verryking van Mielie-meel

Die verryking van mielie-meel deur voedingstowwe soos vismeelblom, voedselgis, melkpoeier en kombinasies van hierdie stowwe, is in die laboratorium bestudeer. Verryking met vismeelblom lyk belowend en aanneemlik te wees in toevoegings tot 2 persent, behalwe dat dit die mieliepap effens kleur.

Die Vorming van Vry Vetsure in Mielie-meel

Die vorming van vry vetsure in mielie-meel en die moontlike verband wat dit mag hê met die bitter- of galsterigwording van verrykte en onverrykte mielie-meel, word bestudeer. Daar is gevind dat toevoeging van die verrykingsmengsel wat in die verlede gebruik is, nie die ontstaan van die vry vetsure in die mielie-meel gestimuleer het nie. By opberging vind daar in die voormengsel self ook nie vethidrolise plaas nie. In mielie-meel begin vry-vetsuurvorming redelik gou en dit gaan progressief voort selfs na maandelange bewaring. Dit is duidelik dat, soos in die praktyk ook gevind is, gesifte gegranuleerde mielie-meel onder Suid-Afrikaanse toestande nie baie langer as twee maande bewaar kan word nie, waarna onder meer 'n bitter smaak daarin ontwikkel. Hierteenoor kan heel (ongemaalde) mielies weer langer opgeberg word sonder dat hierdie vethidroliseringsproses plaasvind.

Die Gebruik van Mielie-meel in Brood

Hoewel mielie-meel vantevore reeds in koringbrood ingebak is, het die brood onaantreklike eienskappe getoon, en daar kon ook hoogstens 10 persent tot 15 persent van die koringmeel deur mielie-meel vervang word. Die proses wat nou ontwikkel is vir die voorbehandeling van mielie-meel, maak dit moontlik om soveel as 25 persent van die koringmeel deur mielie-meel te vervang en tog nog 'n brood met aantreklike eienskappe te verkry. Een voortrefflike eienskap van belang hiervan is dat hierdie koring-mielie-brood nie so gou verouder nie. Die proses is egter nog slegs op laboratorium-skaal uitgevoer, en tegniese aspekte vir grootskaalse toepassing moet nog bestudeer word.

Magou

'n Uitgebreide verslag oor die ondersoek na die vervaardiging van magou en gedroogde magou word in bulletinvorm deur die Instituut uitgegee. Beter tegniese voorbereidingsprosesse vir vervaardiging is uitgewerk en is ter beskikking van magou-vervaardigers gestel. Ondersoeke na voedingsaspekte van magou is aan die gang, veral oor die invloed van 'n hoë suur by 'n lae proteïen-inname.

of the B complex) increased and the biological value of the protein present in maize possibly improved. Various aspects of the process are being investigated and, as the investigations to date have been carried out on laboratory scale only, considerably more work on a technical scale as well as on the economics of the process is required.

Enrichment of Maize Meal

Enrichment of maize meal through the addition of fish flour, food yeast, milk powder and combinations thereof, was studied. Enrichment of maize meal with fish flour seems promising and acceptable with additions of up to 2 per cent. It, however, tends to discolour the maize meal slightly.

The Formation of Free Fatty Acids in Maize Meal

The formation of free fatty acids and the role they may play in the occurrence of a bitter taste and/or rancidity in enriched or unenriched maize meal is being investigated. Addition of the enriching premix used in the past does not promote the formation of free fatty acids, nor does fat splitting take place in the premix itself during storage. In maize meal, however, hydrolysis of the fat starts fairly soon after milling and continues even after it has been stored for months. It is clear that sifted granulated maize meal cannot be stored for much longer than two months under South African conditions. It has also been found in practice that after about two months a bitter taste develops. Whole, unbroken maize, however, can be stored for much longer periods without the formation of free fatty acids.

The Use of Maize Meal in Bread

Maize meal has, in the past, been incorporated in bread, but the bread showed some unattractive qualities while at the most 10 to 15 per cent. of the wheat meal or flour could be replaced by maize meal. With the method of pre-treating maize meal which has recently been developed at the Institute, it is possible to produce a loaf with attractive qualities with as much as 25 per cent. of the wheat flour replaced by maize meal. One particularly desirable characteristic of this loaf is that it does not become stale quickly. The process has, however, been tested only on a laboratory scale and the application of this method on a large scale has still to be put to the proof.

Magou

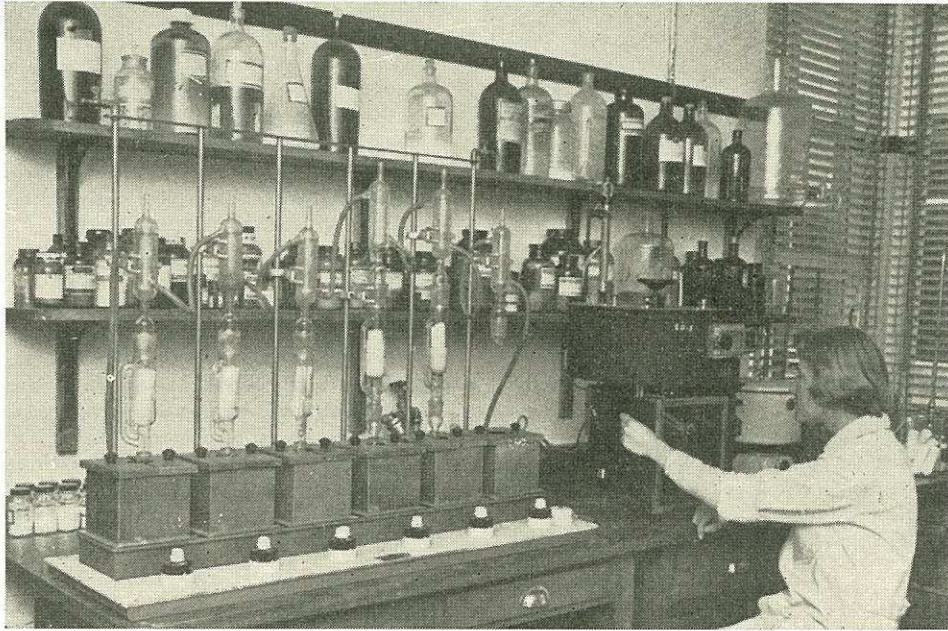
A comprehensive report on the investigation of the production of magou (mahewu) and magou powder is being published in the Bulletin series of the Institute. Improved manufacturing processes have been developed, and details are available to producers of magou. The nutritional aspects of magou are being investigated, particularly the effect of high acid with low protein intake.

Fitiensuur in Graanprodukte

Fitien, 'n bestanddeel wat in plantaardige produkte soos mielies en koring voorkom, kan 'n nadelige uitwerking hê op die kalsium- en fosforabsorpsie vanuit die spysverteringskanaal. Sommige aspekte van hierdie nadelige invloed is nagegaan in proewe met rotte. Daar is gevind dat hoe laer die kalsiuminhoud van die dieet, hoe groter die persentasie fitien wat in die spysverteringskanaal gehidroliseer word met vrysetting van fosfaat wat dan wel geabsorbeer kan word, maar gewoonlik in die urien verlore gaan. Indien kalsium by die dieet gevoeg

Phytic Acid in Cereal Products

Phytic acid, which is present in plant products such as maize and wheat, can have a detrimental effect on the absorption of calcium and phosphorus in the intestinal tract. Some of these disadvantageous effects were studied in experiments on rats. It was found that the lower the calcium content of the diet the greater the percentage of phytic acid hydrolysed in the intestinal tract. The phosphates set free by hydrolysis could be absorbed, but were usually lost in the urine. With the addition of calcium to the diet, it was found that the



Vogbepaling in voedingstowwe met behulp van die Brabender-apparaat.

Moisture determination in foodstuffs with the aid of the Brabender apparatus.

word, is gevind dat die vorm waarin dit bygevoeg word, die uitwerking heelwat kan beïnvloed. Oplosbare kalsium-soute is byvoorbeeld geneig om die hidrolise teen te werk deurdat dit maklik nie-oplosbare kalsiumfitate vorm.

Organiese oksisure, soos melk- en sitroensuur, vorm egter oplosbare kompleksverbindinge met kalsiumfitate. Die uitwerking van die toediening van hierdie tipe sure op die absorpsie van kalsium en fosfaat is nagegaan. Onder andere, is gevind dat die sure hidrolise van fitiensuur bevorder en gevolglik ook die absorpsie van kalsium en fosfaat. Ongelukkig stimuleer die oksisure egter terselfdertyd die uitskeiding van fosfaat. Sterk aanduidings is gevind dat die oksisure en fitiensuur die metabolisme van proteïene beïnvloed. Hierdie aspek word nou ondersoek, veral met die oog op die ondersoek na die voedingswaarde van magou wat 'n hoë melksuurinhoud het.

type of calcium salt was also a determining factor in the hydrolysis of phytic acid. Soluble calcium salts readily form insoluble calcium phytates and therefore depress the breakdown of phytates.

The organic oxy-acids such as lactic and citric acids form soluble complexes with calcium phytates and the influence of these acids on the absorption of calcium and phosphorus was studied. Among other effects, it was found that the acids stimulate the hydrolysis of phytates and consequently the absorption of calcium and phosphorus. Unfortunately these oxy-acids also stimulate the excretion of phosphorus. There was strong evidence that the oxy-acids and phytic acid have an influence on the metabolism of protein. This aspect is now being investigated with particular reference to the nutritional value of magou (mahewu) which has a high lactic acid content.

Broodverryking en -behandeling

Die verryking van brood, veral bruinbrood, met vismeelblom is verder ondersoek. Proewe om die biologiese waarde van die vismeelblom vas te stel, asook van kombinasies van vismeelblom met ander stowwe soos melkpoeier en voedselgis is op rotte uitgevoer, en hieruit het dit duidelik geblyk dat, vir rotte, vismeelblom 'n belangrike aanvullingswaarde het vir die verryking van brood. Proewe op mense is aan die gang.

Die voorkoming van leng in verrykte brood is ook ondersoek. Kalsiumasetaat word reeds suksesvol vir hierdie doel gebruik, maar 'n hoë toediening is hiervoor nodig. Navorsing is gedoen oor 'n laer toediening of om die kalsiumasetaat gedeeltelik te vervang deur ander stowwe wat voortrefliker is vanuit 'n voedingsoogpunt. Ondersoek is ook gedoen om askorbiensuur in plaas van vet te gebruik om die kwaliteit van die brood te verbeter. Hoewel askorbiensuur 'n noemenswaardige volume verbetering in witbrood gee, was dit nie die geval met verrykte brood nie. Die beste verbetering is verkry met vet en kombinasies van vet en lesitien.

MELKPRODUKTE

Die ondersoek na die voedingswaarde van gesteriliseerde melk is afgesluit. Daar is gevind dat gesteriliseerde melk goed met gepasteuriseerde melk vergelyk ten opsigte van proteïengehalte en B-vitamieninhoud.

'n Literatuurstudie en kritiese oorsig oor die bereiding van afgeroomde melkpoeier is gedoen en uitgegee as 'n bulletin van die Instituut. 'n Verdere bulletin oor die samestelling van Suid-Afrikaanse melkpoeiers is in voorbereiding.

Bread Enrichment and Treatment

The enrichment of bread, in particular brown bread, with fish flour, was investigated. The biological value of the fish flour and combinations of fish flour with other materials such as milk powder and food yeast was determined by means of experiments on rats. It was clearly shown that, in the case of rats, fish flour is a valuable additive for the enrichment of bread. Tests on human subjects are in progress.

The prevention of rope in enriched bread was investigated. Calcium acetate is at present used successfully for this purpose but a large addition is required. The purpose of the investigation was to find methods of decreasing the addition or of partly replacing it by substances of greater nutritional value. The possibility of using ascorbic acid instead of fat as a bread improver was also investigated. Although ascorbic acid gave an appreciable improvement in the volume of white bread, this was not the case with enriched brown bread. The greatest improvement was obtained with shortening and combinations of shortening and lecithin.

MILK PRODUCTS

The investigation of the nutritional value of sterilized milk was concluded. It was shown that in respect of protein quality and vitamin B content, the sterilized milk compared well with pasteurized milk.

A literature study and critical review of the methods of production of skimmed milk was published as a Bulletin by the Institute. A further bulletin on the composition of South African milk powders is in preparation.

Nasionale Padnavorsings- instituut

Direkteur: DR. P. J. RIGDEN

Gedurende die onderhawige tydvak is verdere pogings aangewend om die Instituut op te bou en nuwe afdelings te stig. Ontwikkeling is egter ernstig gestrem deur die moeilikheid wat ondervind is met die werwing van ge-gradueerde personeel. Nietemin het dit geluk om sedert die vorige verslag geskryf is die werk in sekere opsigte uit te brei, deur o.a. 'n begin met die opname van pad-ongelukgegewens te maak en 'n afdeling vir die bestudering van spesiale toetstegnieke te stig.

BITUMINEUSE MATERIALE EN PADBOLAE (EENHEID VIR NAVORSING OP DIE GEBIED VAN BITUMINEUSE BINDSTOF)

Werk is voortgesit i.v.m. sowel die fundamentele probleem in verband met die duursaamheid van in Suid-Afrika vervaardigde bindstowwe, as die praktiese probleme in verband met die gebruik van hierdie bind-



Dr. P. J. Rigden.

National Institute for Road Research

Director: DR. P. J. RIGDEN

During the period under review, efforts to build up the Institute and establish the new Sections have been continued. Development has, however, been severely restricted by the extreme difficulty of recruiting suitable graduate staff. Nevertheless, since the previous report was written, some extension of the work has been possible and has included a start on a survey of road accident data, and also the setting up of a special section to study vibration methods of test.

BITUMINOUS MATERIALS AND SURFACINGS (BITUMINOUS BINDER RESEARCH UNIT)

Work has continued on both the fundamental problem of the durability of South African-produced binders and the practical problems involved in using these binders for road surfacing. Production of shale oil (torbanite) bitumen for road surfacing purposes is declining and more attention has, therefore, been directed to an investigation of the bitumens produced in the Union from crude petroleum.

Laboratory Work

Two refineries in the Union are now producing bitumens from a crude petroleum imported from Saudi Arabia, and a start has been made on a comparison of the physical and chemical properties of these bitumens with those of bitumens imported directly from other crude sources. So far, no major differences between the various types of bitumen have been found.

Laboratory work on the improvement of the rheological properties of road tars is in progress. Preliminary results indicate that dispersion of synthetic rubber in tar or digestion of coal in the tar at high temperature may give improved resistance to flow at high road temperatures and less tendency to brittleness at low road temperatures.

Similarly, improvement can be effected if a homogeneous mixture of the tar and a substantial proportion of petroleum bitumen can be made. An undisclosed process for making such blends has been successfully developed in Germany, and the Institute has now worked out a method by which homogeneous blends containing up to 50 per cent. of bitumen can be prepared. The method is now awaiting trial on a plant scale.

As part of the research into understanding the physical mechanism of failure of a binder on the road, particularly

stowwe in padbolae. Die vervaardiging van skalie-olie- (torbaniet) bitumen vir gebruik in padbolae is aan die afneem, en meer aandag is dus geskenk aan die ondersoek van bitumens wat in die Unie vervaardig word uit ru-petroleumolies.

Laboratoriumwerk

Twee raffinaderye in die Unie vervaardig tans bitumens van ru-petroleum uit Saudi-Arabië ingevoer, en 'n begin is gemaak met 'n vergelyking van die fisiese en chemiese eienskappe van hierdie bitumens met dié van bitumens wat direk van ander ru-oliebronne afkomstig is. Tot dusver is geen noemenswaardige verskille tussen die verskillende bindstoftipes gevind nie.

Laboratoriumwerk i.v.m. die verbetering van die vloeieienskappe van padtere word voortgesit en voorlopige resultate dui daarop dat die oplossing van sintetiese rubber en steenkool in teer by hoë temperature ten gevolge het dat beter vloeiveerstand by hoë padtemperature en minder brosheid by lae temperature verkry word.

Soortgelyke verbeteringe kan teweeggebring word indien 'n homogene mengsel van teer en 'n aansienlike persentasie petroleumbitumen gemaak kan word. 'n Proses vir die bereiding van sulke mengsels is met sukses in Duitsland ontwikkel, en alhoewel hierdie inligting nie vrygestel is nie, het die Instituut nou 'n metode ontwikkel om homogene mengsels te maak wat tot 50 persent bitumen bevat. Hierdie metode wag nou om op proefskaal uitgetoets te word.

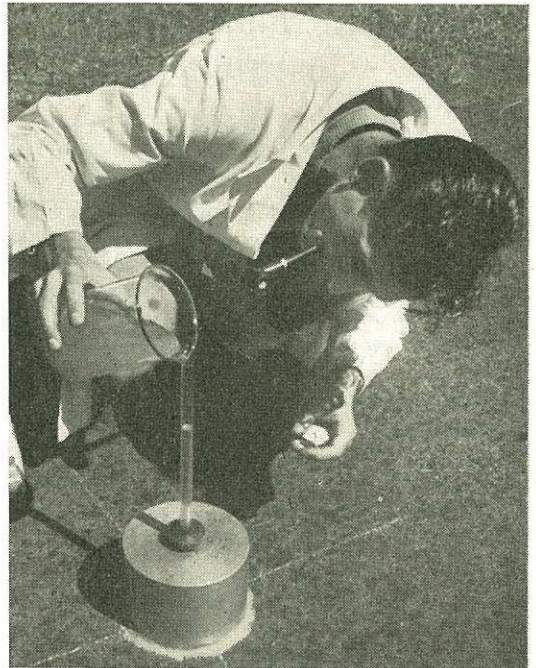
As deel van die navorsing om 'n insig te kry in die fisiese meganisme van die mislukking van 'n bindstof op die pad, veral by lae temperature, is ondersoek voortgesit na die gedrag van bindstowwe onder kortstondige belastingstye, soos die wat byvoorbeeld voorkom by vinnig bewegende verkeer. Die visko-elastiese eienskappe van bindstowwe onder vibrasie is gemeet en by die meeste bindstowwe wat ondersoek is, het die elastisiteitsmodulus by $+5^{\circ}\text{C}$. toegeneem vir 'n toename in viskositeit tot 'n maksimum van ongeveer 3×10^{10} dines/vk. cm.

'n Torsie-vibrasietegniek is ook ontwikkel om die skuifmodulus te meet.

Volskaalse Padeksperimente

Die inspeksiespan van die Eenheid het nou nege padeksperimente wat gereeld ondersoek moet word en vier hiervan is gedurende die onderhawige tydvak ondersoek.

Die meeste van die Eenheid se volskaalse padeksperimente is ontwerp om die werkverrigting van verskillende bindstowwe, in enkellaag-herseëlwerk, te vergelyk onder die verskillende verkeers- en klimaatsomstandighede wat verteenwoordigend is van die verskillende gebiede van die Unie. Hulle sluit ook in een eksperiment om die werkverrigting van bindstowwe te vergelyk in tweelaag-voormengselkonstruksies van verskillende tipes, sowel as 'n



The absorption rate of water poured into a permeability apparatus measures the porosity of the road surface.

Die absorpsiespoed van water wat in 'n deurdringbaarheidsapparaat gegooi word, bepaal die poreusheid van die padoppervlak.

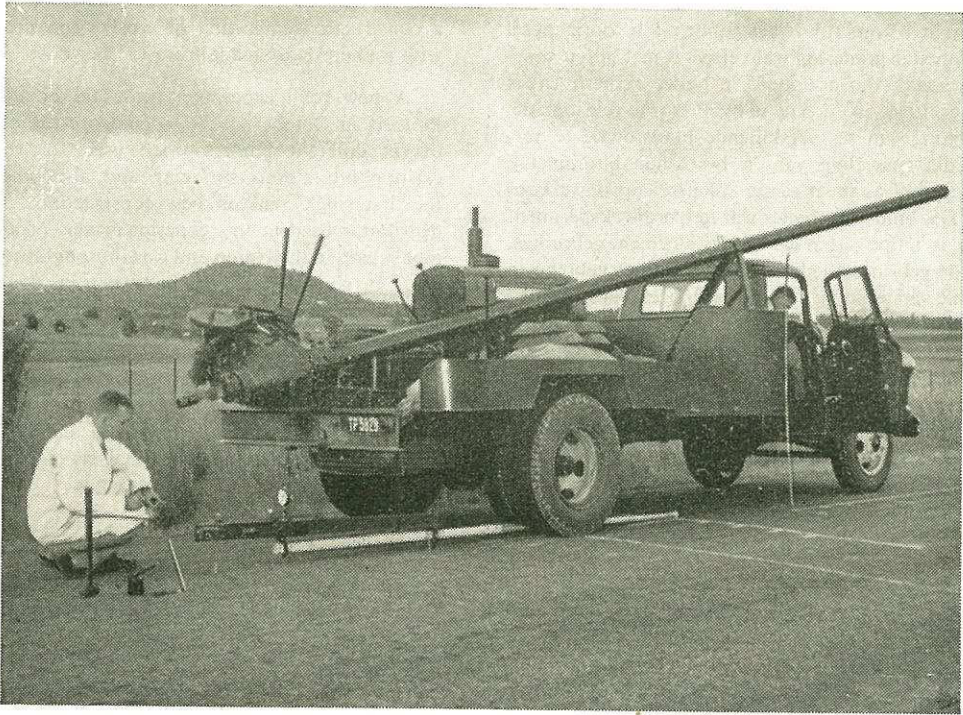
at low temperatures, investigation has continued into the behaviour of binders under short loading times such as occur under fast-moving traffic. The visco-elastic parameters of binders have been measured under vibration and, with most of the binders investigated, the Young's modulus at $+5^{\circ}\text{C}$. increased with increase of viscosity to a maximum value of approximately 3×10^{10} dynes/sq. cm.

A torsion vibration technique to measure shear modulus has also been developed.

Full-scale Road Experiments

The Inspection Panel of the Unit now has nine road experiments to examine regularly and has inspected four of these during the period under review.

Most of the Unit's full-scale road experiments have been designed to compare the performance of different binders in single-coat resealing work under various conditions of traffic and climate, representative of different parts of the Union. They include, as well, one experiment to compare the performance of binders in two-course premix construction of different types, and



Meting van pad-deurbuiging deur middel van die Benkelman-balk.

Measurement of road deflection by means of the Benkelman beam.

is om vas te stel watter bewegings, behalwe dié wat deur verkeer veroorsaak word, in ag geneem moet word by die ontwerp van paaie.

Die gebruik van 'n eenvoudige verhouding wat die „aktiwiteit” van 'n klei aangee, en wat verkry word van standaardtoetse vir plastisiteit en klei-inhoud, is nuttig gevind vir die herkenning van gevalle waar besondere behandeling nodig is.

Studie van Onversadigde Grondsoorte

Laboratoriumwerk is voortgesit i.v.m. die skuifsterkte en konsolidasie van onversadigde grondsoorte, en publikasie in hierdie verband is goedgekeur vir die Internasionale Konferensie oor Grondmeganika en Fondamenteingenieurswese. Dit is bewys dat kennis van die gewone grondeienskappe, soos velddigtheid en waterinhoud, 'n goeie aanduiding is van die werkverrigting wat verwag kan word van sekere grondsoorte, en dat kennis van die oppervlakgeologie van 'n gebied die verspreiding van buitengewone grondsoorte binne redelike perke kan bepaal.

Verwerking van Rotsmateriale

Die ondersoek van verweerde rotse (hoofsaaklik doleriet) wat gebruik word as padfondamentmateriale is

project to measure what movements, other than those caused by traffic, have to be allowed for in design.

The use of a simple test for “activity” of a clay, derived from standard tests for plasticity and clay content, has been found useful for the recognition of cases where particular treatment is required.

Study of Partially Saturated Soils

Laboratory work has continued on the shear strength and consolidation of partially saturated soils. It has been shown that a knowledge of common soil properties, such as field density and moisture content, gives a good indication of the behaviour to be expected in certain soils, and that a knowledge of the surface geology of an area can fix the distribution of unusual soils within fair limits.

Weathering of Rock Materials

Work on weathered rocks (mainly dolerites) used as road foundation materials has continued and studies

voortgesit, en die uitwerking van klimaat en topografie op ontbindingsprodukte is bestudeer.

Pogings is aangewend om toetse te ontwikkel vir die herkenning en uitkiesing van goeie padboumateriale.

KOSTE VAN PADKONSTRUKSIE EN -ONDERHOUD

Onder leiding van die W.N.N.R. se Bedryfs-ekonomie-seksie het 'n klein groepie werkers 'n begin gemaak met die sistematiese bestudering van die koste-struktuur van padbouwerk. Na 'n voorlopige studie van die tipes toerusting en materiale wat gebruik word, is 'n volskaalse ondersoek onderneem vir die bestudering van 'n nuwe padkonstruksieprojek in die sentrale gebied van Transvaal.

PADONGELUKKESTUDIES

Een van die punte op die Instituut se aanvanklike navorsingsprogram is die bestudering van die huidige posisie wat die Unie se padongelukgewens betref. 'n Begin is gemaak met 'n opname van die tipes inligting verkrygbaar in die groot stede en provinsiale en staats-organisasies. Die bedoeling is om 'n verslag uit te bring oor hierdie opname wat ook aanbevelings sal bevat betreffende die algemene probleme in verband met die wyse waarop padveiligheid aangepak behoort te word.

AFDELING SPESIALE PROBLEME

Hierdie nuwe afdeling is gestig om werk te doen i.v.m. 'n aantal probleme wat die toepassing van moderne tegnieke op die toetsing en ontwerp van padmateriale en -strukture raak. Aandag word in die eerste plek geskenk aan die gebruik van vibrasie- en golfvoortplantingsmetodes as voortsetting van ontwikkelingsrigtings in Europa, en ook om die gebruik van radio-isotope vir die sneller bepaling van grondvogtigheidsgehalte en -digtheid in die veld. Werk i.v.m. die visko-elastiese eienskappe van bitumineuse stowwe onder vibrasie waarmee die B.B.N.E. reeds 'n begin gemaak het, is nou deur hierdie Afdeling oorgeneem.

have been made to determine the effect of climate and topography on the decomposition products. Attempts have been made to develop tests for the recognition or selection of good road-building materials.

COSTS OF ROAD CONSTRUCTION AND MAINTENANCE

Under the general guidance of the C.S.I.R. Industrial Economics Section, a small team has commenced work on a systematic study of the cost structure of road building operations. After a preliminary study of the types of equipment and materials used, a full-scale investigation has been put in hand to study a new road construction project in the central area of the Transvaal.

ROAD ACCIDENT STUDIES

The Institute's initial programme of research includes an item to investigate the present position in the Union of road accident data. A start has now been made on a survey of the types of information available in the larger cities and provincial and government organizations. The intention is to produce a report on this survey which will also include recommendations as to how the general problems of road safety should be tackled.

SPECIAL PROBLEMS SECTION

This new Section has been set up to work on a number of problems involving the application of modern techniques to the testing and design of road materials and structures. Attention is being given in the first instance to the use of vibration and wave propagation methods, following on new lines of development in Europe, and also to the use of radio-isotopes for the rapid determination of soil moisture content and density in the field. Work on the visco-elastic properties of bituminous materials under vibration, started earlier in the Bituminous Binder Research Unit, is now being transferred to this Section.

Mediese Navorsing

Ere-raadgewer: PROF. S. F. OOSTHUIZEN

Komitees

Die Raad spreek sy dank uit aan die lede van die Mediese en Tandheelkundige Navorsingskomitee en aan lede van die sub-komitees vir mediese navorsing vir hul voortdurende belangstelling en vir hul leiding ten opsigte van die navorsingsprogramme van die mediese navorsings-eenhede.

Prof. M. van den Ende van die Universiteit van Kaapstad is aangestel as permanente lid van die Mediese en Tandheelkundige Navorsingskomitee.

Dr. B. J. P. Becker en dr. J. C. Thomas het aan die einde van 1956 uitgetree as lede van die Mediese en Tandheelkundige Navorsingskomitee, en in ooreenstemming met die bepalinge van die konstitusie van die Komitee, is hulle vir een jaar nie weer verkiesbaar nie. Hul plekke is gevul deur prof. B. J. Meyer van die Universiteit van Pretoria en dr. J. H. S. Gear van die Poliomiëlitiese Navorsingstigting. Dr. R. A. Alexander en R. Elsdon-Dew is tot die Komitee benoem as plaasvervangende lede in die plekke van prof. Meyer en dr. Gear.

Fondse

Vir die boekjaar 1957/58 is in Januarie 1957 sowat £107,650 toegeken vir mediese en tandheelkundige navorsing. Hiervan was sowat £23,500 vir mediese en tandheelkundige navorsing by die Universiteite, £7,500 vir die Suid-Afrikaanse Instituut vir Mediese Navorsing, en sowat £76,650 vir mediese navorsingseenhede (met uitsluiting van die Navorsingseenheid vir Pneumokoniose).

Skakeling

Dr. Robert M. Kark en dr. Graham Bull, die Raad se mediese ere-skakelbeamptes in die Verenigde State en die Verenigde Koninkryk onderskeidelik, het weereens waardevolle hulp verleen aan Mediese en Tandheelkundige navorsers in Suid-Afrika oor die ontwikkelinge op die gebied van mediese en tandheelkundige navorsing in Groot-Brittanje en Noord-Amerika.

Prof. J. C. Middleton Shaw, wat in Ierland is, het toegestem om dr. Bull behulpsaam te wees met rapporte oor ontwikkelings op die gebied van tandheelkundige navorsing.

Die Raad het goedgekeur dat prof. H. W. Snyman die Afrikaanse gebiede elke tweede jaar sal besoek ten einde die nodige skakeling te bewerkstellig tussen die Unie en mediese navorsingsinstitute in hierdie gebiede.

Medical Research

Hon. Adviser: PROF. S. F. OOSTHUIZEN

Committees

The Council expresses its appreciation to the members of the Medical and Dental Research Committee and members of the medical research sub-committees for their continued interest and for their guidance on the research programmes of the medical research units.

Prof. M. van den Ende of the University of Cape Town was appointed as a permanent member of the Medical and Dental Research Committee.

Dr. B. J. P. Becker and Dr. J. C. Thomas relinquished membership of the Medical and Dental Research Committee at the end of 1956 and, in accordance with the Committee's constitution, were for one year not eligible for re-election. Their places were taken by Prof. B. J. Meyer of the University of Pretoria and Dr. J. H. S. Gear of the Poliomyelitis Research Foundation. Drs. R. A. Alexander and R. Elsdon-Dew were appointed to the Committee as alternate members in the places of Prof. Meyer and Dr. Gear.

Funds

A sum of about £107,650 was allocated in January, 1957, for medical and dental research during the financial year 1957/58, some £23,500 being allocated to medical and dental research at universities, £7,500 to the South African Institute for Medical Research, and about £76,650 to medical research units (excluding the Pneumococcal Research Unit).

Liaison

Dr. Robert M. Kark and Dr. Graham Bull, the Council's honorary medical liaison officers in the United States of America and the United Kingdom respectively, have continued to give valuable help to Medical and Dental research workers in South Africa, on developments in the field of medical and dental research in Great Britain and North America. Prof. J. C. Middleton Shaw, who is in Ireland, has agreed to assist Dr. Bull in reporting on developments in the field on dental research.

The Council approved that Prof. H. W. Snyman should visit African territories every second year to establish the necessary liaison between the Union and medical research institutions in these territories.

Mediese Navorsingseenhede

Verslae deur die hoofde van die mediese navorsingseenhede verskyn hieronder. Die bystand van staats- en provinsiale owerhede, die S.A. Instituut vir Mediese Navorsing, universiteite en individue wat meegehelp het met hierdie werk, word met dank erken.

AMEBIASE-NAVORSINGSEENHEID

Hoof van die Eenheid: DR. R. ELSDON-DEW

Universiteit van Natal, Durban

Gedurende die jaar is aanmerklike uitbreiding in die omvang van die Eenheid se werksaamhede moontlik gemaak deur 'n toekenning van \$135,000 (ongeveer £48,000) deur die Regering van die Verenigde State. Hierdie toekenning, wat oor 'n tydperk van vyf jaar versprei is, is gemaak op aanbeveling van die Voorsitter van die Studieseksie vir Tropiese Siektes van die Verenigde State se Volksgesondheidsdiens, prof. W. W. Frye wat die Eenheid verlede jaar besoek het, en dit ook vir die Hoof van die Eenheid moontlik gemaak het om sy private praktyk op te gee sodat hy sy volle aandag aan navorsingswerk kan wy.

Aangesien hierdie toekenningsgelde sowel as die jaarlikse fondse wat deur die Raad bygedra word, nie aangewend mag word vir verskaffing van die addisionele akkommodasie wat nodig is vir die wyer navorsingswerksaamhede wat nou beoog word nie, is besluit om 'n beroep op die publiek te doen. Skenkings ten bedrae van ongeveer £5,000 is alreeds hiervoor ontvang en dit word gehoop om uiteindelik ongeveer £25,000 te verkry vir die oprigting van die vereiste geboue, met huisvesting vir drie addisionele laboratoriums.

Net soos in vorige jare, het die Eenheid weer 'n aantal vooraanstaande besoekers van oorsee getrek, terwyl lede van die Eenheid wat studiereise na die buiteland onderneem het, baie in aanvraag was as sprekers op mediese kongresse.

Navorsingsprojekte

Die studie oor faktore wat invloed het op *Entamoeba histolytica in vitro* is voortgesit en die lys van antibiotika, chemiese en ander middele wat nou uitgetoets word, is indrukwekkend, nl. sowat 70 toetse, waarby enige duiende pasiënte betrokke is.

Geen aanmerklike vordering op die Eenheid se vorige resultate kan gemeld word nie, maar aangesien hierdie resultate reeds 'n daling in die mislukkingsyfer aangetoon het van ongeveer 50% tot 5%, en sal verdere verbetering hierop moeilik bewerkstellig kan word. Dit weerhou die Eenheid egter nie om in sy strewte te volhard nie, veral omdat daar nog altyd weerinstortings is wat op een of ander wyse oorkom moet word.

Opnames in verband met verskillende bevolkingsgroepe het voortgeduur en behalwe die navorsingswerk oor ameba is daar ook 'n begin gemaak met opnames oor bilharzia in samewerking met die Bilharziaeenheid. Behal-

Medical Research Units

Reports by the Heads of the medical research units are given in the succeeding sections. The assistance of governmental and provincial authorities, the South African Institute for Medical Research, universities and individuals who have co-operated in this work is gratefully acknowledged.

AMOEBIASIS RESEARCH UNIT

Head of the Unit: DR. R. ELSDON-DEW

University of Natal, Durban

During the year a very considerable expansion in the scale of activities of this Unit was made possible by a grant of \$135,000 (about £48,000) by the United States Government. This grant, which is to be spread over a period of five years, was made on the recommendation of the Chairman of the Tropical Diseases Study Section of the U.S. Public Health Service, Professor W. W. Frye, who visited the Unit last year, and has also made it possible for the Head of the Unit to give up his private practice in order to devote his full time to research.

As neither the grant nor the monies currently provided by the Council can be used to provide the additional accommodation required for the wider field of investigation now contemplated, it was decided to launch a public appeal. Donations amounting to about £5,000 have already been received and it is hoped eventually to raise about £25,000 which will make it possible to erect the necessary building with animal houses and additional laboratories.

As in past years, the Unit has continued to attract a number of prominent visitors from overseas and at the same time members of the Unit on overseas tours have been much in demand as speakers at medical congresses.

Research Projects

The study of the factors influencing *Entamoeba histolytica in vitro* has been continued and the list of antibiotics, chemical and other agents now tested is formidable, being of the order of some 70 trials, involving many thousands of patients.

No great advance on the Unit's previous results can be reported, but as these results have already shown a decrease in the failure rate from 50% to 5%, further improvement will be difficult to attain. This will not, however, prevent the Unit from seeking it, particularly as there is still a proportion of relapses which must be overcome in some way.

Surveys of various populations have continued and, in addition to the work on the amoebae, surveys on bilharzia have also been started in collaboration with

we die vasstelling van die omvang van die voorkoms van die parasiet in die omgewing van Durban, is daar ook 'n oorsig gekry van die outopsie-opgawes by plaaslike hospitale vir 'n aanduiding van die sterfgevallen ten opsigte van hierdie siekte. Die uitslag hiervan toon dat dit heelwat minder is as wat algemeen vermoed was.

In die laboratorium duur navorsingswerk voort vir die verkryging van suiwer kulture van die ameba. Hierdie organismes wil nie as sulks alleen groei nie en dit is moeilik om hulle selfs met 'n enkele simbiot te kweek. Heelwat sukses is behaal om ameba uit lewerabsesse te kweek, selfs tot so 'n mate dat dit as 'n diagnostiese prosedure gebruik kan word. Sukses is behaal met die oorplanting van die lewer-ameba na die *Streptobacillus* van Frye—'n organisme wat oorsee vir hierdie doel aangewend word. Die Eenheid het daarin geslaag om sistevorming te bewerkstelling in ameba wat uit lewerabsesse verkry is. Dit is van groot belang in die ekologie van die siekte, want tevore was die mening dat daar vir ameba wat die ingewande verlaat, geen hoop bestaan om verdere voedsterdiere te vind nie omrede hul onvermoë om siste te produseer.

Gedurende die verslagtydperk is 'n interessante geval teengekom waar fimose van die penis deur ameba veroorsaak is. Slegs twee sulke gevalle is in die verlede aangetref.

Verdere proewe is aan die gang vir die suiwering van 'n antigeen wat in bloedtoets vir amebiase gebruik kan word. Hoewel die Eenheid in die verlede in staat was om doelmatige antigene te produseer, is hulle egter nie vir gewone diagnostiese doeleindes vrygestel nie omdat die ondervinding geleer het dat daar bykomende faktore is wat die interpretasie van resultate nie alleen bemoeilik nie maar ook gevaarlik maak in die hande van 'n oningewyde. Dit is 'n langtermynprojek.

As gevolg van die geldelike toekenning deur die Volksgeondheidsdiens van die Verenigde State sal die Eenheid nou in staat wees om die uiters noodsaaklike proewe te onderneem in verband met die dieetfaktore wat onderliggend is aan die verandering in die ameba van die kommensale tot die invallende vorm. Dit is nodig om daarop te wys dat daar 'n groot aantal persone is wat *E. histolytica* in hul ingewande dra sonder enige sigbare gevolge, maar in ander persone, en om redes wat nie verklaar kan word nie, tree die ameba in 'n aanvallende vorm op en veroorsaak baie nadeel wat in die geval van die naturel, dikwels noodlottige gevolge het.

'n Leidraad vir hierdie verandering is die feit dat naturelle baie meer vatbaar as die Indiër of die blanke is vir die gevaarlike verskynsels van hierdie siekte. Uit proewe oor die faktore met betrekking tot *E. histolytica* in die mens, is dit bekend dat die bakterieë wel 'n rol speel, en epidemiologiese studies wat deur die Eenheid uitgevoer is, dui daarop dat bakteriese flora wel terdeë deur dieet verander word. Hierdie gesigspunt sal in die toekoms die hoofaanvalfront van die Eenheid wees, en dit sal 'n langtermynprojek vorm.

the Bilharziasis Unit. In addition to determining the incidence of the parasite in the neighbourhood of Durban, a review was made of the autopsy records of local hospitals to determine the mortality due to this disease. This proved to be considerably less than is generally accepted.

In the Laboratory, further investigations are being done on the establishment of pure cultures of the amoeba. These organisms will not grow by themselves, and it is difficult to grow them even with a single symbiont. Considerable success has been obtained in growing amoebae from liver abscesses—so much so that this can now be used as a diagnostic procedure. Success must be reported in transferring the liver amoebae to the *Streptobacillus* of Frye—an organism which is used overseas for this purpose. The Unit has been able to induce cyst-formation in amoebae obtained from liver abscesses. This has considerable importance in the ecology of the disease, for it was previously considered that amoebae which had left the bowel to enter the liver had, by their inability to produce cysts, given up all hope of subsequent hosts.

During the year, an interesting case, in which amoebae were found to have caused phimosis of the penis, was encountered—only two such cases have been reported previously.

Further experiments are being done to purify an antigen for use in blood-tests for amoebiasis. Though the Unit has been able to produce effective antigens in the past, they have not been released for ordinary diagnostic purposes, as experience has shown that there are other factors which make the interpretation of results difficult and, in the hands of the uninitiated, dangerous. This is a long-term project.

Now that the grant from the United States Public Health Service has materialized, the Unit will be able to undertake the very necessary experiments into the dietary factors underlying the change in the amoebae from the commensal to the invasive state. It must be pointed out that there are a very large number of people who harbour *E. histolytica* in their bowels without any apparent effect, but in some people, and for some reason as yet unknown, these amoebae take on an invasive form and cause considerable disability which, in the African, not infrequently proves fatal. A clue to this change is provided by the fact that the Africans are very much more susceptible to the dangerous manifestations of the disease than are either the Indians or the Whites. From experiments on the factors affecting *E. histolytica* in the human it is known that the bacteria play some part, and epidemiological studies carried out by the Unit suggest that the bacterial flora must be profoundly modified by diet. This will be the Unit's main line of attack in the future and will be a long-term project.

NAVORSINGSEENHEID VIR ARTROPODE-GEDRAAGDE VIRUSSIEKTES

Hoof van die Eenheid: DR. JAMES GEAR

Na voorlopige besprekings met dr. Hugh Smith, Geassosieerde Direkteur van die Internasionale Gesondheidsafdeling van die Rockefellerstigting, is die navorsingseenheid vir artropode-gedraagde virusse in 1953 gestig. Van sy aanvang af is dit gesamentlik ondersteun deur die Suid-Afrikaanse Instituut vir Mediese Navorsing, die Poliomiëlitis-navorsingstigting, en die Rockefellerstigting. Laasgenoemde het twee senior lede van sy wetenskaplike personeel, dr. K. C. Smithburn en dr. R. H. Kokernot, hierheen gestuur om die navorsingswerk te lei; dit is boonop verantwoordelik vir die salarisse van verskeie tegnisi en vir die lone van meeste van die Naturelle-personeel. Dit het ook vanuit Amerika baie wetenskaplike uitrusting verskaf wat nie in Suid-Afrika verkrygbaar is nie, sowel as rytuie vir vervoerdoeleindes. Die ander toerusting en laboratoriumvoorrade is voorsien deur die Suid-Afrikaanse Instituut vir Mediese Navorsing, wat ook verskeie professionele beamptes en tegniese personeel vir die navorsingspan gesekondeer het. Akkomodasie vir die werk is beskikbaar gestel in die laboratoriums van die Poliomiëlitisnavorsingstigting op Rietfontein en dit het ook die laboratoriumdienste verskaf.

In 1956 is hierdie navorsingspan officieel gekonstitueer as die Navorsingseenheid vir Artropode-gedraagde Virussiektes van die Wetenskaplike en Nywerheidsnavorsingsraad en 'n toekenning vir die bestryding van lopende koste is goedgekeur. Die program vir navorsing op artropode-gedraagde virussiektes is dus gedurende die verslagtydperk voortgesit met die gesamentlike finansiële steun van die Suid-Afrikaanse Instituut vir Mediese Navorsing, die Poliomiëlitis-navorsingstigting, die Rockefellerstigting en die Wetenskaplike en Nywerheidsnavorsingsraad, met die waardevolle medewerking van die Unie Departement van Volksgesondheid en die Veeartsenykundige Afdeling van die Departement van Landbou.

Vorige Studies

In die voorafgaande jare, 1954–1956, was die werk van die navorsingspan daarop toegespits om die omvang van die Artropode-gedraagde virusprobleem in Suid-Afrika te bepaal. Vir hierdie doel is verskeie veldekspedisies onderneem en bloedmonsters van mense, veediere, wild en voëls is versamel vir immunologiese opnames om daardeur vas te stel watter virusse bedrywig is. Ook is bloedmonsters geneem van koorslydende menspasiente. Muskiete en ander bloedsuiende insekte en ander artropode is versamel met die doel om virusse uit hulle te probeer afskei.

ARTHROPOD-BORNE VIRUS DISEASES UNIT

Head of the Unit: DR. JAMES GEAR

After preliminary discussion with Dr. Hugh Smith, Associate Director of the International Health Division of the Rockefeller Foundation, the arthropod-borne virus research unit was established in 1953. From the outset it was supported jointly by the South African Institute for Medical Research, the Poliomyelitis Research Foundation, and the Rockefeller Foundation. The latter sent out two senior members of its scientific staff, Dr. K. C. Smithburn and Dr. R. H. Kokernot, to lead the investigations, and in addition it is responsible for the payment of several technicians and most of the Native staff. It also supplied from the United States much scientific equipment not obtainable in South Africa, as well as transport vehicles. The other equipment and laboratory supplies were provided by the South African Institute for Medical Research which also seconded several professional officers and the technical staff to the team. Accommodation for the work was made available in the laboratories of the Poliomyelitis Research Foundation at Rietfontein, which also has provided the laboratory services.

In 1956, this team was officially constituted the Arthropod-borne Virus Diseases Unit of the Council for Scientific and Industrial Research, and a grant towards its running expenses was approved. Thus, during the year under review, the programme of investigations of the arthropod-borne viruses was continued under the joint financial support of the South African Institute for Medical Research, the Poliomyelitis Research Foundation, the Rockefeller Foundation, and the Council for Scientific and Industrial Research, with the valuable collaboration of the Union Health Department and the Veterinary Division of the Department of Agriculture.

Previous Studies

In the preceding years, 1954–1956, the work of the team was oriented to define the extent of the problem of arthropod-borne viruses in South Africa. In order to do this, several expeditions into the field were undertaken and bloods from human beings, domestic and wild animals, and birds, were collected for immunological surveys to determine which viruses were active. Blood was also taken from human patients with febrile illnesses. Mosquitoes and other blood-sucking insects and other arthropods were collected for attempts to isolate virus from them.

Die bloed-immunologiese opnames het duidelik aangetoon dat daar 'n aantal virusse voorkom wat wydverspreide besmetting in mense en plaasdiere orals in Suid-Afrika veroorsaak. Ander virusse kom ook voor, maar is beperk in hul distribusie. Daar is bevind dat immuniteit teen verskeie virusse hoog is in die kusvlaktes van Tongaland in Noord-Natal. Gevolglik was 'n groot deel van die studie op hierdie gebied gekonsentreer. In 1955 is 'n veldstasie in die Ndumu-wildreservaat opgerig en in daardie jaar is 15 stamme van die virus geïsoleer uit muskietgroepe van die *Aedes circumluteolus* spesies wat naby Simbu-pan gevang is. Daar is bevind dat hierdie isolate aan 5 onderskeie antigeniese tipes behoort waarvan drie blykbaar tevore nie bekend was nie. 'n Virus behorende aan die B-groep arthropode-gedraagde virusse is ook geïsoleer uit muskiete van die *Taeniorhynchus uniformis* spesies.

By 'n Naturel is 'n virusstam geïsoleer wat identies is met een van die tevore nog onbekende tipes wat geïsoleer is van die *Aedes circumluteolus*, sodat hierdie spesies dus vir die eerste keer geïnkrimineer word as 'n belangrike vektor-insek. Daar is ook bewys dat minstens drie van die tipes wat in Tongaland geïsoleer is heel dikwels mense, beeste, skape en bokke aanval en dat besmetting hoofsaaklik beperk is tot die laagliggende gebied.

Studies in die Lopende Jaar

Veldwerk in hierdie gebied het dwarsdeur die jaar 1956 voortgeduur. Nog twee isolerings van virusstamme is van die *Aedes circumluteolus* spesies gemaak, terwyl 'n ander virus geïsoleer is van 'n Naturel wat koorsiekte opgedoen het. Proefondervindelik is aangetoon dat hierdie virus oorgedra word deur die muskiet van die *Culex univittatus* spesies en dat dit naverwant is aan, hoewel nie identies nie met, die Oeganda S-virus. Opnames met beskermingstoetse het getoon dat hierdie virus 'n gewone patoëen van mense in die Natalse kusgebied is.

'n Span navorsers het ook na Wesselsbron in die Oranje Vrystaat gegaan om ondersoek in te stel na 'n uitbreking van Slenkdalkoors wat aansienlike veeverliese veroorsaak het. Pogings is aangewend om die vektor van die siekte te vind. Slenkdalkoors is van twee groepe *Culex theileri* spesies geïsoleer, maar pogings om die virus oor te dra deur middel van muskietbyte deur hierdie spesies het gefaail.

Veertien lyne van die Slenkdalkoorsvirus is geïsoleer uit die bloed of lewer van natuurlik-besmette diere, en uit die bloed van sommige is 'n geskikte antigeen berei vir vinnige diagnose van hierdie siekte.

'n Uitbreking van 'n siekte op die grense van die Krugerwildtuin in die gebied tussen en grensende aan die Olifants- en Letabariviere is ondersoek. 'n Virus is geïsoleer by twee mans wat die besmetting opgedoen het op 'n visvangsrit langs die Letabarivier. Hierdie virus is geïdentifiseer as soortgelyk aan die wat die Chikungunya-

The blood immunological surveys clearly showed that a number of viruses are present and cause widespread infection both of man and domestic animals in the Union of South Africa. Others, although present, are more restricted in their distribution. It was found that immunity to several viruses was high in the coastal plain of Tongaland in Northern Natal. Accordingly, much of the study has been concentrated on this area. A field station was established in the Ndumu Game Reserve in 1955. In that year the isolation of 15 strains of virus was made from batches of mosquitoes of the species *Aedes circumluteolus* caught near Simbu Pan. These isolates were shown to belong to 5 distinct antigenic types, three of which were apparently previously unknown. A virus belonging to the Group B arthropod-borne viruses was also isolated from mosquitoes of the species *Taeniorhynchus uniformis*.

A strain of virus was isolated from a sick Native, and it was shown that this virus was identical with one of the previously unknown agents isolated from *Aedes circumluteolus*, which was thus incriminated for the first time as an important vector insect. It was also demonstrated that at least three of the agents isolated in Tongaland attack man, cattle, sheep and goats with great frequency and that infection is essentially limited to the lowland region.

Studies in the Current Year

Field investigations were continued in this area throughout 1956. Two further isolations of strains of virus were made from *Aedes circumluteolus* and another virus was isolated from a Native with fever. It was shown that this virus could be experimentally transmitted by the mosquito *Culex univittatus*, and that it was closely related to, but not identical with, Uganda S virus. Protection test surveys have shown that this virus is a common human pathogen in the Natal coastal area.

A team of workers also went to Wesselsbron in the Orange Free State to investigate an outbreak of Rift Valley fever which caused considerable losses of livestock. Attempts were made to identify the vector of the disease. Rift Valley fever virus was isolated from two lots of *Culex theileri*, but attempts to transmit the virus by bites of these mosquitoes failed.

Fourteen lines of Rift Valley fever virus were isolated from the blood or liver of naturally infected animals, and from the blood of some an antigen suitable for the rapid diagnosis of this disease was prepared.

An outbreak of a disease occurring on the borders of the Kruger National Park, in the area between and adjacent to the Oliphants and Letaba rivers, was investigated. A virus was isolated from the blood of two men who had contracted this infection on a fishing trip to the Letaba river. This virus was identified as being similar to that causing Chikungunya fever. Immunity surveys indicated that this virus had occurred in northern

koors veroorsaak. Immunitetsopnames het aangedui dat hierdie virus reeds voor 1956 in Noord-Natal voorgekom het, en hierdeur is dus aangetoon dat hierdie besmetting nie 'n onlangse invoering na Suid-Afrika is nie hoewel sy voorkoms nie vermoed was nie.

'n Serologiese eenheid het 'n studie gemaak van die immunologiese verwantskap van die virusse wat in Suid-Afrika geïsoleer is. Dit het ook vasgestel op watter voedsterdiere die verskillende muskietspesies en ander artropode teer.

Vollediger immunitetsopnames is ook gedurende die jaar onderneem en hiermee is bevestiging verkry dat die laagliggende kuststreek van Noord-Natal die gebied is wat gunstiger vir artropode-gedraagde virusse is as enige ander gebied wat tot dusver in die Unie van Suid-Afrika bestudeer is. Dit is waarskynlik dat die virus-gunstige streek naby Eshowe eindig in die streek waar die hele landskap onder intensiewe verbouing gebring is, terwyl die Lebomboberge 'n versperring teen die virus in die weste verskaf. Nietemin kom daar tog 'n paar artropode-gedraagde virussiektes op die Transvaalse en Oranje-Vrystaatse hoëveldstreek voor, insluitende die Wes Nyl-, Slenkdal-, Wesselsbron- en Sindbis-koors.

Dit is dus duidelik dat hierdie groep artropode-gedraagde virussiektes 'n belangrike mediese en veeartsenykundige vraagstuk in die Unie van Suid-Afrika skep.

NATUURHISTORIESE BILHARZIA-EENHEID

Hoof van die Eenheid: DR. BOTHA DE MEILLON

Suid-Afrikaanse Instituut vir Mediese Navorsing,
Johannesburg

Bilharziase in Proefnemingsdiere

Die doel van hierdie werk is om deur middel van proefdiere soveel kennis as moontlik op te doen oor Suid-Afrikaanse bilharziase en om hierdie resultate so ver moontlik te vergelyk met stamme van elders. Die werk is hoofsaaklik op muis, *Mastomys* en ape uitgevoer.

Ingewandsbilharziase is 'n strawwe siekte in Egipte, nie alleen omdat die voorkoms daarvan vinniger toeneem nie maar ook omrede van die betreklik ernstiger patologie daarvan in vergelyking met dié in Suid-Afrika.

Verskeie redes is aangevoer om 'n verklaring te vind vir die groot strafheid van Egiptiese ingewandsbilharziase. Dit is beweer dat daar 'n verskil is tussen die Suid-Afrikaanse en Egiptiese parasiete en dat laasgenoemde meer patogenies is. In 'n lang reeks proewe met muis, ape en *Mastomys* is duidelik aangetoon dat indien daar wel enige verskil bestaan, dit maar klein is en onmoontlik verantwoordelik kan wees vir hierdie verskil in patologie.

'n Ander bewering is dat Egiptiese boere en arbeiders voortdurend besmet raak en dat hierdie herhaalde be-

Natal prior to 1956. It was thus demonstrated that this infection was not a recent introduction to South Africa, although its presence had not hitherto been suspected.

A serological unit has studied the immunological relationship of the viruses isolated in South Africa. It has also determined the hosts on which various species of mosquitoes and other arthropods feed.

More detailed immunity surveys were also undertaken during the year. These have confirmed that the coastal lowlands of northern Natal constitute a region which is more favourable for arthropod-borne viruses than any other region yet studied in the Union of South Africa. It seems probable that the virus-favourable zone ends near Eshowe in the region where the entire countryside has been brought under intensive cultivation. The Lebombo mountains constitute a barrier to these virus infections in the West. However, some arthropod-borne viruses, including those of West Nile, Rift Valley, Wesselsbron, and Sindbis fevers, are prevalent on the high veld region of the Transvaal and Orange Free State. It is apparent that this group of arthropod-borne virus diseases constitute an important medical and veterinary problem in the Union of South Africa.

BILHARZIA NATURAL HISTORY UNIT

Head of the Unit: DR. BOTHA DE MEILLON

South African Institute for Medical Research,
Johannesburg

Bilharziasis in Experimental Animals

The object of this work was to learn as much as possible about South African bilharziasis by animal experiment and, where possible, to compare it with strains from elsewhere. The work was carried out mainly in mice, *Mastomys* and monkeys.

Intestinal bilharziasis is a serious disease in Egypt, not only because of its greater frequency, but also because of the relatively graver pathology as compared with South Africa.

Various reasons have been suggested to account for the great severity of Egyptian intestinal bilharziasis. It has been suggested that there is a difference between the South African and Egyptian parasites, the latter being more pathogenic. In a long series of experiments with mice, monkeys and *Mastomys* it was clearly shown that if any differences do exist they are small and unlikely to account for the differences in pathology.

Another suggestion is that the Egyptian peasant and labourer is constantly being reinfected and that this

smetting uiteindelik hul weerstand en immuniteit vernietig en 'n strawwe patologie daaruit volg. 'n Gevolgtrekking hieruit is dat namate ons eie besproeiingskemas uitbrei en herhaalde besmettings as gevolg daarvan algemeen word, ons in die Unie uiteindelik ook die strawwe tipe Egiptiese bilharziase hier sal ontwikkel. In hierdie opsig het proewe met muise en ape nie hierdie opvatting gestaaf nie. Proewe met ape het aangetoon dat die eerste besmetting 'n definitiewe siektepatroon skep wat nie deur 'n daaropvolgende besmetting herhaal word nie tensy die aap eers deur medisyne genees word. Tweedens het herhaalde weeklikse besmetting van ape en muise oor 'n tydperk van 'n jaar of meer geen strawwer patologie deur lewerhistologie geproduseer as die wat op 'n enkel besmetting volg nie. Deur 'n studie van die biologiese vertoning soos groei, reproduksie, sterftes, ens., van groot muiskolonies is ook aangetoon dat herhaalde besmettings geen afbreking in die muis se weerstandsmeganisme veroorsaak nie. Trouens, uit al bogenoemde proewe het een feit opgeduik wat heeltemal die teenoorgestelde was van wat bewys moes word en dit was dat een besmetting met bilharziase 'n immuniteit verskaf wat tot 'n sekere hoogte beskerming bied teen daaropvolgende besmettings. Die Eenheid kon nie daarin slaag om deur herhaalde herbesmetting die wurmlas in diere op te bou nie. Dit skyn twyfelagtig of dit in die mens teweeggebring kan word. Die eerste besmetting is van alleroorheersende belang. Dit kan so straf wees dat dit 'n dier binne 'n dag of wat kan doodmaak, of dit kan lig van aard wees en 'n siektepatroon skep wat kenmerkend vir byna elke diersoort is maar wat nie vererger kan word deur verdere besmettings nie.

Laastens is beweer dat die Egiptenaar 'n strawwer patologie vertoon weens sy proteïengebreklike dieet. Die bewyse tot dusver steun nie die bewering dat 'n lae proteïen-inname die bilharziaverskynsels in muise verhoog nie, hoewel hierdie addisionele las op die siekte wel die sterftes verhoog.

'n Baie interessante aangeleentheid wat hieruit te voorskyn gekom het is dat dit skyn asof die schistosomes in gelyke mate as die voedsterdier deur so 'n proteïengebrek ly. Die volgroeiende wurms is kleiner, lê minder eiers en die is meestal nie lewensvatbaar nie. Die wurms is blykbaar afhanklik van die proteïene wat deur die voedsterdier ingeneem word, en daar kan ook 'n hele aantal ander dieetfaktore wees waarvan hulle heeltemal afhanklik is, hoewel sommige hiervan moontlik onbelangrik vir die voedsterdier kan wees. Dit open natuurlik 'n wye proefnemingsveld met die hoop om leidrade te vind vir 'n meer rasionele terapeutiese middel.

Uit bogenoemde kan die gevolgtrekking gemaak word dat geen een van die vermoede of beweerde oorsake 'n strawwer tipe bilharziale besmetting in muise, *Mastomys* en ape kan produseer nie en dit lyk ook onwaarskynlik dat soiets in die mens veroorsaak kan word. Indien die Eenheid se interpretasie van sy resultate korrek is, hoewel

process of repeated reinfection finally breaks down his resistance and immunity and so arises the severe pathology. An inference here, of course, is that, as our irrigation schemes grow and frequent reinfection becomes common, we in the Union will eventually end up with the severe type of Egyptian bilharziasis. Here again experiments in mice and monkeys have not supported this belief. It has been shown that in monkeys a first infection produces a definite pattern of disease which is not repeated on subsequent reinfection unless the monkey is first cured by drugs. Secondly, repeated weekly reinfection of monkeys and mice over the course of a year or more has not produced a pathology as assessed by liver histology any more severe than that following a single infection. It has also been shown by studies on the biological performance, as measured by growth, reproduction, mortality, etc., of large colonies of mice, that repeated reinfection does not cause any breakdown in the mouse's defence mechanism. Indeed, from all the experiments noted above one fact emerged which was quite the reverse of what it was attempted to prove and that was, that one infection of bilharziasis produces an immunity which protects to some extent against subsequent infections. The Unit has failed completely to build up the worm burden in animals by repeated reinfection. It seems very doubtful if this can be achieved in man. The first infection is all important. It can be so heavy as to kill an animal in a day or so, or it can be mild, producing a pattern of disease which is characteristic for almost each species of animal but which cannot be aggravated by further infections.

Finally it has been suggested that the Egyptian shows a more severe pathology because of his low protein diet. The evidence so far does not support the suggestion that low protein intake aggravates the bilharzial lesions in mice, though the added burden of disease does raise the mortality.

A very interesting matter that has arisen out of this is that it appears that the schistosomes suffer as the host does from the deficiency. The adult worms are smaller, fewer eggs are laid and these are mostly nonviable. The worms are apparently dependent on the protein taken in by the host, they may be completely dependent on a number of other dietary factors, some of which may be relatively unimportant for the host. This, of course, opens up a wide field for experiment with the hope of obtaining clues to a more rational therapeutic agent.

From the above it may be concluded that one of the suspected or suggested causes produce a severer type of bilharzial lesion in mice, *Mastomys* and monkey and it appears unlikely that they will do so in man. If the Unit's interpretation of its results, admittedly based on laboratory animals only, is correct, then there need be

slegs op laboratoriumdiere uitgevoer, dan hoef daar geen vrees te bestaan vir die verskyning van 'n strawwer tipe bilharziase in Suid-Afrika nie.

Proefwerk met Nuwe Medisyne

'n Nuwe anti-bilharziale middel (Hoechst S616) is op proef gestel. Die middel was effektief in muise wat 'n enkel dosis van ongeveer 40 mg./kg. deur die mond ingekry het. Die interessantste en belangrike ontdekking wat egter hiermee gemaak is was dat die middel die uitwerking van 'n voorbehoedmiddel gehad het, deurdat dit uitbreiding van besmetting verhoed het toe dit toegedien is op die dag van of selfs tot 4 dae na blootstelling aan serkarias. Dus is S616 die eerste voorbehoedmiddel wat hiervoor ontdek is.

Langtermyn-observasie op Komplementbindingsreaksie

Die bilharziale komplementbindingsreaksie wat uitgevoer is met antigene wat deur hierdie Eenheid berei is, het 'n hulpmiddel geblyk te wees in die diagnose van bilharziase in gevalle waar gewone tegnieke misluk het. Dit is egter nodig om die perke van die toets te weet, en sommige hiervan is dus ondersoek. Dit is bv. van belang om te weet hoe die reaksie hom gedra na genesing. Vir hierdie doel is die toets vir 40 maande lank opgevolg op kinders wat suksesvol behandel is. Die uitslag was dat die toets vir hierdie hele periode positief kan bly en dat sy gedrag ongeregeld word na verloop van 4 maande. Die toets met die antigene, wat tot dusver deur die Eenheid berei is, kan dus nie gebruik word om genesing vas te stel nie en moet versigtig geïnterpreteer word na behandeling.

Gesondheidsbeeld in Bantoe kinders met en sonder Bilharzia

In samewerking met die Navorsingseenheid vir Menslike Biochemie is 'n ondersoek uitgevoer by twee skole naby Rustenburg—waar bilharzia straf is by een, maar nie by die ander een nie. Die groepe is antropometries, biochemies, hematologies, parasietologies, klinies en fisiologies vergelyk en dis bevind dat die belemmering wat deur bilharziase teweeggebring is baie minder ernstig kan wees as wat gewoonlik vermoed word.

Bilharziale Komplementbindingsantigene

Werk hieroor is voortgesit in samewerking met dr. B. Wolstenholme van die Suid-Afrikaanse Instituut vir Mediese Navorsing. Nuwe antigene en tegnieke word ondersoek met die hoop op verbetering van die toets en om dit meer spesifiek en betroubaar te maak in alle stadiums van die siekte.

Ander Laboratoriumwerk

Werk op die vatbaarheid van slakke, identifikasie van serkaria afgegee deur gevange wilde slakke, instandhouding van stamme van schistosomes en vektors duur voort.

no fear of the appearance of the severe type of bilharziasis in South Africa.

Experimental Work with New Drugs

A new antibilharzial drug (Hoechst S616) was tested. The drug was effective in mice receiving a single oral dose of about 40 mg./kg. The most interesting and important discovery made, however, was that the drug acted as a prophylactic in that it prevented infection from developing when administered on the day of or up to 4 days following exposure to cercariae. S616 is the first prophylactic to be discovered.

Long-term Observations on B.C.F. Test

The bilharzial complement fixation reaction performed with antigens prepared by this Unit has proved to be a helpful tool in the diagnosis of bilharziasis where ordinary techniques have failed. It is necessary, however, to know the limits of the test and some of these have therefore been investigated. It is important to know, for instance, how the reaction behaves after cure. For this purpose the test was followed up in children for 40 months after successful treatment. The results showed that the test may remain positive for this whole period and that it behaves erratically especially after the lapse of 4 months. The test with the antigens, prepared by this Unit thus far, cannot therefore be used to assess cure, and must be interpreted with caution after treatment.

Health Picture in Bantu Children with and without Bilharziasis

In collaboration with the Human Biochemistry Research Unit, an investigation was carried out in two schools—bilharziasis being prevalent at one and not at the other—near Rustenburg. The groups were compared anthropometrically, biochemically, haematologically, parasitologically, clinically and physiologically. It was found that the handicap imposed by bilharziasis may well be less than is usually believed. The investigation continues.

Bilharzial Complement Fixation Antigens

Work on this continued in collaboration with Dr. B. Wolstenholme of the South African Institute for Medical Research. New antigens and techniques are being investigated with the hope of improving the test and making it more specific and reliable in all stages of the disease.

Other Laboratory Work

Work involving susceptibility of snails, identification of cercariae shed by wild caught snails, maintenance of strains of schistosomes and vectors continues.

Konferensie van Wêreldgesondheidsorganisasie oor Bilharziase

Hierdie konferensie wat vanaf 26 November tot 8 Desember 1956 op Brazzaville gehou is, is op uitnodiging en koste van die Wêreldgesondheidsorganisasie deur dr. B. de Meillon van die Natuurhistoriese Bilharzia-eenheid en dr. J. Pitchford van die Veld-eenheid bygewoon. 'n Aantal referate is gelewer. Die konferensie, wat bygewoon is deur deskundiges uit Afrika en ander dele van die wêreld, was 'n groot sukses en het meegehelp om helderheid te verskaf oor baie van die bestaande strydvrage. Een uitstaande gevolgtrekking waartoe geraak is, is dat beseft is dat bilharziase, anders as so baie ander siektes wat deur insekte oorgedra word, nie so maklik sal swig vir 'n eenvoudige regstreekse aanslag op die vektor nie. Baie afgevaardigdes het getuig van mislukkings om resultate hiervan te verkry. Dit het dus duidelik geword dat die aanslag teen bilharziase op alle fronte onderneem moet word en dat sulke aspekte in aanmerking geneem moet word soos onderwys in die breedste betekenis van die woord (skool, bioskoop, lesings, ens.); verbetering van die algemene gesondheidstoestand en sosio-ekonomiese status; verbeterde besproeiingstelsels, en beter terapie. Ook moet die samewerking van plaaslike boere en ander werkverskaffers in die gebied verkry word. Dit vereis dus 'n wydropgesette aanslag waarby die medewerking van verskillende departemente 'n vereiste is.

KARDIO-PULMONALE NAVORSINGSEENHEID

Hoof van die Eenheid: PROF. G. A. ELLIOTT

Universiteit van die Witwatersrand

Die navorsingswerk van die Kardio-Pulmonale Eenheid het gedurende die verslagtydperk in hoofsaak die rigtings gevolg soos volledig vermeld in vorige jare. 'n Paar nuwe ontwikkelings word hieronder bespreek.

Asemhalingsmeganika

Baie aandag is gedurende hierdie tydperk gegee aan die verbetering en uitbouing van die tegnieke. 'n Basiese vereiste vir akkurate drukvolume-studies is 'n metode waardeur 'n akkurate rekord verkry kan word van onmiddellike volume en snelheid van lugvloei gedurende stille en geforseerde asemhaling. Die inherente gebreke van die pneumatograaf, wat tot dusver deur die Eenheid gebruik is, het daartoe gelei dat 'n studie van alternatiewe instrumente vir hierdie doel onderneem is. As gevolg van hierdie werk is twee gewysigde vorms van die spirometer met aansienlik verbeterde eienskappe ontwikkel. Ook is 'n nuwe asemhalingsklep met 'n hoë inneemvermoë en 'n lae weerstand ontwikkel. Pogings om 'n liggaamspletis-mografiese metode van groter akkuraatheid te ontwikkel

World Health Organization Conference on Bilharziasis

This Conference which was held in Brazzaville from 26 November to 3 December, 1956, was attended, at the invitation and expense of World Health Organization, by Dr. de Meillon of the Bilharzia Natural History Unit and Dr. J. Pitchford of the Field Unit. A number of papers were presented. The Conference, attended by experts from Africa and other parts of the world, was a great success and helped to clarify many hitherto controversial matters. One outstanding conclusion was certainly the realization that bilharziasis, unlike so many other vectorborne diseases, is not likely to yield to a simple direct attack on the vector. Failure to achieve results by this means was reported by many delegates. It thus became clear that the attack against bilharziasis must be fought on all fronts and must take into consideration such aspects as education in the widest sense (school, cinema, lecture and so on); improvement of general health conditions and socio-economic status; improved irrigation systems and better therapy. It must also have the collaboration of local farmers and other employers of labour living in the region. This calls for an all-out attack with the collaboration of several departments.

CARDIO-PULMONARY RESEARCH UNIT

Head of the Unit: PROF. G. A. ELLIOTT

University of the Witwatersrand

The research work of the Cardio-Pulmonary Unit during the period under review followed mainly along lines set out and fully reported in previous years. Certain new developments are discussed below.

Respiratory Mechanics

Much attention was devoted during the period to the improvement and amplification of techniques. A basic requirement for accurate pressure-volume studies is a method whereby an accurate record of instantaneous volume and velocity of air flow may be obtained during quiet and forced respiration. The inherent disadvantages of the pneumatachograph hitherto used by the Unit led to the study of alternative instruments for this purpose. As a result of this work two modified forms of spirometer with considerably improved characteristics were developed. A new respiratory valve with high capacity and low resistance was also developed. Efforts to develop a body plethysmographic method of greater accuracy for studying alveolar pressure and thoracic

vir die studie van alveolêre druk en borsgasvolume was dwarsdeur die jaar aan die gang en word nog voortgesit.

Roetine toepassing van studies oor pulmonêre meganika duur voort en het baie bygedra tot 'n begrip van die aard van die kwaal in baie gevalle van longongesteldhede. Die invloed van verskillende faktore, soos inspanning, hartslag en spoed van asemhaling op die werksgedrag van die long, word bestudeer. 'n Beter omskrywing van die invloed van hierdie veranderlikes op die werking van die long is nodig vir 'n deegliker begrip van die invloed van siekteprosesse van die long.

Veranderings in Asemhalingsfunksie as gevolg van Heelkundige Verwydering van Weefsel

'n Langtermyn studie op 'n reeks gevalle van lugpypverwyding voor en na heelkundige behandeling is voltooi en die gegewens word nou vir publikasie gereed gemaak. Dit het lig gewerp op die meganiese en fisiologiese resultate wat verwag kan word na verlies van longweefsel. Bowendien sal dit in die toekoms van praktiese hulp wees om te bepaal watter persone in staat sal wees om 'n heelkundige verwydering van longweefsel te oorleef en sonder nadelige gevolge.

Langtermyn-studie oor die Aard van Emfiseem

Uit 'n beskouing van die kliniese gegewens alleen, is dit duidelik dat daar meer as een tipe „emfiseem” is. Op die oomblik word 'n ontleding gemaak van die gevalle wat deur die Eenheid gedurende die afgelope ses jaar bestudeer is in 'n poging om die kliniese en fisiologiese gegewens te korreleer. In die loop van hierdie studie het dit nodig geword om gebruik te maak van 'n verbeterde metode vir die meting van „radiologiese borsvolume”.

Een interessante feit wat deur hierdie studie aan die lig gebring is, is dat die gebruikelike metodes van longvolume-meting die juiste waarde in sommige gevalle van emfiseem heeltemal onderskat. Dit is omdat groot gedeeltes van longweefsel soms feitlik nie in verbinding met die res van die asemhalingskanaal is nie.

Aanduidings vir Hartheelkunde in Hartklepaandoening

Dit is 'n voortsetting van 'n studie wat in vorige jare hoofsaaklik op die mitraalhartklepaandoenings gekonsentreer was. Gegewens is sedertdien sistematies versamel van gevalle wat ook aan ander gevalle van hartklepaandoenings ly. Onlangs is die kliniese, elektrokardiografiese en radiologiese bevindings van 22 gevalle van aorta-vernouing versamel en met die bloedvatdrukings by operasies, operatiewe bevindings en operatiewe resultate vergelyk in 'n poging om 'n beskrywing te kan gee van die aanduidings van hartklepaandoenings. Die resultate van hierdie studie beklemtoon die hoë risiko van hierdie operasie, maar dui tog op sekere klasse daarvan waarin 'n operasie geregverdig kan wees. 'n Soortgelyke studie word gemaak op persone met longslagaarvernouing op wie operasies uitgevoer is.

gas volume have been pursued throughout the year and are continuing.

Routine application of studies of pulmonary mechanics continue and have contributed greatly to the understanding of the nature of disability in many cases of lung disease. The influence of various factors such as effort, cardiac output and respiratory frequency on the mechanical behaviour of the lung are being studied. Better definition of the influence of these variables on lung mechanics is necessary for the better understanding of the influence of disease processes on the lung.

Changes in Respiratory Function due to Surgical Excision of Tissue

A long-term study of a series of cases of bronchiectasis, before and after surgery, has been completed and is in process of being prepared for publication. It has thrown light on the mechanical and physiological results to be expected after the loss of lung tissue. Moreover, it will be of practical help in the future in deciding which subjects will be able to survive surgical removal of lung tissue without crippling disability.

Long-term Study of the Nature of Emphysema

From consideration of clinical data alone, it is apparent that there is more than one type of “emphysema”. An analysis of the cases studied by the Unit during the past six years is, therefore, being done at present in an attempt to correlate clinical and physiological data. In the course of this study it has been necessary to use an improved method of measuring “radiological chest volume”. One interesting fact resulting from this study is that the conventional methods of measuring lung volume grossly underestimate the true value in some cases of emphysema. This is because large areas of lung tissue are sometimes virtually not in communication with the rest of the respiratory tract.

Indications for Heart Surgery in Valvular Heart Disease

This is a continuation of a study which in previous years was concentrated mainly on mitral disease. Data have since been methodically collected on cases suffering from other forms of valvular heart disease as well. Recently, the clinical, electrocardiographic and radiological findings of 22 cases of aortic stenosis were collected and compared with the vascular pressures at operation, operative findings and operative results in an attempt to define the indications for aortic valvotomy. The results of this study accentuate the high risk of this operation but do suggest certain categories in which the operation may be justified. A similar study is at present being made of cases of pulmonic stenosis which have been operated upon.

Kongenitale Hartsiektes

Gedurende die afgelope twee jaar het die Eenheid ten volle besef hoe moeilik dit gaan om 'n diagnose te maak van 'n oop interventrikulêre septum indien pulmonale hipertensie eers 'n gevaarlike punt bereik het. 'n Oorsig is begin van die kliniese, elektrokardiografiese, radiologiese en hartkateterisasie-gegewens in 'n poging om helderheid te kry oor hierdie probleem.

Binnespierse Magnesiumsulfaat

Onlangs het Johannesburgse navorsers gemeld dat binnespierse inspuitings van magnesiumsulfaat in persone met miokardiale isemie, groot simptomatiese verbetering bewegebring en daartoe geneig is om die serum-lipoproteïenpatroon na normaal te laat terugkeer. Hierdie waarneming, indien bevestig, kan van groot betekenis wees. 'n Proefneming word dus uitgevoer, in medewerking met die Suid-Afrikaanse Instituut vir Mediese Navorsing, deur gebruikmaking van die „double blind”-tegniek. Die kliniese en biochemiese uitwerking hiervan word bestudeer.

Spanningstoetse van die Kardio-asemhalingsfunksie

Navorsingswerk is voortgesit op die ontwikkeling van geskikte spanningstoetse. Die oogmerke met so 'n toets is eerstens om 'n objektiewe waardebeplanning te kry van die totale funksie (soos seleksie van gevalle vir heelkundige behandeling, geskikheidsertifisering vir verskillende beroepe, ens.), en tweedens om skeiding te maak tussen ongeskiktheid weens longgebreke en tussen ongeskiktheid weens hartkwale. 'n Vorm van toetsing is uiteindelik verkry wat die meeste inligting met die minste moeite verskaf, en dit word nou toegepas op normale gevalle en op gevalle van hart- en longkwale wat deur die kliniek gaan. Voorlopige resultate is bevredigend.

Algemeen

Soos in vorige jare, word gevalle van buitengewone belang aan intensiewe studie onderwerp. 'n Voorbeeld hiervan is die geval van die Hamman-Rich-sindroom wat nou vir vier jaar al met herhaalde longfunksie-studies opgevolg is. Deur middel van hierdie volledige studie op 'n persoon, wat langer geleef het as enige ander op rekord, is heelwat interessante inligting verkry oor die progressiewe versteuring van funksie.

Die statistiese voorbereiding, wat al sedert die voorafgaande twee jaar aan die gang is vir 'n studie om die normale waardes te bepaal vir die funksietoets wat toegepas word, duur nog voort.

'n Studie is begin vir bepaling van die invloed van inasemsnelheid op die asemhaling deur dooie gedeeltes, soos gemeet deur 'n stikstof-metode met 'n enkel asem-trekking. Voorlopige waarnemings skyn daarop te dui dat die dooie gedeelte in verband staan met hierdie veranderlike.

Die studie oor die langtermyn-uitwerking van blootstelling aan nitrosegasse, waarvan melding gemaak is in vorige jare, is gedurende hierdie jaar voltooi.

Congenital Heart Disease

The Unit has been impressed during the past two years with the great difficulty of establishing the diagnosis of ventricular septal defect, once pulmonary hypertension has become marked. A review of the clinical, electrocardiographic, radiological and cardiac catheterization data has been commenced in an attempt to clarify this problem.

Intramuscular Magnesium Sulphate

It was recently reported by Johannesburg workers that intramuscular injections of magnesium sulphate in subjects of myocardial ischaemia produced great symptomatic improvement and tended to restore the serum lipoprotein pattern towards normal. This observation, if verified, will be of major importance. A trial is, therefore, being conducted with the collaboration of the South African Institute for Medical Research, employing the "double-blind" technique. Clinical and biochemical effects are receiving study.

Stress Tests of Cardio-Respiratory Function

Work has been continued on the development of a suitable stress test. The objects of such a test are, firstly, to obtain an objective assessment of overall function (as in selection of cases for surgery, certification of fitness for various occupations, etc.) and, secondly, to separate disability due to lung defects from disability due to heart defects. A form of test has eventually been selected to give most information with least effort, and is now being applied to normal controls and cases of heart and lung disease passing through the Clinic. Preliminary results are encouraging.

Miscellaneous

As in previous years, cases of unusual interest have been the subject of intensive study. An example is a case of the Hamman-Rich syndrome which has been followed now with repeated lung function studies for four years. By means of this detailed study in a subject who has lived longer than any other yet recorded, some interesting information has been obtained on the progressive disturbances of function.

The statistical preparation of a study, carried out over the preceding two years to establish normal values for the function tests employed, is still in progress.

A study was commenced to determine the influence of inspiratory velocity on respiratory dead space, as measured by the single-breath nitrogen work-out method. Preliminary observations tended to show that dead space was related to this variable.

The study of the long-term effects of exposure to nitrous fumes reported in previous years was completed during the year.

NAVORSINGSEENHEID VIR KLINIESE VOEDING

Hoof van die Eenheid: PROF. J. F. BROCK

Universiteit van Kaapstad

Serum-cholesterol en Vet in die Dieet

Verdere navorsing het aangetoon dat die peil van serum-cholesterol ongetwyfeld in bedwang gehou kan word deur 'n vermindering van die vetinhoud of van die vet/kalorie-verhouding in die dieet, en ook deur regulering van die relatiewe hoeveelhede van die verskillende vetsoorte. Hoogs waarskynlik is hierdie invloed van vetsoorte op die serum-cholesterol grotendeels afhanklik van die mate van versadiging of onversadiging van die vet. Oor die algemeen veroorsaak die onversadigde vette 'n vermindering in die cholesterol-inhoud van die bloed. Sulke onversadigde vette sluit plantvette en visolies in, is vloeibaar by liggaamstemperatuur en het 'n hoë jodiumsyfer as maatstaf van hul onversadiging. Diervette is betreklik versadig, het 'n lae jodiumsyfer en is gewoonlik solied by liggamstemperatuur. Vetolies wat deur industriële prosesse hidrogineer word, verander ook in soliede vette met 'n lae jodiumsyfer. Sulke versadigde vette is nadelig vir sover hulle 'n verhogende invloed het op die serum-cholesterol. Dit is bewys dat hierdie nadelige gevolge van die versadigde vette tot 'n mate vereffen kan word deur byvoeging van of vervanging met die onversadigde vette. Met ander woorde, kwaliteit van vet is belangriker as kwantiteit.

Daar is nog geen vaste bewys vir die gevolgtrekking dat verlaging van die serum-cholesterol die vooruitsigte vir toekomstige of herhaalde kroonslagartrombose verminder nie. Nietemin bestaan daar reeds indrukwekkende bewys dat hierdie bewering wel juis mag wees, en verskaf dus wel 'n basis vir verdere navorsing.

Hierdie navorsingseenheid is nou besig om genoemde probleme op te volg, beide in die metabolismesaal in die hospitaal en op 'n groep vrywilligers wat andersins 'n normale bestaan voer.

Proteïene-ondervoeding

'n Vergelyking van hierdie probleem met die voorafgaande, naamlik, die studie van die verhouding tussen dieetvet en serum-cholesterol, bied interessante vraagstukke aan. Probleme i.v.m. dieetvet het betrekking tot 'n relatiewe klein deel van die wêreldbevolking, maar rig nietemin verwoesting aan onder diegene wie se intellek en opvoeding aan hulle 'n leidende rol in hul omgewing toevertrou. Die probleem van proteïene-ondervoeding raak egter die groot meerderheid van die wêreld se minderbevoorregte bevolking onder wie dit voorkom as een van die belangrikste oorsake, indien nie die allerbelangrikste nie, van verhoedbare morbiditeit en mortaliteit. Die rede is klaarblyklik dat die proteïene-voedsels

CLINICAL NUTRITION RESEARCH UNIT

Head of the Unit: PROF. J. F. BROCK

University of Cape Town

Serum Cholesterol and Dietary Fat

Further work has established beyond reasonable doubt that the level of blood cholesterol can be manipulated not only by reduction of the total fat or of the fat/calorie ratio in the diet, but also by adjusting the ratio of one fat to another. The apparent determining factor in the differing effects of different fats on blood cholesterol is the degree of saturation or unsaturation. In general, fats of vegetable and marine origin which are liquid at body temperature and have a high iodine number indicating relative unsaturation, are favourable in their effect on blood cholesterol; fats of animal origin which are relatively saturated and have a low iodine number, and oils which have been treated by industrial hydrogenation processes with resultant lowering in iodine number and which are, in general, solid at body temperature, tend to be unfavourable in their effect. There is evidence that the unfavourable effect of saturated fats can to some extent be neutralised by the addition of unsaturated fats; in other words, quality of fat may be more important than quantity of fat in the diet.

The conclusion, that lowering the blood cholesterol influences favourably the prospect of future or recurrent coronary thrombosis through, either the mechanism of atherogenesis, or the mechanism of thrombogenesis, is still an unproved assumption. The evidence supporting the assumption is, however, impressive and it is a justifiable hypothesis for further work.

The Unit has been active in studying these developments both in the metabolism ward and in long-term experiments on volunteers living an ordinary life.

Protein Malnutrition

The contrast between this field of enquiry and the dietary fat/blood cholesterol field is intriguing. The former problem is applicable to a relatively small privileged fraction of the total population of the world, but it is causing havoc among those whose brains and education make them the natural leaders in their communities. The protein-malnutrition problem, however, affects the major underprivileged section of the world's population, where it is probably one of the great causes of correctable morbidity and mortality, if not the greatest. The reason, of course, is that protein foodstuffs are always relatively expensive compared with those food-

betreklik duur is in vergelyking met die gouversadigende en maklik kweekbare styselvoedselsoorte. Die gevolge van proteïene-ondervoeding by minderbevoorregte bevolkingsgroepe is veral te bespeur by die kinders tussen die ouderdom van twee en vier jaar sodra hul proteïen-inname by speentyd beperk word deur die afwesigheid van geskikte plaassvervangers vir melk. Kwashiorkor is dus 'n allerbelangrike leidraad in die navorsing van 'n wêreldwye probleem.

In hierdie Eenheid is verder vooruitgang gemaak met die fraksionering van gedroogde melkpoeier om te bepaal watter bestanddele van melk doeltreffend in die behandeling van kwashiorkor is.

Daar is reeds aangetoon dat genesing van kwashiorkor bewerkstellig kan word deur mengsels van sintetiese preparate van die agttien aminosure, waarvan kaseïen—die hoofproteïen van melk—saamgestel is. Dit kan geskied selfs in die afwesigheid van vitamïene, hoewel laasgenoemde nodig is om genesing te konsolideer. Verdere fraksionering het bewys dat genesing deur mengsels van slegs elf van die agttien aminosure teweeggebring kan word. Die werk hieroor duur voort. Die groot betekenis van hierdie gevolgtrekkings is dat waardevolle kennis ingesamel word i.v.m. die vervaardiging van geskikte plaassvervangers vir melk, wat geheel en al of grotendeels van plantbronne geproduseer kan word.

'n Verdere vertakking van hierdie werk handel oor studies op volwassenes wat in die hospitaal opgeneem word vanweë ondervoeding, soos bewys deur edeem, hartversaking en dies meer. Sulke letsels kom nie voor onder bevoorregtes nie, en kan dus nie verklaar word volgens ondervinding wat onder daardie omstandighede opgedoen word nie. Daar is ten minste 'n moontlikheid, indien nie 'n waarskynlikheid nie, dat proteïene-ondervoeding 'n belangrike oorsaak is. In hierdie studie op volwassenes word daar gepoog om verklarings te vind vir die betreklike minderwaardigheid van mielies as 'n graankos vir menslike gebruik. Hoogs waarskynlik kan hierdie gebrek verreën word deur die toevoeging van peul-produkte of vismeel om sodoende 'n meer voedsame mengsel te verskaf.

Ander Projekte

Navorsingswerk oor die nefrotiese sindroom word voortgesit. Korttermyn balansstudies en langtermyn opvolging van pasiënte, insluitende elektrolitiese balanse, kwantitatiewe bepaling van daaglikse uitskeiding van proteïene in die urine, nierbiopsie, en 'n studie van die gevolge van die steroïde hormone duur voort. Twee belangrike bydraes is gepubliseer en handel oor die werk van die afgelope vyf jaar. 'n Ander belangrike publikasie in hierdie verband handel oor primêre aldosteronisme.

Die studie van vloeistof en elektrolitiese balans, en aminosuurpartisie in die urine van gevalle van kwashiorkor wat die belangrike effek van kaliumtoediening aangedui het, duur voort en word uitgebrei met behulp van 'n

stuffs, mainly of starchy origin, which are easily produced for the satisfaction of hunger. The problem of protein malnutrition is most evident in children between the ages of 2 and 4 years, when protein needs are high and protein supplies have been cut off by weaning and by absence of suitable milk substitutes in under-privileged populations. Kwashiorkor is, therefore, a vital clue in the investigation of a world-wide problem.

The Unit has pursued its previous work on the fractionation of dried milk powder in order to determine which nutrients in milk are the effective curative fractions. It has been shown that cure can be initiated in kwashiorkor by mixtures of synthetic equivalents of the 18 amino acids which are the building stones of casein, the principal protein in milk. This can be done even in the absence of vitamins, although it is apparent that vitamins are required for the consolidation of cure. By further fractionation it has been shown that cure can be initiated with 11 out of the 18 amino acids. Further work is continuing in this field. The significance of these observations is that they give a vital clue for the constitution of a milk substitute prepared wholly or mainly from vegetable sources.

Work has been extended to adult subjects suffering from protein malnutrition and at present in hospital with oedema, heart failure, and other serious disorders. These disorders are not encountered in privileged people and are not yet explicable in terms of experience in medicine among privileged people. There is at least a possibility, if not a probability, that protein malnutrition is one of the vital causative factors. In this adult study, an attempt is being made to find the reasons for the relative inferiority of maize as a cereal for human beings. It is more than possible that maize can be suitably supplemented by pulses or by fish meal so as to render it much more nutritious.

Other Projects

Work on the nephrotic syndrome is proceeding with short-term balance studies and long-term follow-up, including electrolyte balance, quantitative determination of the daily output of protein in the urine, renal biopsy and a study of the response to steroid hormones. The work of the past five years has been published in two important papers. Arising out of this work an important paper has been published on primary aldosteronism.

The study of fluid and electrolyte balance and amino-acid partition in the urine of cases of kwashiorkor, which brought to light the important life-saving effect of potassium supplements, is being continued and expanded

navorsingschemikus van die Williams Waterman Fonds van New York.

Die oorsaak van die hemorragiese verskynsels in kwashiorkor is vasgestel. Belangrike navorsing word gedoen om die effek van dieetvet op bloedstolling in mens en dier te bepaal. Huidige metodes om bloedstolling te bestudeer is óf nie voldoende sensitief óf anders nie noukeurig genoeg nie, en een van die personeellede verbonde aan hierdie Eenheid is tans besig aan die Harvard-Mediese skool, Boston, V.S.A., om nuwe metodes te bestudeer.

Publikasies

Dertien publikasies is deur die Eenheid gedurende die verslagtydperk uitgegee.

TANDHEELKUNDIGE NAVORSINGSEENHEID

Hoof van die Eenheid: PROF. J. T. IRVING

Universiteit van die Witwatersrand,
Johannesburg

Die werk van hierdie Eenheid is voortgesit met die oog op die bepaling van die vernaamste feite i.v.m. tand-sowel as beenvorming en die invloed van verskillende faktore daarop. Daar word gevoel dat totnogtoe baie min in hierdie verband bekend is, en slegs op so 'n fondament kan ons kennis van tandsiektes gegrond word.

Die Chemie van Verkalking

Die werk in die vorige verslag beskryf is uitgebrei en het in omvang toegeneem. Vantevore is reeds bevind dat die eind- en ϵ -aminogroepe van dentienkollageen nou verwant is met die binding van die kalksoute—in die vorm van apatietkristalle—met die organiese grondlaag, aangesien hierdie groepe beskikbaar geword het vir reaksie met dinitrofluorbenseen toe die weefsel ontkalk is. Verdere werk het aangetoon dat dieselfde vir been geld, met dié verskil egter dat in been gedurende ontkalking minder groepe vir reaksie beskikbaar word tensy hulle tydens die verkalkingsproses met dinitrofluorbenseen behandel is. Daar vind waarskynlik in been gedurende ontkalking die een of ander herrangskikking van die kollageenmolekuul plaas, dog dit gebeur nie in dentienkollageen nie. Die resultate tot dusver verkry, is bevestig deur gebruikmaking van 'n kleuringsmetode wat op heeltemal ander beginsels berus. In die geval van huidkollageen is bevind dat ongeveer die helfte van die totale ϵ -aminogroepe met dinitrofluorbenseen gereageer het, terwyl by volkome verkalkte dentien en been so goed as geen van daardie groepe enige reaksie daarmee vertoon het nie. Ontkalkingsmiddels het geen invloed op die ϵ -aminogroepe van huidkollageen gehad nie, maar het

with the co-operation of a research chemist from the Williams Waterman Fund of New York.

The cause of the haemorrhagic phenomena of kwashiorkor has been defined. An important study is under way on the effect of dietary fats on blood coagulation in man and animals. Existing methods for the study of blood coagulation proved to be neither sufficiently sensitive nor accurate and an associate of the Unit is at present at the Harvard Medical School, Boston, U.S.A., studying new methods.

Publications

Thirteen publications were issued by the Unit during the period under review.

DENTAL RESEARCH UNIT

Head of the Unit: PROF. J. T. IRVING

University of the Witwatersrand,
Johannesburg

The work of this Unit has continued towards the fundamental facts of tooth, and also bone, formation and the influence of various factors upon this. It is felt that there is as yet little information in this field, and only upon such grounding can our knowledge of dental disease be properly based.

Chemistry of Calcification

The work described in the previous report has been extended and amplified. Previously it was found that the terminal and ϵ -amino groups of dentin collagen were intimately related to the binding of the lime salts—in the form of apatite crystals—to the organic matrix, since these groups became available to react with dinitrofluorobenzene when the tissue was decalcified. Further work showed that the same applied to bone, but with this difference, that in bone during decalcification, fewer groups were available to react unless they were treated with dinitrofluorobenzene as decalcification was occurring. Presumably some rearrangement of the collagen molecule occurs in bone during decalcification, but this does not take place in dentin collagen. The results so far obtained were confirmed using a dye method which depends upon quite different principles. In hide collagen about half the total ϵ -amino groups were found to be reactive with dinitrofluorobenzene, whereas in fully calcified dentin and bone virtually none were. Decalcifying agents had no effect upon the ϵ -amino groups of hide collagen but caused, when decalcification was complete,

veroorzaak dat na afloop van die ontkalking meer as 90 persent van daardie groepe in been en dentien reaktief geword het. Dit is dus heeltemal moontlik dat die verkalkingsvermoë van 'n weefsel berus op die reaktiwiteit van die kollageen waaruit dit bestaan.

Die Meganismes van Tandverkalking

Glasuurvorming word reeds enige jare deur die Eenheid bestudeer, veral uit die oogpunt van die invloed van vitamien E en proteïen op die dieet. By onlangse ondersoek het geblyk dat die vetgehalte van die dieet, en veral die gehalte aan hoogsonversadigde vetsure, 'n beherende invloed op die werking van sowel vitamien E as proteïen het, en dit selfs in so 'n mate affekteer dat proteïen vitamien E grotendeels kan vervang indien die hoeveelheid van sulke vetsure voldoende verminder word. Dit is reeds 'n bekende feit dat hoogversadigde vette 'n belangrike rol in ander liggaamsprosesse speel, en hul verband met glasuurvorming is nog 'n voorbeeld hiervan.

Die Selskeikunde van Tandverkalking

Die intrasellulêre lipoïede—met inbegrip van die Golgi-liggaampies—word as een van die indekse van die metaboliese aktiwiteit van selle beskou. Onlangs is begin met die bestudering van intrasellulêre lipoïede in tandvormende selle, veral met die doel om veranderinge in hul eienskappe en verspreiding onder verskillende dieet- en endokriene-invloede op te spoor. Terselfdertyd word intrasellulêre lipoïede in beenvormende selle en dié in die selle van die mondslymvliese bestudeer met die oog op vergelyking. Hierdie ondersoek is nog in die stadium waarin die vereiste metodes gestandaardiseer word.

Die Metabolisme van Verkalking

Nog 'n navorsingsbeampte het op 1 Maart diens aanvaar. Sy sal verantwoordelik wees vir die bestudering van mikrochemiese en asemhalingsmetodes, en ook vir die ensiemiologie en metabolisme van die tand- en mondweefsels.

Mondflora

Dr. A. J. Clement van die Tandheelkundige Skool van die Witwatersrandse Universiteit het as deelytdse vrywillige werker sy ondersoek i.v.m. mondflora voortgesit. Hy is besig om metodes uit te werk vir die klassifisering en identifisering van verskillende laktobasilstamme.

ENDOKRIEN/METABOLISME- NAVORSINGSGROEP

Hoof van Groep: PROF. F. FORMAN

Universiteit van Kaapstad

Adrenale Steroïde

Die berekening van urinêre corticoïde en aldosterone sowel as van plasma-cortisol deur middel van chromatografie

over 90 per cent of those in bone and dentin to become reactive. Thus the calcifiability of a tissue may well reside in the reactivity of the collagen of which it is composed.

Mechanisms of Tooth Calcification

The process of amelogenesis has now been investigated for some years in the Unit, especially from the viewpoint of the influence of vitamin E and protein in the diet. Recent work has shown that the fat content of the diet, and especially the content of highly unsaturated fatty acids, has a controlling effect upon the action of both vitamins E and protein, so much so, that, if the level of these fatty acids is reduced sufficiently, protein can largely replace vitamin E. As is now well known, highly unsaturated fats play an important role in other spheres of bodily activity and their implication in amelogenesis is a further instance of this.

Cytochemistry of Tooth Calcification

The intracellular lipoids—including the Golgi bodies—are held to be one index of the metabolic activity of cells. Recently, work began upon the intracellular lipoids in tooth-forming cells, with a view particularly to tracing changes in their properties and distribution under various dietary and endocrine influences. At the same time, a comparative study is being made of the intracellular lipoids in bone-forming cells and of those in the cells of the oral mucosa. This investigation is still at the stage of standardizing the techniques to be used.

Metabolism of Calcification

An additional research officer assumed duty on March 1st. Her duties will be to study by microchemical and respiratory methods, the enzymology and metabolism of the dental and oral tissues.

Oral Flora

Dr. A. J. Clement of the Witwatersrand University Dental School continued his work in a part-time voluntary capacity on the oral flora. He is working out methods for classifying and identifying various strains of lactobacilli.

ENDOCRINE/METABOLIC RESEARCH GROUP

Head of the Group: PROF. F. FORMAN

University of Cape Town

Adrenal Steroids

Estimations of urinary corticoids and aldosterone and of plasma cortisol by chromatography have been

grafie is voortgesit veral met betrekking tot swangerskap, diabetiese swangerskap, en suikersiekte met en sonder komplikasies. Die veranderings in 'n geval van funksionerende adrenale karsinoom en in drie gevalle van Cushing se sindroom is ondersoek.

Plasma-insulien

Pogings om 'n berekening te maak van plasma-insulienaktiwiteit deur middel van 'n rotdiafragma het nie geslaag nie.

Suikersiekte

Ondersoeke na die voordiabetiese toestand, duur voort. Kliniese toetse is onderneem om hipoglisemiese middels mondelings toe te dien, terwyl 'n opname oor suikersiekte voortgesit word.

Geslagtelik

Die nuwe (Albert) metode vir die berekening van die follikulêr-stimulerende hormone deur gebruikmaking van die eierstok van 'n rot het goed gewerk. Die algemene ondersoek na intergeslagtelike probleme duur voort.

Kalsium en Fosfor

Navorsingswerk duur voort in die rigting soos tevore aangedui. In besonder is 'n breedvoerige reeks proewe oor die nier-hantering van kalsium en fosfor uitgevoer met enigsins onverwagte resultate, wat binnekort gepubliseer sal word.

Breedvoerige stofwisselingstudies is uitgevoer op pasiënte wat ly aan idiopatiese hiperkalciemie, sarcoidosis en vitamien D-bestande osteomalasie.

HARTNAVORSINGSEENHEID

Hoof van die Eenheid: PROF. H. W. SNYMAN

Departement van Interne Medisyne,
Universiteit van Pretoria

Die werksaamhede van hierdie Eenheid het gedurende die afgelope jaar goed gevlot. Honderd-een-en-dertig hartkateterisasies is tot dusver in die kliniek uitgevoer, waarvan minstens vier gevalle nou gepubliseer kan word. Die meeste werk was van 'n suiwer diagnostiese aard. Saam hiermee word studies in die teater dikwels by operasie gedoen.

Naas die kateterisasies is die werk van die tegniese assistent veral toegespits op die bereiding van hartmonsters vir anatomiese studies, veral die van die vaatstelsel. Die materiaal verkrygbaar by outopsies is ongelukkig baie skaars maar daar is egter ook harte by teregstellings verkry. Tot dusver is ongeveer 37 harte verkry, en kontras-medium foto's is gedoen. Met die aankoop van 'n mikrotroom sal die histologiese voorbereiding en studering ook vinniger geskied.

continued, with particular reference to pregnancy, diabetic pregnancy and diabetes with and without complications. The changes in a case of functioning adrenal carcinoma and in 3 cases of Cushing's syndrome have been investigated.

Plasma Insulin

Attempts to estimate plasma insulin activity by a rat diaphragm method have remained unavailing.

Diabetes

Investigations on the prediabetic state are being continued. Clinical trials of the oral hypoglycaemic agents have been undertaken, while a survey of diabetes is being continued.

Sex

The new (Albert) method of estimation of follicular stimulating hormones by use of the rat ovaries has been working well. The general investigation into problems of intersex continued.

Calcium and Phosphorus

Work has continued on the lines previously outlined. In particular, a detailed series of experiments into the renal handling of calcium and phosphorus has been performed, with somewhat novel results which will be published shortly.

Detailed metabolic studies have been made of patients suffering from idiopathic hypercalcaemia, sarcoidosis and vitamin D. resistant osteomalacia.

HEART RESEARCH UNIT

Head of the Unit: PROF. H. W. SNYMAN

Department of Internal Medicine,
University of Pretoria.

During the past year the activities of this Unit proceeded smoothly. To date, a hundred and thirty heart catheterizations have been carried out in the clinic, of which at least four cases can now be published. Most of the work was purely diagnostic in nature. Additional to these, studies are frequently made in the theatre during operations.

In addition to the catheterizations, the work of the technical assistant is concerned mainly with the preparation of heart specimens for anatomic studies, particularly the study of the vascular system. Unfortunately the available material from autopsies is scarce, but some hearts have also been acquired at executions. To date, about 37 hearts have been obtained and contrast medium Röntgen plates have been taken. With the acquisition of a microtome, histological preparation and study will also be speeded up.

Die Eenheid gaan voort met die studie in verband met tuberkulose perikarditis, en daar word gepoog om voor en na verwydering deur operasie ook linker ventrikulêre drukke te verkry. Die voorkoms van pulmonale hipertensie word nog gevolg. Geen verdere gevalle van idiopatiese pulmonale hipertensie is teengekom nie, maar die ondersoek word nog voortgesit. Verder sal geprobeer word om die verhouding tussen vertraagde eerste klank en verhoogde linker atrieële drukke te bepaal om daaruit 'n afleiding te maak vir voorspelling van die linker atrieële drukke volgens vertraagde eerste klank op die fonokardiogram.

Die aanvraag vir hartkateterisasiestudies vir diagnostiese doeleindes het ook baie toegeneem, en nou word twee dae i.p.v. een dag per week hiervoor afgestaan.

Die Eenheid het daarin geslaag om 'n eie deurstromingsapparaat (cuvette) te maak. Die apparaat is voltooi en moet nog net uitgetoets word. Hierdeur sal die Eenheid in staat gestel word om suurstofbepalings te maak terwyl die kateterisasiessies aan die gang is.

NAVORSINGSEENHEID VIR MENSLIKE BIOCHEMIE

Hoof van die Eenheid: DR. A. R. P. WALKER

Suid-Afrikaanse Instituut vir Mediese Navorsing

Kalsiummetabolisme in die Suid-Afrikaanse Bantoe

In samewerking met kindergeneeskundiges van die Coronation-hospitaal vir nie-blankes is verdere observasies gemaak oor die voorkoms van kliniese rachitis in jong Bantoe kinders, veral met betrekking tot die seisoensvoorkoms daarvan.

Ystermetabolisme van die Suid-Afrikaanse Bantoe

Suid-Afrika skyn die enigste land in die wêreld te wees waar 'n volwasse bevolking in die algemeen die gewoonte het om 'n voedingstof te gebruik, nl. yster, wat 10 tot 20 maal meer is as wat sy liggaam vereis. Die biochemie, hematologie en moontlik ook patologie van die gebruiklike oormaat yster skep 'n aanloklike probleem, waarvan die oplossing alleen deur navorsers in hierdie land gevind kan word. Een aspek wat nou bestudeer word, is die voorkoms van ystergebrek-anemie in die plaaslike Bantoe, vergeleke met ander nie-blankebevolkings in verskillende dele van die wêreld. Talryke observasies het getuig van die gunstige posisie waarin die Bantoe in hierdie besondere opsig verkeer en wat blykbaar toegeskryf kan word aan sy hoë inname en reserwes van yster. Dog aangesien verandering in hoogteligging sekere bloedwaardes beïnvloed, sal sulke waardes wat verkry is vir die Rand en ander gebiede wat enige duisende voet bo seespieël geleë is, ontoelaatbaar wees vir die doel om bevredigende vergelykings te maak met ooreenstemmende gegewens afkomstig van laagliggende plekke digby die see. Gevolg-

The Unit is continuing its study in connection with tuberculous pericarditis and an endeavour is being made to obtain left ventricular pressures in the theatre before and after pericardiectomy. The incidence of pulmonary hypertension is still being followed up. No further cases of idiopathic pulmonary hypertension have been encountered but investigations are being continued.

An endeavour will also be made to determine the relation between the delayed first heart-sound and increased left atrial pressures, in order to make deductions for the prediction of the left atrial pressures according to delayed first sound on the phonocardiogram.

The demand for cardiac catheterization studies for diagnostic purposes has increased and two days, instead of one day per week are now being devoted to this work.

The Unit has succeeded in making its own cuvette. The apparatus is completed and needs only to be tested. This will enable the Unit to carry out oxygen determinations during catheterizations.

HUMAN BIOCHEMISTRY RESEARCH UNIT

Head of the Unit: DR. A. R. P. WALKER

South African Institute for Medical Research

Calcium Metabolism in the South African Bantu

In collaboration with paediatricians from the Coronation Non-European Hospital, further observations have been made of the incidence of clinical rickets among young Bantu children, especially in regard to the seasonal incidence.

Iron Metabolism of the South African Bantu

South Africa appears to be the only region in the world where, generally speaking, an adult population habitually consumes a nutrient, namely iron, 10-20 times more than its physiological requirement. The biochemistry, haematology, and possible pathology of habitual iron excess thus constitutes a fascinating problem, the clarification of which can come only from the workers in this country. One aspect being studied is the incidence of iron deficiency anaemia in the local Bantu compared with other non-White populations in various parts of the world. Numerous observations have testified to the favourable position of the Bantu in this particular respect, which, of course, is believed to be due primarily to the high intake and reserves of iron in these people. However, since change in altitude affects certain blood values, such values obtained on the Rand and other regions several thousand feet above sea level, do not permit the making of satisfactory comparisons with corresponding data obtained at altitudes near sea level.

lik is, in samewerking met prof. E. B. Adams van die Durbanse Mediese Skool, studies begin waarin sekere bloedwaardes en ander gegewens verkry word van Bantoe-pasiënte in die hospitaal, sowel as van stedelike en plattelandse Bantoes en van beperkte Indiër- en blanke bevolkingsgroepe. Die keuse van Durban is veral geskik, want behalwe dat dit by seevlak geleë is, kom 'n abnormale ysterkonsentrasie daar blykbaar meer algemeen voor as wat die geval op die Rand is.

Ysterkleuring in Bantoe-aortas

In Kanada het studies aangetoon dat indien die borslagaar van die mens aan die Berlynsblou-reaksie blootgestel word, daar dan gekleurde kolle ontstaan op en in die omtrek van letsels wat aanwesig is. Die kleuring word as 'n indirekte bewys van binnewardse bloeding beskou, en skyn te korreleer met die omvang en strafheid van aterosklerotiese letsels. Die Eenheid het nou ooreenstemmende ondersoeke uitgevoer op 'n groot reeks aortas van Bantoes en ook op die van volwasse blankes. Observasies wat op aortas van laasgenoemde gedoen is, kom wesenlik ooreen met die wat deur die Kanadese navorsers beskryf is. Daarteenoor vertoon 'n groot gedeelte van die Bantoe-aortas verspreide blouverkleurde kolle wat soms die hele monster affekteer en soms deur beide die intimale en die mediale lae strek. Dit skyn of die kleuring nie in verband staan met die aanwesige letsels nie, wat dikwels baie gering is. Observasies het aangetoon dat die graad van kleuring goed korreleer met die mate van siderose wat in die lewer aanwesig is. Tog het studies aangedui dat die kleuring buite verhouding is tot die ysterkonsentrasie in die betrokke aorta. Trouens, die gemiddelde ysterkonsentrasie in aortas van Bantoes toon min verskil met die konsentrasie daarvan in aortas van blankes. Die oorsaak van die verspreide bloukleuring is nog duister, maar dit is sekerlik nie toe te skryf aan ysterbesoedeling nie.

Ginekomastia

In samewerking met drs. I. Bersohn en W. L. Politzer van die Suid-Afrikaanse Instituut vir Mediese Navorsing en dr. Martini van die Witwatersrandse hospitaal van die Naturellewerkersvereniging, het die Eenheid verdere observasies gemaak op Bantoe-mynwerkers wat aan strawwe ginekomastia ly. Een-en-twintig gevalle is bestudeer, en hoewel die ondersoek nog onvolledig is, lyk dit of die resultate tot dusver verkry die algemene mening in twyfel trek dat ginekomastia in die Bantoe 'n teken is van kroniese proteïen-ondervoeding, en dat abnormale funksie van die lewer in die Bantoe 'n nadelige uitwerking het op die normale inaktivering van hormone wat deur die binyer en eslagskliere geproduseer word en gevolglik tot ginekomastia lei.

Die mening is eerder dat beskadiging van die lewer en ander organe, tydens speentyd en onmiddellik daarna,

Accordingly, collaborative studies have been initiated with Professor E. B. Adams of Durban Medical School, in which certain blood values and other data are being obtained on Bantu patients in hospital, and on urban and rural Bantu, and with limitations on Indian and White population groups. The choice of Durban, apart from being situated at sea level, is especially apposite, since abnormal iron deposition is apparently even more common than on the Rand.

Iron Staining in Bantu Aorta

Studies in Canada have shown that, when human thoracic aorta is exposed to the Prussian Blue reaction, areas of discoloration develop in and near the lesions present. The staining is regarded as indirect evidence of intramural haemorrhage, and appears to correlate with the extent and severity of atherosclerotic lesions. The Unit has now carried out corresponding examinations on a large series of aorta from Bantu, also from European adults. Observations made on the latter aorta agree substantially with those described by the Canadian workers. On the other hand, a large proportion of Bantu aorta show areas of diffuse blue staining, sometimes affecting the whole specimen, and sometimes extending through both intima and medial layers. The staining appears to be unrelated to the lesions present, which are often very slight. Observations have shown that the degree of staining correlates well with the extent of the siderosis present in the liver. Yet studies have shown that the staining is out of all proportion to the iron concentration in the relevant aorta; actually, mean iron concentrations in Bantu aorta show little difference from the concentration in European aorta. The cause of the diffuse blue staining is obscure, but certainly is not due to iron contamination.

Gynaecomastia

In collaboration with Drs. I. Bersohn and W. L. Politzer of the S.A.I.M.R., and Dr. Martini of the Witwatersrand Native Labour Association Hospital, this Unit has made further observations on Bantu mine-workers suffering from severe gynaecomastia. Twenty-one subjects have now been studied. Although the investigation is incomplete, the results thus far appear to call into question the commonly-held views that gynaecomastia in the African is an expression of chronic protein malnutrition, and that hepatic dysfunction in the Bantu impairs the normal inactivation of hormones produced by the adrenals and gonads, and hence leads to gynaecomastia.

It is considered rather that injury to the liver and other organs at weaning time and immediately thereafter

'n substraat vorm wat geskik is vir die bespoediging van lewersiekte (fibrose, sirrose, karsinoom), ginekomiastia en miskien ook ander siektes later in die lewe.

Parasitisme en Gesondheid

Op hierdie gebied is verdere navorsing gedoen en dit word gehoop om dit in die toekoms nog verder uit te brei en te intensifiseer. Hierdie studies is hoofsaaklik in samewerking met die Bilharzia Natuurhistoriese Navorsings-eenheid en die Lewerfunksie-eenheid uitgevoer.

Die studies oor die mondelinge toediening van *Miracil D* vir die behandeling van Bantoe-skoolkinders besmet met bilharzia, is voortgesit. Van die 150 skoolkinders wat behandel is (almal het eiers in die uriene getoon), het slegs 50 persent negatief geword na 'n tussenpose van 4 maande, en hierdie verhouding het na 'n 6 maande gedaal tot 40 persent, vermoedelik as gevolg van herbesmetting. Hierdie genesingsverhouding, hoewel teleurstellend, stem ooreen met die genesingsverhouding wat elders gemeld is.

Verskeie biochemiese en hematologiese observasies is gemaak op 24 Bantoeskole en 24 Bantoe dogters voor behandeling en toe weer 5 maande na behandeling. Afgesien van die totale vermindering in die graad van beskningsnelheid van rooi bloedliggaampies, skyn dit of daar geen opvallende verskil is tussen die syfers wat verkry is op kinders wat positief gebly en op die wat negatief geword het nie. Miskien was die tussenpos van „negatiefheid” te kort. Betekenisvolle verskille kan miskien wel te voorskyn kom by die volgende en finale ondersoek wat beplan word om 'n jaar na behandeling plaas te vind.

Die vergelyking van Bantoe-skoolkinders van twee naby mekaar geleë skole—een met en een sonder bilharzia—in die Rustenburgse gebied, word voortgesit. Kliniese ondersoek is onderneem deur die Senior Kindergeneeskundige van die Baragwanath-hospitaal vir nie-blanke op groepe kinders van beide skole. Om enige moontlike vooroordeel uit te skakel, is die kindergroepe van beide skole vermeng, maar die observasies het geen betekenisvolle verskil getoon tussen die kinders met of sonder bilharzia nie. Die totale beeld van die biochemiese en hematologiese observasies is dat in die toetse wat uitgevoer is die kinders van die skool sonder bilharzia die kinders van die skool met bilharzia effens oortref het.

Verskillende fisiologiese toetse, insluitende observasies oor werksvermoë en die staptoets, is deur die Eenheid vir Toegepaste Fisiologie van die Kamer van Mynwese op die kinders van die skole uitgevoer. Observasies op die oë en tande is uitgevoer deur die betrokke spesialiste, hoofsaaklik om die gesondheidspeil wat aangetref is, volledig te maak. Intelligensietoetse word uitgevoer deur die Nasionale Instituut vir Personeelnavorsing. Die stoelgange wat geneem is van al die groepe kinders wat bestudeer is, is ondersoek. Die vernaamste bevinding was

engenders a substrate suitable for the precipitation of liver disease (fibrosis, cirrhosis, carcinoma), gynaecomastia and perhaps other diseases in later life.

Parasitism and Health

In this field, further research has been carried out which it is hoped to increase and intensify in the future. The studies described have been carried out in collaboration mainly with the Bilharzia Natural History Unit and the Liver Function Unit.

The studies of the oral administration of *Miracil D* in the treatment of Bantu school-children infected with bilharzia were continued. Of the 150 schoolchildren treated (all having ova in their urine), only 50 per cent. became negative after an interval of 4 months. This proportion became reduced to 40 per cent. after 6 months interval, presumably due to re-infestation. This cure rate, although disappointing, corresponds with the cure rate reported elsewhere.

Various biochemical and haematological observations were made on 24 Bantu boys and 24 girls before treatment, and 5 months after treatment. Apart from an overall reduction in erythrocyte sedimentation rate, there appeared to be no obvious difference between figures on those children remaining positive, and those who became negative. Perhaps the interval of “negativeness” was too short. Significant differences may become apparent at the next and final examination, which is planned to take place a year after treatment.

The comparison of Bantu schoolchildren from two nearby schools, with and without bilharzia, in the Rustenburg region was continued. Clinical examinations were undertaken by the Senior Paediatrician of Baragwanath Non-European Hospital on groups of children from both schools. To obviate bias, the groups of children from each school were mixed, but the observations did not reveal a significant difference between the children with and those without bilharzia. The overall picture of the biochemical and haematological observations is that the children from the school without bilharzia are very slightly superior, in the tests carried out, to the children from the school with bilharzia.

Various physiological tests, including observations on working capacity, and the step test, were carried out on the children from the schools by the Applied Physiology Unit of the Chamber of Mines. Observations on eyes and on teeth were made by the relevant specialists, mainly to fill out the health picture obtained. Intelligence tests are being carried out by the National Institute for Personnel Research. The stools, taken from all groups of Bantu children studied, were examined. The main

die talle gevalle van lae voorkoms van parasiete, veral *ascaris*.

'n Interessante aspek van hierdie ondersoek was die lig wat dit gewerp het op die waarde van „enkel toetse” op urine vir die aanwesigheid van eiers van *Schistosoma haematobium*. Die mening is nou dat die uitskeiding van bilharziale eiers uit die blaas baie ongeregeld is en dat selfs in 'n enkele analise van 'n monster daar so min as 30 persent van positiewe opgespoor kan word. Die ondersoek het egter aangetoon dat by die Tweedepoortskool, wanneer al die kinders straf besmet was met bilharzia, enige enkele ondersoek tot meer as 90 persent positiewes aangetoon het. Die toepaslikheid van hierdie observasies vir vasstelling van die aanwesigheid van bilharzia in 'n gegewe bevolkingsgroep, is klaarblyklik, en verdere navorsingswerk in hierdie verband word voortgesit.

VOEDINGNAVORSINGSEENHEID

Hoof van die Eenheid: PROF. J. GILLMAN

Universiteit van die Witwatersrand,
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Voeding

Vitamiën A-metabolisme

Tydens die sintese van vitamien A, is die al-trans, 2-cis- (of neo-) en 6-cis-isomere geïsoleer. Dit het die geleentheid verskaf om die metode vir die bepaling van vitamien A aan 'n verdere toets te onderwerp. Dit is bekend dat neo- en 6-cis-vitamien A onderskeidelik 76 persent en 23 persent van die sterkte van al-trans vitamien A bevat.

Voedingsfaktore wat Goeie Funkisionering van die Hartslagaarsstelsel Reguleer

In 'n reeks proewe op 300 rotte is aangetoon dat ontsteking van die slagaaarbuitewand veroorsaak kan word deurdat die niere nie behoorlik funksioneer nie, weens 'n verstoring in die kalsium- en fosformetabolisme. Bloedvatletelsels kan verhoog of gedeeltelik voorkom word onderskeidelik deur vermeerdering of verlaging van die skildklierfunksie. Die veroorsaking van groot patologiese veranderings in die niere van rotte deur verskillende dieettegnieke gaan gepaard met akute en kroniese hartspierontsteking sonder enige merkbare verandering in die struktuur van die slagare, insluitende in die hoofslagaar. Plaaslike faktore wat verantwoordelik is vir oormatige mineralisering van die weefsels word tans ondersoek. Aterosklerose is aangedui deur 'n reeks toetse met 85 bobbejane op 'n dieet wat laag in dierevet was.

Dieetfaktore wat Liggaamsgewig en Vrugbaarheid Reguleer

Diëte wat 30 persent vet, 30 persent proteïene en 36 persent koolhidraat bevat het, het vetsug in rotte veroorsaak,

finding has been the often very low incidence of parasites, particularly *ascaris*.

An interesting aspect of this investigation was the light thrown upon the value of “spot tests” on urine for the presence of ova of *Schistosoma haematobium*. The current view is that the voiding of bilharzial ova from the bladder is very irregular and that single sample analysis may well pick up as little as 30 per cent. of positives. The investigation showed, however, that at Tweedepoort School, when all children had heavy infestations of bilharzia, any one examination gave over 90 per cent. positives. The relevance of these observations to the assessment of the presence of bilharzia in a given population group is obvious, and further work is in progress.

NUTRITION RESEARCH UNIT

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Nutrition

Vitamin A metabolism

During the synthesis of vitamin A the all-trans, 2-cis-(or neo-) and 6-cis-isomers, were isolated. This provided the opportunity to submit the assay method for vitamin A to a further test. It is known that neo- and 6-cis-vitamin A possess respectively 76 per cent. and 23 per cent. of the potency of all-trans vitamin A.

Nutritional factors regulating the integrity of the cardio-vascular system

In a series of 300 rats, it was shown that periarteritis can be induced by derangement of kidney function, mediated through a disturbance in calcium and phosphorus metabolism. The vascular lesions can be intensified, or partially prevented, by increasing or depressing respectively the function of the thyroid gland. The production of gross pathological changes in the kidney in rats by various dietary techniques is accompanied by acute and chronic myocarditis without any marked change in the structure of the arteries, including the aorta.

The local factors responsible for excessive mineralization of the tissues are being investigated.

Atherosclerosis has been described in a series of 85 baboons receiving diets low in animal fats.

Dietary factors regulating body weight and fertility

Diets containing 30 per cent. fat, 30 per cent. protein and 36 per cent. carbohydrate led to marked obesity in rats. The offspring of the parent stock became obese

en die aanteel van die rotte het vetsug ontwikkel op 'n baie jonger leeftyd as wat met die ouers die geval was. In die tweede geslag het die lewensvatbaarheid van die kleintjies verminder en in die derde geslag kon geen een van die wyfies kleintjies voortbring nie. Voorlopige gegewens dui aan dat vetsug by die rotte nie gepaard gegaan het met 'n afname in hul langlewendheid nie.

Rotte wat gevoer is op 'n dieet wat hoog in proteïene, laag in koolhidraat en laag in vet was, het 'n verlaagde groeitempo getoon—die maksimum liggaamsgewig wat bereik is, was aanmerklik minder as die gewigte van die kontrolerotte. Die vrugbaarheidsyfer was hoog en die sterfesyfer onder die kleintjies laag. Hierdie waarneming weerlê die algemene opvatting dat die vrugbaarheidsyfer verlaag word wanneer die proteïengehalte van die dieet tot bokant bepaalde minima verhoog word. Die verskille in die siektepatroon deur die dieet veroorsaak, word nou ondersoek.

Dieefaktore wat die menstruasiesiklus van die bobbejaan beïnvloed

Daar is reeds aangetoon dat die menstruasiesiklus van die bobbejaan gou versteur kan word deur dieet. Sodanige verstourings was egter nie toe te skryf aan gebrek aan vitamien B₁₂, foliensuur of sitrovorumfaktor of diereproteïene nie, maar aan 'n tot hertoe ongeïdentifiseerde faktor wat in beeslewer voorkom. Beeslewer word nou gefraksioneer met die doel om die faktor of faktore te identifiseer wat, volgens die dieetverband waarin dit in ons proewe gebruik is, noodsaaklik is vir instandhouding van 'n normale menstruasiesiklus.

Ekperimentele Karsinogenese

Primêre karsinoom van die lewer is op twee maniere veroorsaak: deur endokrientechnieke op rotte wat die voorraadsrantsoen ontvang het, en deur insluiting van etionien in 'n dieet van mielies en sojaboontjies.

Proewe met rotte het aan die lig gebring dat karsinoom van die lewer kan ontstaan sonder voorafgaande nekrose of sirrose. Die lokalisering van karsinoom van die lewer by rotte wat op bottergeel gevoer is, word deur dieet beïnvloed. Die ondersoek in verband met die metabolisme van galsure en galkleurstowwe ten opsigte van karsinogenese word kragdadig voortgesit.

Metabolistudies op die Bobbejaan

Die metabolisme van koolhidraat en van vet by die bobbejaan word deur middel van voedings- en endokrientechnieke ondersoek. Deur geskikte endokrienverwyderings is aangetoon dat dit moontlik is om die metabolisme van trigliseriede los te koppel van die metabolisme van fosfolipiede en van cholesterol.

Die resultate van isotoopproewe met piruvaat, gemerk in die tweede koolstofatoom, word nou ontleed en die voorlopige resultate dui daarop dat die sintese van cholesterol en van fosfolipiede bly voortbestaan in bobbejane waarvan die pankreas verwyder is, maar dat dit nie die geval is met die trigliseriede nie.

at a much younger age than the parents. In the second generation, the viability of the young decreased and, in the third generation, none of the mothers had been able to raise a litter. Preliminary data indicated that obesity was not accompanied by a decrease in the longevity of the rats.

Rats fed on a high protein-low carbohydrate-low fat diet showed a depressed rate of growth, the maximum body weight attained being significantly less than the weights of control rats. Fertility rates were high and the infantile mortality rate low. This observation disproves the common belief that the fertility rate is decreased when the protein content of the diet is increased beyond defined minima. The differences in the disease patterns consequent on the diet are now being investigated.

Dietary factors influencing the menstrual cycle of the baboon

It had been shown that the menstrual cycle of the baboon could be deranged rapidly by diet, such derangements were not due to a lack of vitamin B₁₂, folic or folinic acid or animal protein, but to some, as yet, unidentified factor present in ox liver. Ox liver is now being fractionated with a view to identifying the factor or factors which, in the context of the diet used in our experiments, is essential for maintaining normal menstrual periodicity.

Experimental Carcinogenesis

Primary carcinoma of the liver was produced in two ways: by endocrine techniques in rats fed a stock ration; and by the inclusion of ethionine in a maize-soya bean diet. Experiments on rats have disclosed that carcinoma of the liver can develop without antecedent necrosis or cirrhosis. The localisation of carcinoma of the liver in rats fed on butter-yellow is influenced by diet. The investigation of the metabolism of bile acids and bile pigments in relation to carcinogenesis is being actively pursued.

Metabolic Studies in the Baboon

The metabolism of carbohydrates and of fat in the baboon is being investigated by nutritional and by endocrine techniques. By appropriate endocrine ablations, it has been demonstrated that it is possible to uncouple the metabolism of triglycerides from that of the phospholipids and of cholesterol.

The results of isotope experiments with pyruvate labelled in the second carbon are now being analysed. The preliminary data indicate that the synthesis of cholesterol and of phospholipids, but not of triglycerides, continues in depancreatized baboons.

Die ondersoek van die serumlipiede en proteïen-gebonde jodium van bobbejane gedurende die normale menstruasiesiklus, dragtigheidsperiode en soogtyd is voltooi. Die veranderinge in die proteïengebode jodium en serumlipiede by die bobbejaan se menstruasiesiklus verskil van dié wat vir 'n vrou beskryf is. Terwyl die serumlipiede in die dragtige bobbejaan 'n patroon volg wat die teenoorgestelde is van dié wat vir swangerskap by die mens beskryf word, is die serumpatroon vir proteïen-gebonde jodium soortgelyk aan dié by die vrou.

PNEUMOKONIOSE-NAVORSINGSEENHEID

Hoof van die Eenheid: DR. A. J. ORENSTEIN

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Die Eenheid is op 1 April 1956 tot stand gebring. Dit word gesamentlik gefinansier deur die Unie-Departement van Mynwese en die Transvaalse en Oranje-Vrystaatse Kamer van Mynwese, en 'n toekening hiervoor is gemaak deur die S.A. Mynwerkersunie en die Gesamentlike Komitee van die Mining Union. Die Departement van Mynwese het onderneem om die koopsom en veranderingskoste van 'n gebou en die koste van 'n addisionele gebou te finansier tot 'n bedrag van £200,000. Die goedgekeurde begroting van die Eenheid vir die verslagtydperk was £82,600 en vir die jaar 1957/1958 is dit ongeveer £120,000.

Historiese Agtergrond

Pneumokoniose is waarskynlik die oudste industriële siekte. Die gevare verbonde aan mynbou in harde rots was selfs aan die Romeine en Grieke bekend sowat tweeduizend jaar gelede. Hierdie longkwaal van mynwerkers en 'n paar van die voorsorgmaatreëls wat toegepas is, is in die 16e eeu reeds deur Agricola en Paracelsus beskryf.

In moderne tye is die siekte opgemerk en beskryf deur Thackray (1832) en deur Farr (1835), beide van Engeland. In 1864 het E. U. Greenhow silikadeeltjies in die longe van mynwerkers opgemerk deur gebruikmaking van gepolariseerde lig—miskien vir die eerste keer in die wêreld.

In Suid-Afrika is die bedreiging van hierdie siekte so vroeg as 1901 opgemerk, en tentatiewe voorbehoedmaatreëls is kort daarna geneem as gevolg van die verslag van 'n kommissie wat teen die einde van 1902 deur Lord Milner aangestel is. Dit is van belang om op te merk dat hierdie kommissie slegs 1,201 mynwerkers ondersoek het, omdat baie van hulle geweier het om ondersoek te word. Die kommissie het bevind dat 15 persent van die wat ondersoek is, definitief, en 'n addisionele 7 persent, waarskynlik, myntering opgedoen het. Hoogs waarskynlik was die verhouding baie hoër, omdat radiografie toe nog nie beskikbaar was nie. Hoewel regulasies uitgevaardig was wat die gebruik van water en doeltreffender ventilasie

The investigation of the serum lipids and protein-bound iodine of baboons during the normal menstrual cycle, pregnancy and lactation has been completed. The changes in serum protein-bound iodine and serum lipids in the baboon's menstrual cycle differ from those described in the human female. While serum lipids in the pregnant baboon follow a pattern which is the reverse of that described in human pregnancy, the serum P.B.I. pattern is similar to that of woman.

PNEUMOCONIOSIS RESEARCH UNIT

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The Unit was established on the 1st April, 1956. It is financed jointly by the Union Department of Mines and the Transvaal and O.F.S. Chamber of Mines. A grant was made by the S.A. Mineworkers' Union and the Mining Union's Joint Committee. The Department of Mines has assumed the financing of the purchase and alteration of a building and the cost of additional building, at an estimated total cost of £200,000. The approved budget of the Unit for the period under review was £82,600 and for the year 1957/1958 about £120,000.

Historical Background

Pneumoconiosis is probably the oldest industrial disease. The risk of mining in hard rock was known to the Romans and Greeks about two-thousand years ago. This lung disease of miners and some of the precautions used were described by Agricola and Paracelsus in the 16th century. In modern times the disease was recognised and discussed by Thackray in 1832 and by Farr in 1835, both in England. In 1864, E. U. Greenhow recognised silica particles in miners' lungs by the use of polarized light—probably for the first time in the world.

In South Africa, the menace of this disease was recognised as early as 1901, and tentative preventive measures were taken soon after, as a result of the report of a commission appointed by Lord Milner at the end of 1902. It is interesting to note that this commission only examined 1,201 miners, as many refused to be examined. They found that over 15 per cent. of those examined, definitely, and an additional 7 per cent. probably, had miners' phthisis. It is more than probable that the rate was higher, as radiography was, of course, not available. Although regulations prescribing the use of water and more efficient ventilation and prohibiting

voorskryf en toegang in the skagte na skietwerk verbied, blyk dit tog dat hierdie voorskrifte nie algemeen uitgevoer is nie.

Nuwe regulasies is in 1910 uitgereik as gevolg van die verslag van 'n tweede kommissie. Die getuienis van dr. Macaulay en Irvine voor hierdie kommissie was dat die sterftesyfer van die mynwerkers sesmaal hoër was as die van die volwasse blanke mans van die Witwatersrand. Die regulasies wat toe uitgevaardig was het onder meer waterbespuitings voorgeskryf vir die beheer van die stof en gasse wat deur die skietwerk ontstaan. Teen hierdie tyd was die gevaar van stof blykbaar baie beter besef en die voorsorgmaatreëls daarteen meer algemeen toegepas, en is die gravimetrie metode ook toegepas om die stofgehalte te bereken. Die verbetering in die toestand wat gevolg het op die maatreëls wat toegepas is, kan uit die rekords van hierdie berekenings gesien word. In September 1911 het die gewig van stof in 'n kubieke meter lug gewissel van 80 tot 280 mg.; in April 1912 was dit tussen 14 en 39 mg., en in September 1912 het dit gedaal tot tussen 0.2 en 17.1 mg.

In 1911 is 'n derde kommissie benoem wat heeltemal uit mediese persone bestaan het—een hiervan was dr. A. H. Watt. Hy het vir die eerste keer in die geskiedenis radiologiese ondersoeke uitgevoer op 'n groep van 326 mynwerkers uit 'n totaal van 3,163 klinies ondersoekte mynwerkers. Hierdie kommissie het bevind dat 26 persent beslis pneumokoniose het en 'n addisionele 5.5 persent twyfelagtige gevalle was. Die gemiddelde indiensnemingsduur van diegene wat die siekte opgedoen het, was 8.2 jaar. Dit is paslik om hier melding te maak van die erkentlikheid wat die bevolking en die wêreld verskuldig is aan die pioniernavorsers op hierdie gebied in Suid-Afrika—nl. aan dr. Donald Macaulay, dr. L. G. Irvine en Sir Robert Kotze.

Vanaf 1912 toe die eerste Mynteringswet aangeneem is tot vandag toe, het daar 'n geleidelike ontwikkeling plaasgevind in die waardering van die belangrikheid van stofbeheermaatreëls sowel as in die verbetering van die diagnose van die siekte. 'n Uitstaande gebeurtenis was die stigting van die Silikose (nou Pneumokoniose) Mediese Buro in 1916.

Dit ly geen twyfel nie dat hierdie voorbehoedmaatreëls doeltreffend was. Die vermindering van sowel inasembare stof as voorkoms van die siekte, en die groot vermeerdering in die gemiddelde indiensnemingsduur van diegene wat die siekte opgedoen het, is afdoende bewys hiervan. Dog hoewel Suid-Afrika die leier op die gebied van voorbehoedmaatreëls was, kom die siekte nog voor en daar is nog ruimte vir uitbreiding van ons kennis oor die „natuurlike geskiedenis” van die siekte en vir studies oor praktiese maatreëls van doeltreffende voorkoming van stofproduksie en vir die verdrywing van sulke stof wat onvermydelik geproduseer word voordat dit deur die mynwerkers ingasem kan word.

entry after blasting, were issued, it appears that these were not generally carried out.

Another set of regulations was issued in 1910 as a result of the report of a second commission. The evidence of Drs. Macaulay and Irvine before this commission was that the mortality among the miners was six-fold that of the male adult Europeans on the Witwatersrand. The regulations then issued, provided *inter alia*, for water blasts to control blasting dust and fumes. By this time the danger of dust was, it appears, more fully realized and the preventive measures consequently more generally applied. In those days the gravimetric method of dust estimation was used, and the improvement due to the measures adopted can be appreciated from the records of these estimates: in September 1911, the weight of dust in a cubic metre of air ranged between 80 and 280 mgs.; in April 1912, it was between 14 and 39 mgs.; and in September 1912, it fell to between 0.2 and 17.1 mgs.

In 1911 a third commission was appointed, consisting entirely of medical men. One member of the commission was Dr. A. H. Watt. For the first time in the world, he carried out a mass radiological examination of 326 miners, out of 3,163 clinically examined. This commission found about 26 per cent. of definite pneumoconiosis and an additional 5.5 per cent. of doubtful cases. The average duration of employment of those affected by the disease was 8.2 years. At this point it seems right to record the debt this nation and the world owe to the pioneer workers in this field in South Africa—Drs. Donald Macaulay, L. G. Irvine, and Sir Robert Kotze.

From 1912, when the first Phthisis Act was passed, to the present time, there has been steady progress in the appreciation of the importance of dust control measures, and also progressive improvement in the diagnosis of the disease. The outstanding event was the establishment of the Silicosis (now Pneumoconiosis) Medical Bureau in 1916.

That the preventive measures have been markedly efficacious, there is no doubt whatsoever. Both the reduction of respirable dust and the incidence of the disease, as well as the greatly increased length of average employment of those who contract the disease, fully attest this. But, though South Africa has been a leader in preventive measures, the disease still occurs, and there is still room for further improvement in our understanding of the “natural history” of the disease, as well as the study of practicable means for more effective prevention of the production of dust and of means of dissipating such dust as is unavoidably produced before it can be inhaled by the workers.

Oogmerke en Samestelling van die Eenheid

Dit is op hierdie doelwitte wat die werksprogram van die Eenheid gerig is, sowel as om die patologiese en mediese gaping in ons kennis oor pneumokoniose op te vul. 'n Hulpmaatreël hiervoor sou wees die afwending van sulke mense wat besonder vatbaar is vir die nadelige gevolge van die stof, hetsy omrede een of ander gebrek in hul konstitusie of hetsy hulle om een of ander rede allergies is vir die besondere soort stof. Studies van liggaamstipering, tesame met die statistiese analise van bestaande en toekomstige toepaslike gegewens, is daarop gemik om die geldigheid van sodanige faktore vas te stel.

Die personeel van die Eenheid bestaan tans uit 'n direkteur, 'n onderdirekteur, agt voltydse en twee deelydse senior vakkundige beamptes, een beurshouer, agt junior vakkundige beamptes, vyftien tegnisi, ses klerke en nege nie-blankes—'n totaal van 51 persone. Die personeel wat deur die Central Mining and Investment Corporation vir die Spesiale Stofprojek beskikbaar gestel is bestaan uit drie deelydse en twee voltydse vakkundige beamptes en twee laboratoriumassistentente.

Die Eenheid bestaan uit vyf afdelings, waarvan vier nou in werking is maar geen een nog op volle personeelsterkte nie. Die afdelings is die Klinies-Fisiologiese, die Etiologies-Patologiese, die Statistiese (personeel by die Eenheid gevoeg deur die Nasionale Fisiese Navorsingslaboratorium) en die vir Stofnavorsing (deur kontrak met die Central Mining and Investment Corporation en in die Laboratoriums van die Kamer van Mynwese). 'n Radiologiese Projek is nog onder bespreking.

Sommige van die nadelige gevolge van pneumokoniose kan ongetwyfeld versag word of selfs ook klinies genees word deur moderne terapie. Die bedoeling is om 'n kliniek te stig wat hoofsaaklik rondgaande pneumokoniose pasiënte sal behandel. Indien nodig, sal sulke pasiënte ook tot die hospitaal toegelaat word. Die Johannesburgse Hospitaalraad het toegestem dat 'n geskikte gebou hiervoor op die hospitaalterrein opgerig kan word, en onderhandelings word tans met die Transvaalse Provinsiale Administrasie hieroor gevoer. Behandeling by die kliniek is nie net bedoel om verligting aan pneumokoniose-pasiënte te bring nie, maar ook om die tot nog toe ontbrekende inligting te verkry oor die terapie en kliniese geskiedenis van die verskillende vorms van die siekte.

Klinies-Fisiologies

Vyf studies is uitgevoer. Dit handel oor die voorkoms van asemhalingsversteurings by mynwerkers en hul verwantskap met radiologiese bevindings; 'n ondersoek van die moontlikheid om 'n eenvoudige toets of groep toetse te gebruik as hulpmiddel om die siekte te diagnoseer en 'n bepaling te maak van die graad van ongeskiktheid wat dit veroorsaak; 'n studie van die longfunksie van mynwerkers sonder silikose, sowel as 'n studie van persone wat nooit aan stof blootgestel was nie (spoorwegwerkers);

Aims and Constitution of the Unit

It is towards these targets that the programme of this Unit is directed, as well as to the filling of the pathological and medical lacunae in our knowledge of pneumoconiosis. An ancillary measure could be the keeping away from exposure to dust of people who may be particularly susceptible to dust, either because of some defect of their constitution or because of some allergy to the particular dust. Somatotype studies are to be directed, in conjunction with the statistical analysis of existing and future relevant data, towards ascertaining the validity of such factors.

The staff of the Unit consists at present of a director, a sub-director, eight full-time and two part-time senior professional officers, one bursar, eight junior professional officers, fifteen technicians, six clerks and nine non-Europeans, a total of fifty-one persons.

The staff detailed by the Central Mining and Investment Corporation for the Special Dust Project consists of three part-time and two full-time professional officers and two laboratory assistants.

The Unit consists of five divisions, four of which are now in operation, but none is as yet fully developed. These are the Clinico-Physiological, the Aetiology-Pathological, the Statistical (staff attached to the Unit from the National Physical Research Laboratory) and Dust Research (by contract with Central Mining and Investment Corporation and in the Chamber of Mines Laboratories). A Radiological Project is still under discussion.

Certain of the disabilities associated with pneumoconiosis are undoubtedly susceptible to amelioration, and even clinical cure, by modern therapy.

The intention is to open a clinic for the treatment principally of ambulatory cases of pneumoconiosis. When necessary, however, patients would be admitted to hospital. The Johannesburg Hospital Board has agreed that a suitable building should be erected in the hospital grounds for this clinic, and negotiations to this end are now being conducted with the Transvaal Provincial Administration. The treatment at the clinic is likely, not only to give pneumoconiosis sufferers considerable relief, but also to provide information, now almost totally lacking, on the therapy and clinical history of the various forms of disease.

Clinico-Physiological

Five studies were conducted. These were the incidence of respiratory disturbances of miners and their relation to the radiological findings; an investigation into the possibility of using a simple function test or a group of such tests which would assist in diagnosing the disease and the assessment of disability caused by it; a study of the lung function of miners without silicosis together with a study of men who were never exposed to dust (railway workers); a study of simplified technique of

'n studie van 'n vereenvoudigde tegniek vir die meet van longventilasie en suurstofvereistes tydens oefeninge, en 'n studie oor die uitwerking van inaseming van suiwer suurstof tydens oefeninge.

Die gevolgtrekking waartoe tot sover gekom is, is dat geen meting van enige enkel asemhalingsfunksie 'n betroubare aanduiding van die voorkoms of uitwerking van silikose is nie. Die meting van agt verskillende asemhalingsfunksies het egter wel onderskei tussen persone met radiologiese tekens van silikose en die wat dit nie het nie. Die verslegting in asemhalingsverrigting skyn in noue verband te staan met die aantal diensjare, maar nie altyd met die radiologiese voorkoms nie.

'n Mate van werk is uitgevoer op 'n pletismografiese bepaling van alveolêre druk. Die doel met hierdie projek was om 'n beraming te kry van die weerstand teen lugvloei sodat die taak van asemhaling in sy samestellende dele opgebreek kan word. Die kliniese bevindings in mynwerkers dui daarop dat weerstand teen lugvloei in die lugbaan 'n belangrike faktor is in die ongeskiktheid wat deur 'n stofonderhewige werkkruis veroorsaak word. Beramings is deur middel van 'n aantal alternatiewe metodes gemaak en die beste hiervan sal uitgekies word vir gebruik op 'n groep mynwerkers gedurende die komende jaar. Die metodes wat ontwikkel is vir die bepaling van alveolêre druk is oorspronklik.

Etiologies-Patologies

Behalwe die ondersoek van long- en hartmonsters van oorlede mynwerkers—2,034 gedurende die jaar—en die uitvoering van 123 volledige lykskouings, is baie tyd bestee aan diagnostiese konsultasies met die Sertifiseringskomitee van die Mediese Buro.

Die navorsingswerk was toegespits op die studie van die patologie van silikose, asbestose en steenkoolwerkers-pneumokoniose deur ondersoek van menslike en dierlike materiaal en deur stofproewe op diere. Skeikundige veranderings in die longe van diere wat aan stof blootgestel is, is bestudeer en 'n geskrif oor die opgemerkte toename van lipiede in die longe van diere wat aan silikastof blootgestel was, is vir publikasie ingedien. Dierproewe met fyn asbestof het aangetoon dat dit verspreide fibrose kan veroorsaak. Proefnemings met ander vorms van asbes is aan die gang. Proewe is aangevoer oor die uitwerking van pneumokokkale en tuberkuleuse besmetting by die ontstaan van silikose. Eksperimentele werk oor die uitwerking van aluminiumoksied vir die voorkoming van fibrose wat deur silika veroorsaak word, is gedurende die jaar voltooi, en die materiaal wat verkry is word nou bestudeer.

Statisties

Gedurende die eerste helfte van die jaar is 'n analise gemaak van die gegewens wat in die verslae van die Silikoseburo beskikbaar is. Dit is opgevolg met 'n studie van die Buro se rekords, veral die van mynwerkers wat

measuring lung ventilation and oxygen requirements during exercise and a study of the effects of breathing pure oxygen on exercise.

The conclusion thus far arrived at is that no measurement of any single respiratory function is a reliable index of the presence or effects of silicosis. Measurement of eight various respiratory functions does, however, differentiate between persons with radiological signs of silicosis and those without. Deterioration in respiratory performance appeared to bear a close relation to years of service, but not always to the radiological appearances.

Some work was done on a plethysmographic estimation of alveolar pressure. The object of this project is to estimate resistance to air flow, so that the work of breathing may be broken down into its component parts. The clinical findings in miners suggest that airway resistance is an important factor in the disability resulting from a dusty occupation. Estimates have been made by a number of alternative methods and the best of these will be chosen for use on a group of miners during the next year. The methods evolved for the estimation of alveolar pressure are original.

Aetiology-Pathological

In addition to examining lung and heart specimens from deceased miners—2,034 during the year—and performing 123 full autopsies, much time was occupied in diagnostic consultations with the Medical Bureau Certifying Committee.

The research work was directed to the study of the pathology of silicosis, asbestosis and coalworkers' pneumoconiosis by the examination of human and animal material and by animal experiments with dust. The changes of the chemistry in the lungs of animals subjected to the action of dust were studied, and a paper on the observed increase of lipoids in the lungs of animals subjected to silica dust was submitted for publication. Animal experiments with fine chrysotile (asbestos) dust showed that it can produce diffuse fibrosis. Experimental work with other forms of asbestos are in progress. Experiments were initiated on the effect of pneumococcal and tuberculous infection on the production of silicosis. Experimental work on the effect of aluminium oxide in preventing fibrosis caused by silica was completed during the year. The material obtained is now being studied.

Statistical

In the first half of the year an analysis of the data in the Silicosis Bureau reports was made. This was followed by a study of the Bureau records, particularly those of miners who started work prior to 1916, and

voor 1916 begin werk het, en dit beteken die tabulering van gegewens uit oor die 800 lêers. Dit statistiese beoordeling sal heelwat tyd in beslag neem.

'n Loodsstudie van 170 rekords van nie-blanke werkers, wat as silikoselyers gesertifiseer is, is uitgevoer om vas te stel of 'n groter getal bestudeer moet word. Die Loodsstudie het aangetoon dat 'n ontleding van 'n groter aantal rekords moontlik baie lonend sal wees.

Studies oor negatief-binomiaal en verwante distribusies is gemaak vir 'n bepaling van hul bruikbaarheid in die probleem wat bestudeer word.

Stofnavorsing

Die Kamer van Mynwese het toegestem dat sy Laboratorium verskillende navorsingsprojekte onderneem. Dit sluit in ondersoeke na die kumulatiewe uitwerking van stof wat geproduseer word deur verskeie drilbore wat in een omgewing werk, en na metodes om sulke stof te beheer; die silika-inhoud van steenkoolstof, en sekere tegniese studies aangaande mikroskopiese ondersoek van stof.

Implemente vir die versamel en meet van stof is belangrike werktuie by stofnavorsing, en die Kamer van Mynwese se Laboratorium het 'n groot hoeveelheid werk uitgevoer vir die ontwikkeling en verbetering daarvan. Nuwe tegnieke is ontwikkel in die elektronmikroskopie van stof, en 'n foto-elektriese evaluator is gebou en word nou uitgetoets. Stoffilters—doek en elektrostasies—is ondersoek met die doel om hul doeltmatigheid te verbeter, en stofproduksie deur lugdruk-boormasjiene is ondersoek. Dit is bevind dat masjiene met lang en middelmatige suiers minder stof produseer as die masjiene met kort suiers. Die Laboratorium het waardevolle hulp verleen in die tegniek van stofproewe met diere wat deur die Patologiese Afdeling uitgevoer is, en ook met die verbetering van stofbepalings in mynwater. Die gebruik van die fase-kontras mikroskoop vir stofondersoek is nagegaan en daar is bevind dat dit nie die fyner stofdeeltjies aantoon wat onder die ligte mikroskoop sigbaar is nie.

Die ondersoekwerk deur die navorsingspan van die Central Mining and Investment Corporation sluit in die stofproduksie deur verskillende tipes lugdruk-drilbore onder gestandaardiseerde toestande. Ook is 'n studie gemaak van die uitwerking van lugdruk, waterdruk en kwaliteit van water, wat in die masjiene gebruik word, op die produksie van stof. Dit is bevind dat die hoeveelheid stof wat vrygestel word uit die water wat vanaf die uitlaatkrane verstuif word, groter was as die hoeveelheid stof by die rotsvergruising deur die drilboor. Werk op hierdie projek sal voortgesit word met die doel om enige moontlike vooroordeel uit te skakel.

Die hoofprojek van hierdie kontrak is om 'n bepaling te maak van stofbloomstelling ten opsigte van die hoeveelheid stof in die lug en die tyd van blootstelling van individue aan stof gedurende 'n werkskof in die verskillende

entailed tabulating the data of over 800 files. The statistical assessment will take considerable time.

A pilot study of 170 records of non-European workers certified as suffering from silicosis was made to establish whether a larger number should be studied. The pilot study showed that the analysis of a much larger number of records is likely to be rewarding.

Studies of negative binomial and related distribution were made with the object of determining their adaptability to the problem to be studied.

Dust Research

It was agreed by the Chamber of Mines that several research projects should be undertaken by the Chamber's Laboratory. These will comprise investigations into the cumulative effect of dust produced by several drills working in one area, and methods of controlling such dust; the silica content of coal dusts, and certain technical studies concerned with microscopic examination of dust.

Dust collecting and measuring instruments are very important tools in dust research and the Chamber of Mines Laboratory has done a great deal of work on developing and improving these. New techniques were developed in electron microscopy of dust and a photoelectric evaluator was built and is undergoing tests. Dust filters, cloth and electro-static, were investigated with the aim of improving their efficiency and the dust production of pneumatic drilling machines was investigated. It was found that long and medium piston machines produced less dust than the short piston machines. The Laboratory rendered valuable assistance in the technique of dust experiments on animals, carried out by the Pathology Division, and also in improvement of dust determination in mine water. The use of the phase contrast microscope for dust examination was investigated. It was found that it does not show up the finer dust particles visible under the light microscope.

The investigations by the Central Mining and Investment Corporation team comprised dust production by several types of pneumatic drills under standardized conditions. The effects on dust production of air pressure, water pressure and water quality used in the machines, were also studied. It was found that the proportion of dust released from the water atomized at the release ports was greater than the dust from the rock comminution by the drill. Work on this project will be continued to eliminate possible bias.

The principal project of this contract is the ascertaining of the dust exposure in regard to quantity of dust in the air and the time of exposure of individuals to dust

mynbedrywighede (vakmanswerk). 'n Ondersoek is begin na die natuurwette van groottedistribusie van stofdeeltjies. As dit afgehandel is, sal die bevindings waardevol wees vir die oplossing van sekere stofbestrydingsprobleme.

Liggaamstipering

Dit is besluit om ondersoek in te stel of liggaamsbou enige invloed het op vatbaarheid vir stofbenadeling. 'n Ondersoek na verskillende metodes van liggaamstipering is uitgevoer en die Eenheid is tans besig om besonderhede te beplan vir die instrumente en prosedure vir die metode wat die belowendste skyn te wees. Parallel met hierdie ondersoek en nou aan die gang is 'n statistiese ontleding van sulke gegewens wat beskikbaar is in die Pneumokoniose Mediese Buro.

Hulp aan Buite-navorsers

Hulp is verleen aan dr. M. Hurwitz, Radioloog van die Pneumokoniose Buro, met sekere radiologiese ondersoeke wat hy onderneem het, en aan dr. P. Smit van die New Consolidated Goldfields met 'n ondersoek na tuberkulose. Laasgenoemde duur nog voort in die Patologiese Afdeling.

TERINGNAVORSINGSEENHEID

Hoof van die Eenheid: DR. B. A. DORMER

King George V-hospitaal, Durban

Bloedbepalings van M. Tuberculosis

Een van die projekte was 'n ondersoek van nie-pulmonale tuberkulose materiaal wat vir bloedbepalings aangestuur is. Meeste van die materiaal was afkomstig van gevalle van tuberkulose meningitis, maar daar was ook 'n matige hoeveelheid materiaal van ander bronne, soos kliere, urines, buikwatersugstowwe, gewrigsvloestowwe en beenabsesse.

Alle positiewe kulture is ondersoek vir sensitiwiteit en kwaadaardigheid. Geen *M. tuberculosis*-groei wat van die nie-pulmonale materiaal geïsoleer is kon as 'n beesstam aangetoon word nie. Nogtans is beestingorganismes in die speeksel van een geval van longtering in 'n blanke man gevind. Dit is die enigste geval van beeslongtering wat nog ooit in Suid-Afrika in die mens aangetref is. Die bron van die besmetting was 'n tuberkulose kudde beeste wat melk verskaf het aan 'n taamlike groot omdedelike gemeenskap buitekant Durban, en die hele kudde is afgemaak.

Weerstand teen Isonikotiniëse Hidrasiede-suur (I.N.S.H.)

'n Aanmerklike hoeveelheid inligting oor hierdie projek is verkry wat sal help met die oplossing van die groot probleem oor wat gedoen moet word vir die kroniese pasiënte wie se speeksel positief bly vir tubercle bacilli na 'n behandeling van agt maande en langer.

Vir hierdie doel is die geïsoleerde tubercle bacilli

during a working shift in the several occupations (trades) of mining. An investigation was commenced on the laws of size distribution of dust. This, when completed, will be of value in dealing with certain dust problems.

Somatotyping

It was decided to investigate whether bodily constitution has any influence on susceptibility to damage by dust. An investigation into several methods of somatotyping was carried out and the Unit is at present engaged in planning the details of instrumentation and procedure for the method which appears to be the most promising. Parallel with this investigation, and now in progress, is a statistical analysis of such data as are available in the records of the Pneumoconiosis Medical Bureau.

Assistance to Outside Investigators

Assistance was given to Dr. M. Hurwitz, Radiologist of the Pneumoconiosis Bureau, in certain radiological investigations he initiated, and to Dr. P. Smit of the New Consolidated Goldfields in an investigation of tuberculosis. The latter is still continuing in the Pathology Division.

TUBERCULOSIS RESEARCH UNIT

Head of the Unit: DR. B. A. DORMER

King George V Hospital, Durban

Typing of M. Tuberculosis

One of the projects was the investigation of non-pulmonary tuberculous material submitted for typing. Most of the material came from cases of tuberculous meningitis, but there was a moderate amount of material from other sources, e.g. glands, urines, ascitic fluids, joint fluids and bone abscesses.

All positive cultures were investigated for sensitivity and virulence. No growth of *M. tuberculosis* isolated from non-pulmonary material has proved to be a bovine strain. However, bovine organisms were found in the sputum of one case of pulmonary tuberculosis in a European male. This is the only case of bovine pulmonary tuberculosis in man ever to have been found in South Africa. The source of the infection was a tuberculous herd of cattle, supplying milk to a moderately large peri-urban community outside Durban and the whole herd had to be destroyed.

I.N.A.H. Resistance

A considerable amount of information on this project has been obtained which will help to solve the great problem of what should be done for chronic patients whose sputum remains positive for tubercle bacilli after treatment for eight or more months.

For this the tubercle bacilli isolated were investigated

ondersoek vir weerstandontwikkeling, kultuur- en morfologiese veranderinge, kwaadaardigheid van bacilli van afwisselende grade van weerstand ten opsigte van „kleurabsorpsie”, en die produksie van „katalase” en die „biologiese uitwerking” wanneer dit in marmotjies, muise en konyne ingespuut is. Sommige van hierdie resultate is gekorreleer met die kliniese en radiologiese toestand van die pasiënte.

Ondersoeke oor ’n tydperk van 5 jaar in verband met die weerstandontwikkeling het aangetoon dat volkome weerstand teen isonikontiniese hidrasiede (I.N.S.H.) nie in een van die gevalle gevind is nie.

Weerstand teen lae konsentrasies van I.N.S.H. 5–10 μ gm. per ml. ontwikkel na omtrent drie maande se behandeling; dit neem omtrent 3 jaar om weerstand teen 200 μ gm. per ml. te ontwikkel, terwyl ’n paar gevalle wat vir ongeveer 5 jaar behandel is, organismes geproduseer het waarvan sommige bestand was teen 300 μ gm. per ml.

Die kultuur- en morfologiese veranderinge wat met die weerstandontwikkeling voorgekom het, maak identifikasie baie moeilik omdat daar geen tipiese brosgagtige opgehewe kolonies ontwikkel nie, die kolonies dikwels glad en glansend is, en tipiese pèrelstringbouvorm van die organismes dikwels nie in Z.N.-gekleurde smere gesien word nie.

Die kleurabsorpsie- en katalasetoetse vir kwaadaardigheid is op 105 stamme van *M. tuberculosis* uitgevoer en toon verskillende grade van weerstand. Daar was slegs 65.6 persent korrelasie tussen die kleur- en katalasetoetse en 55.3 persent korrelasie tussen kleur- en biologiese toetse, en 78.9 persent korrelasie tussen katalase en biologiese toetse. ’n Totaal van 489 biologiese toetse is uitgevoer, en die gevolgtrekking was dat die biologiese toetse behou moet word omdat dit die betroubaarste is.

Al die diere wat ingeënt is met die organisme wat bestand is teen 300 μ gm. per ml., het slegs ’n beperkte hoeveelheid letsels ontwikkel, of anders glad geen tekens van besmetting getoon nie. Die korrelasie van die kliniese en radiologiese toestand van hierdie pasiënte met die biologiese toetse gaan voort. Diere wat ingeënt is met organismes van verskillende grade van weerstand op tot 200 μ gm. I.N.S.H. per ml. het ’n besmettingsyfer getoon van 2+ tot 6+.

In sommige gevalle was dit moeilik om ’n mening te vorm of die besmetting sal voortgaan of agteruitgaan, en toe is besluit om ingeënte diere drie maande te hou voordat hulle afgemaak en ondersoek word. Die indruk wat verkry is van die paar diere wat op die wyse getoets is, is dat die letsels in diere wat ingeënt is met organismes bestand teen 300 μ gm. per ml., na verloop van 3 maande nie wou toeneem nie.

Bloed-rugmurgvloeistof (C.S.F.)-Broom-verhoudingstoetse

Hierdie ondersoek wat moet dien as hulpmiddel vir die oplossing van die moeilike diagnose-probleem in sommige

for development of resistance, cultural and morphological changes, virulence of bacilli of varying degrees of resistance with regard to “dye absorption”, and production of “catalase” and the “biological effects” when injected into guinea pigs, mice and rabbits. Some of these results were correlated with the clinical and radiological condition of the patients.

Investigations over a period of 5 years on the development of resistance have shown that complete resistance to isonicotinic hydrazide, (INAH), has not been found in any cases.

Resistance to low concentrations of INAH 5–10 μ gm. per ml. develops after about 3 months treatment; it takes about 3 years for resistance to 200 μ gm. per ml. to develop, while a few cases treated for about 5 years have produced organisms, some of which are resistant to 300 μ gm. per ml.

The cultural and morphological changes that occur with development of resistance, make identification very difficult because typical raised crumbly colonies do not develop, colonies are often smooth and shiny, and typical beading and conformation of organisms are often not seen in Z.N. stained smears.

The dye absorption and catalase tests for virulence were done on 105 strains of *M. tuberculosis*, showing varying degrees of resistance. There was only 65.6 per cent. correlation between dye and catalase tests and 55.3 per cent. correlation between dye and biological test, and 78.9 per cent correlation between catalase and biological tests. In all, 489 biological tests were carried out, and it has been concluded that the biological test must be retained as the most reliable.

All the animals inoculated with organisms resistant to 300 μ gm. per ml. developed limited lesions only, or showed no signs of infection at all. The correlation of the clinical and radiological condition of these patients with the biological tests is progressing. Animals inoculated with organisms showing varying degrees of resistance up to 200 μ gm. INAH per ml. showed infection rates varying from 2+ to 6+.

In some cases it was difficult to form an opinion as to whether the infection would progress or regress, and it was then decided to leave inoculated animals for 3 months before killing and examining them. The impression formed from the few animals so tested is that the lesions would not progress after 3 months in animals inoculated with organisms resistant to 300 μ gm. per ml.

Blood/C.S.F. Bromide Ratio Test

This investigation as an aid to the difficult problem of diagnosis in some cases of non-pyogenic meningitis

gevalle van nie-ettervormende meningitis, is bykans voltooï. 'n Totaal van 84 gevalle, wat 'n mate van rugmurgvloeistof-abnormaliteit toon, en 22 kontroles is ondersoek. Hierdie ondersoek is moontlik gemaak deur 'n toekenning deur die S.A. Rooikruis.

Die bevindings oor die broomverhouding word gekorreleer met die gebruiklike biochemiese (globulien, totale proteïen, suiker en chloried), sitologiese, bakteriologiese en kliniese bevindings.

I.N.S.H. as Voorbehoedmiddel by 'n Indiese

Behuisingskema

Op die Springfield-behuisingsbouterrein, 'n Durbanse Munisipale sub-ekonomiese behuisingskema met 'n bevolking van sowat 5,500 Indiërs wat in 650 huis woon, is 'n tuberkulien en massa X-straal opname onderneem teen die einde van 1955. Toe die eerste fase van die opname afgesluit is in Junie 1956, is almal behalwe 23 persone aan die tuberkulientoets en almal behalwe 21 persone aan die X-straaltoets onderwerp (uitgeslote 'n paar tuberkulien-negatiewe kinders onder 5 jaar oud). Die opname dek dus 99.6 persent van die bevolking. Die tweede fase van die opname het in Julie 1956 begin en toe dit aan die einde van November afgesluit is, het almal behalwe 31 persone die tuberkulien- en X-straaltoets ondergaan. Met die eerste opname was 5,512 persone ondersoek, en 5,432 met die tweede, terwyl 5,154 persone gemeen was in albei opnames.

Alle tuberkulose gevalle is tuis of by hul werk, waar moontlik, met I.N.S.H. 15 mgm./Kg./dag behandel. Alle familiekontakte van aktiewe gevalle het I.N.S.H. 5 mgm./Kg./dag ontvang vir solank die geval behandeling ontvang het. Alle positiewe reaktors tydens die eerste opname, sowel as alle persone wat oorgeswaai het van negatief na positiewe reaktors, en alle persone wat in die gebied ingetrek het en as positiewe reaktors bevind is, het I.N.S.H. 5 mgm./Kg./dag vir 6 maande lank ontvang waar pulmonale verkalking deur X-straal aangedui is, en vir 3 maande lank indien daar geen verkalking was nie.

Voordat die opname begin is, was 125 gevalle van pulmonale tuberkulose (2.3 persent) bekend, en hiervan was 52 as aktief beskou. Gedurende die eerste fase van die opname, is 84 nuwe gevalle van pulmonale tuberkulose ontdek (1.5 persent), sodat daar dus 136 gevalle van aktiewe pulmonale tuberkulose was—'n voorkoms dus van 2.5 persent.

Gedurende die tweede fase van die opname is 13 nuwe gevalle van pulmonale tuberkulose ontdek. Weens verhuising, sterftes, ontdekking van nuwe gevalle en die beoordeling van sekere gevalle as nie langer aktief nie, het die voorkoms van aktiewe tuberkulose in die gebied aan die einde van die tweede opname op 2.5 persent gebly.

Ses gevalle van nie-pulmonale tuberkulose was bekend voor die opname 'n aanvang geneem het, een geval is gevind gedurende die eerste fase en drie gedurende die tweede fase.

is almost complete. In all, 84 cases showing some C.S.F. (cerebro spinal fluid) abnormality, and 22 controls, have been investigated. This investigation was made possible by a donation from the S.A. Red Cross.

The bromide ratio findings are being correlated with the usual biochemical (globulin, total protein, sugar and chloride), cytological, bacteriological and clinical findings.

I.N.A.H. Prophylaxis in an Indian Housing Scheme

At the Springfield Housing Estate, a Durban Corporation sub-economic housing scheme with a population of about 5,500 Indians living in 650 homes, a tuberculin and mass X-ray survey was commenced at the end of 1955. When the first phase of the survey was concluded in June, 1956, all but 23 persons had been tuberculin tested, and all but 21 had been X-rayed (excluding some tuberculin negative children under 5 years). Thus a coverage of 99.6 per cent of the population was obtained. The second phase of the survey commenced in July, 1956, and when it concluded at the end of November, 1956, all but 31 persons had been tuberculin tested and X-rayed. In the first survey, 5,512 persons were examined; 5,453 persons in the second survey, and 5,154 persons were examined in both.

All cases of tuberculosis received I.N.A.H. 15 mgm./Kg./day at home or at work whenever possible. All family contacts of active cases received I.N.A.H. 5 mgm./Kg./day for as long as the case received treatment. All positive reactors at the time of the first survey, as well as all persons who converted from negative to positive reactors, and all persons found to be positive reactors on moving in to the area received I.N.A.H. 5 mgm./Kg./day for 6 months if pulmonary calcification was found on X-ray and for 3 months if there was no calcification.

Before the survey commenced there were 125 known cases of pulmonary tuberculosis (2.3 per cent.), and of these 52 were regarded as active.

During the first phase of the survey, 84 new cases of pulmonary tuberculosis were detected (1.5 per cent.), so that there were thus 136 cases of active pulmonary tuberculosis, a prevalence of 2.5 per cent.

During the second phase of the survey, 13 new cases of pulmonary tuberculosis were detected.

Due to population movement, deaths, the detection of new cases, and the assessment of certain cases as no longer active, the prevalence of active tuberculosis in the area at the end of the second survey remained at 2.5 per cent.

Six cases of non-pulmonary tuberculosis were known before the survey commenced, one case was found during the first phase, and three during the second phase.

I.N.S.H. as Voorbehoedmiddel by Verpleegsters en Huispersoneel

Al die verpleegsters en huispersoneel van die King George V-hospitaal—'n totaal van 815—het die I.N.S.H. as voorbehoedmiddel ontvang in dosisse van 5 mg. per kilo per dag. Hierdie projek is nou in sy tweede jaar en tot datum het nog geen een van hierdie personeelgroepe tuberkulose opgedoen nie. Hierdie prosedure sal vir 'n paar jaar gevolg word om 'n waardebeplanning te kry van I.N.S.H. as voorbehoedmiddel by 'n groep persone wat in noue kontak met aansteeklike gevalle van tuberkulose verkeer.

I.N.S.H. as Voorbehoedmiddel by Kinders wat in die Hospitaal Gebore is

Ongeveer 30 kinders word jaarliks in die King George V-hospitaal gebore. Geen ander inrigting wil die babatjies aanneem nie, en toe hulle na familieledede gestuur was vir versorging, was die sterfte 100 persent. Met die oog hierop, is besluit om die kinders by hul moeders te hou ten spyte van die feit dat die moeders tuberkulose was, en om dan I.N.S.H. as 'n voorbehoedmiddel vir die babatjies te gebruik.

Al die babatjies het 5 mg. per kilo per dag gekry en het borsvoeding van hul tuberkulose moeders ontvang. Tot datum het slegs 2 van die 35 kinders Mantoux-positief geword, en hulle was 'n tweeling wie se moeder nie die I.N.S.H. aan hulle gegee het nie. Die voorneme is om vir 'n paar jaar met hierdie werk aan te hou met die doel om 'n praktiese bydrae te maak vir die oplossing van die probleem van tuberkulose moeders en hul kinders.

Tuberkulose Meningitis

Gedurende die tydperk 28 Februarie 1956 tot 28 Februarie 1957, is 50 nuwe kindergevalle van tuberkulose meningitis toegelaat. Aan die einde van die tydperk het 60 persent van hulle nog geleef. Die post-mortembevindings van die wat aan tuberkulose meningitis dood is, het uitgebreide breinbesmetting getoon met serebraleversagting. Een van hulle het ook 'n groot serebrale tuberkulose gewas en een veelvoudige tuberkulose gewasse in die brein gehad, en 7 het ook verspreide algemene tuberkulose gehad. Een sterfgeval het ontstaan as gevolg van 'n heraanval van tuberkulose meningitis wat sowat 3 jaar gelede elders behandel was, en die post-mortem het aansienlike fibrose getoon met groot knoppe in die harsingvliese.

Die behandeling het bestaan uit:

- (1) A.C.T.H. gel 10-50 i.v.b.d., onderhuids ingespuut in twee gelyke dosisse, elke 12 uur.
- (2) Binnespiers inspuiting van I.N.S.H. (Rimifon) of Neotizide in dosiese van 20 mgm./Kg./liggaamsgewig/24 uur, in 4 gelyke dosisse, elke 6 uur.
- (3) Kaliumchloried, 2-4 gm. daaglik, om 'n kaliumtekort en soutvaslegging as gevolg van A.C.T.H.-terapie te voorkom.

I.N.A.H. Prophylaxis in Nursing and Domestic Staff

The total nursing and domestic staff at King George V Hospital, numbering 815 in all, received I.N.A.H. prophylaxis in doses of 5 mg. per kilo per day. This project is now in its second year and to date no member of these staff groups has contracted tuberculosis. This procedure will be followed for some years in order to estimate the value of I.N.A.H. prophylaxis in a community in close association with open cases of tuberculosis.

I.N.A.H. Prophylaxis in Children Born in Hospital

About 30 children are born each year in King George V Hospital. No other institution will accept the babies and when they were sent to the care of relatives the mortality was 100 per cent. In view of this it was decided to allow all children to remain with their mothers, in spite of the fact that the mothers were tuberculous, and to use I.N.A.H. as a prophylactic measure in the babies.

All babies are given 5 mg. per kilo per day and are breast fed by their tuberculous mothers. Up to date out of 35 children only 2 have become Mantoux positive, and these were twins whose mother did not give them the I.N.A.H. It is proposed to carry on this work for some years in an endeavour to make a practical contribution to the problem of tuberculous mothers and their children.

T.B. Meningitis

During the period 28 February, 1956, to 28 February, 1957, 50 new cases of T.B. meningitis in children were admitted. At the end of this period, 60 per cent. had survived. The post mortem findings of those who died of T.B. meningitis revealed extensive disease of the brain with cerebral softening. One of these also had a very large cerebral tuberculoma, one had multiple tuberculomata in the brain, and 7 had disseminated generalised tuberculosis also. One death occurred in a relapsed case of T.B. meningitis, treated elsewhere about 3 years previously, and post-mortem showed considerable fibrosis with large tubercles in the meninges.

The treatment consisted of:

- (1) A.C.T.H. gel 10-50 i.v. b.d., by hypodermic injection in 2 divided doses, 12 hourly.
- (2) Intra muscular injection of I.N.A.H. (Rimifon) or Neotizide in dose of 20 mgms./Kg./body weight /24 hours, given in 4 divided doses—6 hourly.
- (3) Potassium chloride, 2-4 gms. daily to avoid potassium deficiency and salt retention consequent upon A.C.T.H. therapy.

- (4) Vitamien B-behandeling, om toksiese reaksie van I.N.S.H. te voorkom.
- (5) Verskillende spesifieke prosedures vir die beheer van verhoogde druk in die skedel.
- (6) Intratekale varidase om rugmurgverstoping te beheer.

Geen daaglikse intratekale terapie is uitgevoer nie, sodat die verantwoordelikheid vir die toepassing van die spesifieke terapie aan die verpleegsters oorgelaat is; geen toksiese reaksies het op I.N.S.H. gevolg nie, en ook het daar geen simptome gevolg op die gebruik van A.C.T.H. nie. Daar het geen verspreiding van tuberkuleuse siekte ergens in die liggaam voorgekom as gevolg van A.C.T.H.-terapie nie, en geen doofheid het ontstaan nie. 'n Antibiotiese dekking met A.C.T.H.-behandeling word nie langer nodig geag nie, aangesien A.C.T.H. nie simptome van tussenkomende siekte verberg soos verwag was nie. Voortdurende antibiotiese behandeling het die ontwikkeling van strawwe sekondêre besmettings toegelaat wat dan baie moeilik was om te genees en ook die oorsaak was van 'n paar sterfgevälle as gevolg van ander oorsake.

Hierdie vorm van terapie word as voldoende beskou en is taamlik eenvoudig. Dit het geblyk dat die sterfgevälle wat voorgekom het nie verhoed kon word nie, behalwe in een geval waarin die dood toegeskryf is aan edeem van die brein-parenchium en moontlik op 'n binne-aarse hipertoniëse soutoplossing sou gereageer het. Dit wil ook voorkom asof die oorblywende ongeskiktheid, volgende op die herstel van die gevälle wat in die laaste stadium van die siekte was, vooraf bepaal was deur die mate van breinbeskadiging wat reeds plaasgevind het ten tye van hul toelating tot die hospitaal.

VIRUSNAVORSINGSEENHEID

Hoof van die Eenheid: PROF. M. VAN DEN ENDE

Universiteit van Kaapstad

Soos in vorige jare, was die navorsingswerk in hoofsaak weer daarop gemik om helderheid te kry oor 'n paar fisiese en ander fundamentele eienskappe van sekere virusse en oor die oplosbare antigene waarmee hulle verbode is in virusbesmette weefsel. Immunologiese en epidemiologiese ondersoeke is ook onderneem, sommige in samewerking met ander viruslaboratoriums in Suid-Afrika.

Grootte en Elektroforetiese Beweglikheid van Virusdeeltjies en Oplosbare Antigene

('n Gedeelte van hierdie werk is deur 'n lid van die Eenheid uitgevoer gedurende sy verloftyd wat hy by die Karolinska-Instituut in Stockholm deurgebring het.)

Poliovirus in die brein van suipmuis, besmet met die Tipe 2 virus, kom voor in 2 grootte-deeltjies (24 en 30m μ).

(4) Vitamin B Compound, to avoid toxic reactions from I.N.A.H.

(5) Various specific procedures for the control of raised intra-cranial pressure.

(6) Intra-thecal varidase, to overcome spinal block.

No daily intrathecal therapy was carried out, so that the responsibility of the administration of the specific therapy devolved upon the nursing staff; no toxic reactions occurred to I.N.A.H., nor were symptoms consequent upon the use of A.C.T.H. encountered. No spread of tuberculous disease occurred elsewhere in the body as the result of A.C.T.H. therapy, and no deafness occurred. Antibiotic cover with A.C.T.H. therapy is no longer deemed necessary, as A.C.T.H. does not mask symptoms of intercurrent disease as expected. Continuous antibiotic therapy allowed the development of severe secondary infections which were very difficult to cure and were responsible for some deaths from other causes.

This form of therapy is considered adequate and is fairly simple. It appeared that the cases who died could not have been saved, with one exception in which the death was attributed to oedema of the brain parenchyma and might have responded to i.v. hypertonic saline. It also seemed that the residuum following recovery of those who were in the late stage of the disease when treatment started, was predetermined by the brain damage already suffered at the time of admission.

VIRUS RESEARCH UNIT

Head of the Unit: PROF. M. VAN DEN ENDE

University of Cape Town

As in previous years, the main emphasis of the work was aimed at the elucidation of some physical and other fundamental properties of certain viruses and the soluble antigens with which they are associated in virus-infected tissues. Immunological and epidemiological investigations were also undertaken, some of these in collaboration with other virus laboratories in South Africa.

Size and Electrophoretic Mobilities of Virus Particles and Soluble Antigens

(Some of this work was done by a member of the Unit during his leave spent at the Karolinska Institute in Stockholm.)

Polio virus in the brains of suckling mice infected with Type 2 virus occurs in 2 particle sizes (24 and 30 m μ).

Die besmette virus en die oplosbare antigeen waarmee dit verbonde is het aangetoon dat dit dieselfde elektroforetiese beweeglikheid het in 'n fosfor-buffer met pH 8.2. Dis 'n bewys ten gunste van die opvatting dat oplosbare antigeen beskou kan word as 'n noodsaaklike bestanddeel van die virus. Kritiek is uitgeoefen oor die tegniek wat gebruik is om die verskillende deeltjie-groottes aan te toon. Weens die fundamentele belangrikheid van hierdie verskynsel is verskeie nuwe tegnieke toegepas, insluitende kromatografie en elektroforese, om vorige bevindings te bevestig. Daarbenewens kan kleiner besmette deeltjies afgeskei en instand gehou word deur geskikte oor-inspuiting in muisbrein. Die betekenis van grootte-distribusie in verhouding tot aanpassing en verswakking is voortdurend ondersoek. Ultrasentrifugale studies is gemaak op gesuiwerde poliovirus van al drie tipes wat in die weefselkultuur gekweek is. Monsters van dieselfde gesuiwerde materiaal is aan elektronmikroskopiese presipitasietoets met homoloog-serums onderwerp, deur gebruikmaking van Oudin se tegniek. Die resultate het getoon dat daar 3, 2 en 1 verskillende grootte-groepe onderskeidelik voorkom in tipes 1, 2 en 3 virusse. Tipe 2 virus wat aan 'n bevriesingsdroging onderwerp is, het die aanwesigheid getoon van 'n komponent wat nie in die ongedroogde materiaal voorkom nie, en ook 'n deeltjie-grootte het van slegs $19\text{ m}\mu$, wat ooreenstem met die deursnee van die kern wat met behulp van die elektronmikroskoop gesien kan word.

Die inhomogeniteit van poliovirus is ook aangetoon deur kalsiumfosfaat-adsorpsie, en -uitwassing. Byvoorbeeld, die Stockholm Tipe 1 poliovirus het hom gedra asof dit uit minstens twee besmette komponente bestaan. In die lig van onlangse navorsingswerk i.v.m. tabakmosaik-virus, kan hierdie tegniek miskien waardevol wees vir die afskeiding van virusstamme van verskillende patogenie.

Op virus wat in 'n weefselkultuur gekweek is, is 'n gebieds-elektroforese („zone-electrophoresis”) in 'n suikergradient uitgevoer. Die grootste gedeelte van die virus het beweeg met 'n beweeglikheid gelyk aan die van hemoglobien. Behalwe hierdie komponent is 'n vinnig migrerende komponent opgemerk wat van die hoofkomponent geskei kan word.

Gebieds-elektroforetiese proewe is ook uitgevoer op die F.A.-stam muis-ensefalitisvirus wat 'n voorlopige suiwering ondergaan het deur iso-elektriese presipitasie en chloroform-behandeling. Twee besmetlike komponente is opgemerk wat onderskeidelik 90 persent en 10 persent van die totale virus verteenwoordig. Die aanwesigheid van 'n derde komponent was minder seker. Die virus van die hoofkomponent is gekonsentreer en onder die elektronmikroskoop bestudeer. Hierdie metode kan miskien 'n aanduiding wees hoe ander virusse deur fisiese middele gesuiwer kan word.

Gesuiwerde bereidings van poliovirus is elektronmikroskopies ondersoek. Dit skyn of die virus bestaan

The infective virus and the soluble antigen with which it is associated have been shown to have the same electrophoretic mobility in phosphate buffer at pH 8.2. This is evidence in favour of regarding soluble antigen as an essential constituent of the virus. Criticisms have been levelled at the techniques employed to demonstrate the different particle size groups. Because of the fundamental importance of the phenomenon, several new techniques, including chromatography and electrophoresis, have been employed to confirm the previous findings. Also, smaller infective particles can be separated and maintained by appropriate passage in mice. The significance of size distribution in relation to adaptation and attenuation has remained under investigation.

Ultracentrifugation studies have been made on purified polio virus of all three types grown in tissue culture. Samples of the same purified material were subjected to electron microscopy and to precipitation tests with homologous sera, using Oudin's technique. The results showed the presence of 3, 2 and 1 different size groups in the type 1, 2 and 3 viruses respectively. Type 2 virus, subjected to freeze-drying, showed the presence of a component not present in the undried material, and with a particle size of only $19\text{ m}\mu$ which corresponds to the diameter of the "nucleus" seen in microscopic studies.

The inhomogeneity of polio virus has also been demonstrated by calcium phosphate adsorption and elution. Thus the Stockholm Type 1 polio virus behaved as if it is composed of at least two infective components. In the light of recent work done elsewhere on tobacco mosaic virus, this technique might be of value for separation of virus strains of different pathogenicity.

Zone electrophoresis in a sugar gradient has been performed on polio virus grown in tissue culture. The major portion of the virus migrated with a mobility equal to that of haemoglobin. In addition, a fast migrating component which could be separated from the main component was observed.

Zone electrophoresis experiments were also performed on the F.A. strain of mouse encephalitis virus which had received a preliminary purification by isoelectric precipitation and chloroform treatment. Two infectious components which comprised respectively 90 per cent. and 10 per cent. of the total virus were observed. The presence of a third component was less certain. The virus from the main component was concentrated and studied in the electron-microscope. The method may point the way to the purification by physical means of other viruses.

Purified preparations of polio virus were investigated by electron microscopy. The virus appears to consist of

uit 'n kern van ongeveer 20 m μ in deursnee en omhul in materiaal wat minder dig voorkom onder die elektronmikroskoop. Seksies wat van 'n knopie polio-virus gesny is wat deur ultrasentrifugering gekonsentreer is, toon aan dat die virus kristalvormig (kubusvormig) ingepak is.

Die meting van die deeltjie-grootte van oplosbare bloutong-antigene in die brein van suipmuisies is deur sentrifugeringsmetodes uitgevoer. Die resultate toon deeltjies van 'n grootte wat wissel van 8 m μ tot meer as 25 m μ . Hulle toon almal dieselfde elektroforetiese beweeglikheid. Die aanduiding is dat die oplosbare antigeen aanwesig is in die vorm van aggregate van die kleinste eenhede (8 m μ).

Studies oor oplosbare hondsdoelheidsantigene duur voort. Ernstige moeilikheid is ondervind met die betreklike onstabieleit daarvan en deur die groot verliese as gevolg van die suiweringsprosedures wat tot dusver toegepas is, sodat min vordering gedurende die verslagtydperk gemaak is om helderheid te verkry oor die aard van hierdie oplosbare antigene. Talle pogings is aangewend vir stabilisering en suiwing van die antigeen tydens die voorlopige suiwingstadiums. Verdere suiweringspogings is ook toegepas deur middel van adsorpsie en uitwassing uit kalsiumfosfaatkolomme, en dit wil voorkom asof klein kolomme met geleidelike liewer as gradient-uitwassing die beste resultate sal gee.

Ander Poliomiëlitis-studies

Type 1 virus is met sukses aanpasbaar gemaak vir die brein van suipmuisie deur alternatiewe weefselkultuur/muisbreinoorinspuiting. Dit skyn of die virus twee vermenigvuldigingsiklusse ondergaan, die eerste vroeg en asimptomaties, en die ander laat en gepaard met verlamming van 'n wisselende getal van die ingespuite muisie. Virusse van beide siklusse kan in die weefselkultuur opgemerk word. Die resultate dui op die moontlikheid dat daar minstens twee variante van die virusse mag voorkom, net een waarvan in staat is om verlamming in jong muisies te veroorsaak. Bewyse is verkry dat oplosbare antigene aanwesig kan wees in die brein van suipmuisie wat met Tipe 1 virus besmet is.

Die Eenheid was behulpsaam met die diagnose van poliomiëlitisgevalle gedurende die onlangse epidemie in Kaapstad. Gedurende die jaar is ongeveer 70 stoelgange ondersoek en 78 gedurende die eerste gedeelte van 1957. Uit 44 hiervan is die poliovirus geïsoleer. Gedurende die wintermaande was 4 van die stamme van die Tipe 3 virus, maar dit lyk of die somer-epidemie deur Tipe 1 virus veroorsaak is. In slegs 3 gevalle is Tipe 2 virus geïsoleer.

Ten behoeve van die plaaslike gesondheidsowerheid is rivierwater en slykmateriaal ondersoek, en ongeveer 40 sera getoets vir die aanwesigheid van teenliggame.

Ander Studies oor Bloutong

'n Studie is begin oor die groeiselheid, plaatjievorming en konsentrasie van bloutongvirusse, met die

a nucleus about 20 m μ in diameter surrounded by less electron dense material. Sections cut through a pellet of polio virus concentrated by ultracentrifugation showed that the virus was packed in a crystalline fashion (cubical).

Measurement of the particle size of the soluble antigen of bluetongue in suckling mouse brains was made by centrifugation methods. The results revealed the presence of particles varying from 8 m μ to more than 25 m μ . All of them show the same electrophoretic mobility. It is suggested that the soluble antigen occurs in the form of aggregates of the smallest (8 m μ) units.

The studies on rabies soluble antigen have continued. The relative instability and the heavy losses incurred in purification procedures so far employed have proved serious difficulties so that little advance has been made during the past year in the elucidation of the nature of the soluble antigen. Many methods have been employed in attempts at stabilizing and purifying the antigen during preliminary stages of purification. Attempts at further purification by adsorption and elution from calcium phosphate columns were made. Relatively small columns and stepwise rather than gradient elution appear to give the best results.

Other Studies on Poliomyelitis

Type 1 virus has been successfully adapted in the brains of suckling mice by alternate tissue culture brain passage. The virus appears to undergo two multiplication cycles, the first early and asymptomatic, the other late and associated with paralysis of a variable proportion of the mice injected. Virus from both cycles can be detected in tissue culture. The results suggest the possibility that at least two variants of the virus may be occurring, only one of which is capable of producing paralysis in infant mice. Evidence has been obtained that soluble antigen may be present in the brains of suckling mice infected with the Type 1 virus.

The Unit has assisted in the diagnosis of poliomyelitis cases during the recent epidemic in Cape Town. Approximately 70 stools were examined during the year and 78 during the first part of 1957. From 44 of them polio virus was isolated. During the winter months, 4 of the strains were of Type 3, but the summer epidemic appeared to be caused by Type 1 virus. On only 3 occasions was Type 2 virus isolated.

Examinations of river water and sludge were also undertaken on behalf of the local health authorities, and approximately 40 sera were tested for the presence of antibodies.

Other Studies on Bluetongue

A start was made with the study of growth rates, plaque formation and concentration of bluetongue viruses

doel om hulle in herkombinasieproewe te gebruik en om helderheid te kry oor die aard van die oplosbare antigeen.

Sinkdalkoors

Dit is vasgestel dat muise wat geskikte dosisse inkry van 'n virus, wat optimaal bestraal is met ultra-violetlig, —hoewel hulle geen simptome vertoon nie—bewys lewer van aktiewe vermenigvuldiging van die virus in die weefsel. Virusse van sodanige diertjies verkry, is besmetlik vir ander muise, maar daar is tog tekens van klein verskille in die kwaadaardigheid daarvan vergeleke met onbestraalde virusse. Antigenisiteit van ultra-violetbestraalde virusse skyn afhanklik te wees van die residuele lewendige virusse teenwoordig.

Titrasiestudies dui daarop dat die virus soos dit in Sinkdalkoors-besmette muisbloed voorkom, uit deeltjies bestaan waarvan 'n klein hoeveelheid betreklik bestand is teen ultra-violetbestraling, maar pogings om hierdie bestande virusse af te skei deur alternatiewe bestraling en deurlating het misluk. 'n Studie is begin oor die stabiliteit van die neurotropiese en pantropiese virussoorte en oor hul gedrag in weefselkulture.

Nie-spesifieke Hemstof in Normale Sera vir CT/W-tipe Virus

Die normale serumhemstof vir die virus wat van 'n geval van knopvelsiekte geïsoleer is, is vollediger bestudeer. Dit kan van die serum verwyder word deur presipitasie by pH 5·3. Fraksies wat verkry is deur „uitsouting” van die serum is met globulien geassosieer, maar met elektroforese vertoon dit 'n beweeglikheid amper gelyk aan die van albumine en is dus aanmerklik verskillend van die langsaambewegende globulien waarmee teenliggaamaktiwiteit gewoonlik gepaard gaan. Die hemstof is betreklike spesifiek vir die virus wat bestudeer word en skyn verskillend te wees van Pillemer se properdine.

Die identiteit van die virus self bly twyfelagtig. Dit is dus minder verwarrend om die virus aan te dui met sy oorspronklike laboratoriummerk CT/W. Dit skyn nou onwaarskynlik dat die virus etiologies verwant is aan knopvelsiekte. Dit is ook verskillend van 'n groep virusse wat deur die personeel van die Onderstepoortse Veeartsenykundige Laboratoriums geïsoleer is van knopvelsiektegevalle, maar die betekenis hiervan ten opsigte van hierdie siekte bly nog twyfelagtig.

with a view to using these in recombination experiments and for the elucidation of the nature of the soluble antigen.

Rift Valley Fever

It has been established that mice receiving appropriate doses of virus optimally irradiated with ultra-violet light, although showing no symptoms, present evidence of active multiplication of the virus within the tissues. Virus recovered from such animals is infective for other mice, but there is evidence of minor differences in virulence as compared with unirradiated virus. Antigenicity of ultra-violet irradiated virus appears to depend on the residual live virus present.

Titration studies suggest that virus as it occurs in Rift Valley fever infected mouse blood consists of particles of which a small proportion is relatively resistant to ultra-violet light, but attempts to separate the resistant virus by alternate irradiation and passage have failed.

A start has been made on the study of the stability of the neurotropic and pantropic varieties of the virus, and their behaviour in tissue culture.

Nonspecific Inhibitor in Normal Sera for CT/W-type Virus

The normal serum inhibitor for the virus isolated from a case of lumpy skin disease has been studied in greater detail. It can be removed from serum by precipitation at pH 5·3. In fractions separated from serum by “salting out” it is associated with globulins. Electrophoretically, however, it has a mobility just short of that of albumen and is, therefore, markedly different from slow moving globulins with which antibody activity is normally associated. The inhibitor is relatively specific for the virus under study and appears to be distinct from Pillemer's properdine.

The identity of the virus itself remains in doubt. It is therefore less confusing to refer to it by its original laboratory label CT/W. It now appears most unlikely to be etiologically related to lumpy skin disease, It is distinct from a group of viruses isolated from lumpy skin disease cases by the staff of the Onderstepoort Veterinary Laboratories, but the significance of these in relation to the disease also remains in doubt.

Nywerheidsnavorsings- institute

In die volgende paragrawe word 'n kort oorsig gegee van die werk wat gedurende die jaar deur nywerheidsnavorsingsinstitute gedoen is. Die institute is as maatskappye sonder winsbejag geïnkorporeer en word deur Beheerrade bestuur. Hulle is dus nie institute van die W.N.N.R. nie en reik afsonderlike jaarverslae uit.

Aangesien die Raad hulle egter finansiële steun, in die verskillende rade verteenwoordig is en ten nouste met hulle saamwerk, is dit wenslik dat opsommings van hul jaarverslae in die van die Raad ingesluit word.

VISNYWERHEIDNAVORSINGSINSTITUUT

Direkteur: DR. G. M. DREOSTI

Dit is besonder aangenaam om by 'n geleentheid soos die herdenking van die tiende verjaarsdag van die Instituut te kan vermeld dat die nuwe laboratorium tans voltooiing nader. Die verwagting is dat die verskuiving vanaf die bestaande beknopte hoofkwartier by Groenpunt na die ruim gebou op die terrein van die Universiteit van Kaapstad voor die einde van April 1957 afgehandel sal wees.

Weens die wye arbeidsveld en die verskeidenheid van onderwerpe wat onder visserij-tegnologie inbegrepe is, is die nuwe gebou van die Instituut so ontwerp dat dit nie alleen die gebruiklike laboratoria en kantore verskaf nie, maar ook spesiale ruimtes voorsien vir die oprigting van installasies vir varsviss-bereiding, inmaak, beroking, bevriesing en verkoeling, en vismeel en vismeelblom-uitrusting van proefaanlegformaat, sowel as broeikamers en 'n dierehuis. Ook is voorsiening gemaak vir maklike herrangskikking van ruimte en vir maksimum benutting daarvan, gepaard met gerieflike instandhouding en minimum onderhoudskoste.

Hierdie nuwe laboratorium, gedeeltelik bekostig uit spesiale toekennings deur die visserijnywerheid, is slegs een uiting van die nywerheid se vertroue in die bestaande en toekomstige waarde van wetenskaplike navorsing. 'n Verdere aanduiding van hierdie vertroue is dat die Visserijnywerheid onlangs addisionele fondse aan die Instituut beskikbaar gestel het wat die Instituut se jaarlikse inkomste met meer as 50 persent verhoog, en wat sal bydra om te voldoen aan die steeds toenemende aanvraag vir tegnologiese navorsingswerk.

Net soos in vorige jare, het die Instituut weer 'n gedeelte van sy werk gewy aan die oplossing van probleme waarvoor die nywerheid te staan gekom het. Op ander

Industrial Research Institutes

In the following paragraphs a brief description is given of the work undertaken by Industrial Research Institutes during the period under review. These institutes are incorporated as non-profit companies and are managed by Boards of Control. They are thus not institutes of the C.S.I.R. and issue separate annual reports.

However, since the Council contributes to their financial support, and is represented on the various boards and works in close collaboration with them, it is considered desirable to include summaries of their annual reports in the Annual Report of the Council.

FISHING INDUSTRY RESEARCH INSTITUTE

Director: DR. G. M. DREOSTI

At the time of the Institute's tenth anniversary, it is particularly pleasing to report that work on the new laboratory is nearing completion. It is expected that the move from the present confined quarters at Green Point to the spacious building on the campus of the University of Cape Town will be accomplished before the end of April, 1957.

Because of the wide field and diversity of subjects embraced by fisheries technology, the Institute's new building incorporates not only conventional laboratories and offices, but also special spaces for fresh-fish preparation, canning, smoking, freezing and chilling plant, and fish meal and fish-flour equipment on a pilot-plant scale, together with incubator rooms and an animal house. Special attention has been given to achieving maximum flexibility and utility, combined with ease of maintenance and minimal maintenance costs.

The new laboratory, paid for in part by special grants from the South African fishing industry, is only one expression of industry's confidence in the present and future value of scientific research. As a further mark of this faith, the fishing Industry has recently voted additional funds, which will increase the Institute's annual income by more than 50 per cent., and which will help to meet the ever-increasing demand for technological research.

As in previous years, a proportion of the Institute's work was concerned with the immediate practical problems of industry. In several spheres, however, it

terreine was dit egter vir die Instituut ook moontlik om heelwat tyd aan basiese nywerheidsnavorsing te wy.

Vars Vis

Die proses om vars vis in antibiotiese ys te preserveer, het onlangs baie belangstelling gewek in Amerika en Europa, waar skouspelagtige verlenging van die koelbewaringsduur verkry is. In Kanada word die gebruik van die antibiotiese ysproses vir die preservering van vis nou deur wet gemagtig, maar in ander lande is die owerhede nog maar baie versigtig daarmee. Aangesien die verspreiding van vars vis na die binnelandse sentrums van Suid-Afrika spesiale probleme skep vanweë die groot afstande waarvoor die vis gedurende warm weer vervoer moet word, is gevoel dat verdere proefnemings op hierdie gebied geregverdig is. Ongelukkig het die jongste studies net gedien om vorige bevindings te beaam, naamlik, dat die gebruik van antibiotiese ys geen groot verlenging aan die bewaringsduur van Suid-Afrikaanse stokvis verleen nie.

Vandag word groot hoeveelhede gerookte vismootjies in Suid-Afrika berei. Voor beroking word die mootjies eers gepek—'n proses wat op verskillende maniere uitgevoer kan word. Om aan die ideaal te voldoen, behoort die metode wat toegepas word vinnige opname van die sout sowel as eenvormige soutgehalte en maksimum meganiese hantering te verseker. Faktore wat ondersoek word is metodes van vervoer van vis vanaf die kaai tot by die fabriek (in ys of sout), metodes van pekeling met spesiale nadruk op die omroering van die pekel, en metodes vir die hantering van vismootjies in die fabriek. Die nywerheidsmoontlikhede van twee nuwe idees, nl. 'n nuwe tipe spanraam en die toediening van pekel deur 'n voortdurende „sproei"-kringloop, word ondersoek. Beide is belowend en sal 'n groter mate van meganisering veroorloof.

Inmaak van Vis

Met die inmaak van sardyne word soms bevind dat individuele visse gedeeltelik of heeltemal opgebreek het met die inmaakproses. Hierdie toestand, bekend as „moes", kan aan verskillende oorsake toegeskryf word. Die lastigste hiervan is die aanwesigheid van 'n proteolitiese protosoon, *Chloromyxum thyrsites*, in die liggaamspiere. Die algemene praktyk in die visinmaakfabriek is om die sardyne op die paktafels met die hand uit te soek vir uitskakeling van sulke vis wat ongeskik is vir inmaak. Maar aangesien die aanwesigheid van die *Chloromyxum* nie altyd uiterlik in rou vis sigbaar is nie, veral as die vis nog baie vars is, is uitsoek met die hand selde indien ooit heeltemal bevredigend. Studies gedurende die jaar onder beskouing het aangetoon dat in monsters vis wat herhaaldelik gesorteer en hersorteer is deur geoefende verpakkings, daar altyd nog 'n klein aantal sagte en pap individu's voorkom wat deurgaans as geskik vir inmaakdoeleindes deurgelaat is. Die toetse het weer duidelik bevestig wat

proved possible to devote a substantial proportion of time to basic industrial research.

Fresh Fish

The preservation of fresh fish in antibiotic ices has recently aroused much interest in America and Europe, where spectacular extensions of storage life have been observed. In Canada the use of antibiotic ices for the preservation of fish is now legally permitted, but throughout the rest of the world, authorities are still extremely cautious. However, since the distribution of fresh fish to inland centres in South Africa presents special problems arising out of the vast distances to be covered in a warm climate, it was felt that further experimental work in this field was justified. Unfortunately, the recent studies have only served to confirm previous findings that the use of antibiotic ices gives no great prolongation of useful storage life with South African hake.

Considerable quantities of smoked fish fillets are being prepared in South Africa today. Before smoking, the fillets are brined—a process which may be carried out in a number of different ways. Ideally, the chosen method should ensure a rapid rate of "striking", uniformity of final salt content, and permit maximum mechanization of handling. Factors under investigation include methods of transporting fish in ice or brine from the quayside to the factory, methods of brining, with special emphasis on agitation of the brine, and methods of handling fillets in the factory. The industrial possibilities of two new ideas, namely a new type of tender and of applying the brine in a continuous "shower" circuit, are being investigated. Both are promising and would permit increased mechanization.

Fish Canning

When canning pilchards, it is sometimes observed that individual fish have partially or completely disintegrated during processing. This condition, known as "mushiness", can be ascribed to various causes, of which the most troublesome is the presence in the somatic muscles of a proteolytic protozoan, *Chloromyxum thyrsites*. It is general practice in fish canneries to sort pilchards manually at the packing tables, in an effort to eliminate those which are unfit for canning. However, as the presence of *Chloromyxum* is not always outwardly apparent in raw fish, especially when they are very fresh, such manual sorting is seldom, if ever, entirely satisfactory. Studies during the year under review showed that, in samples of fish repeatedly sorted and resorted by skilled packers, there was always a small number of soft and mushy units which was consistently selected as fit for canning. The tests again clearly confirmed the

die Instituut vantevore aangedui en aan die nywerheid bekend gestel het; nl. die voordele wat te behaal is deur sortering en verpakking as twee afsonderlike funksies te beskou, met 'n groep bekwame sorteerders wat een na die ander die vis nagaan soos dit met die vervoerbaan na die verpakkingstafel gaan, in stede daarvan om van elke individuele verpakker te verlang om sy eie vis te sorteer voordat hy dit in die blik pak. Hoewel 'n aanmerklike verbetering deur hierdie stelsel meegebring word, word tog gevoel dat die soek na objektiewe fisiese of meganiese metodes van sortering moet voortgaan. Dit is 'n hardnekkige probleem, en verskeie idees wat aanvanklik belowend gelyk het, het geen vrugte afgewerp nie. Navorsing duur dus voort.

Wêreldbelangstelling is onlangs gewek in die estetiese en voedingsvoordele van „gepasteuriseerde” ingemaakte voedsels. Baie delikate produkte wat ongewenste veranderinge ondergaan indien dit aan die „volle” proses onderwerp word, kan hermeties verseël word in 'n blik, dan 'n ligte verhitting ondergaan en daarna in koelbewaring gehou en gedistribueer word. Toetse het aangetoon dat hierdie soort behandeling uitstekend is vir Suid-Afrikaanse kreef.

Vismeel en Visolie

'n Grootse program vir die merk van vis is onlangs deur die Afdeling Visserye onderneem, met die doel om daardeur te probeer vasstel of sardynvisserye by Walvisbaai en by St. Helena baai dieselfde sardynskool of twee aparte sardynskole eksploiteer. As gevolg van 'n reeks kritiese laboratorium- en fabriekstoetse, en deur veranderinge in die fabrieksinstallasies, is meeste van die vismeelfabrieke in Suid-Afrika en Suidwes-Afrika tans toegerus met funksionerende en doeltreffende magnetiese stelsels vir opsporing van die merkplaatjies. 'n Aantal sulke merkplaatjies is al reeds op hierdie wyse teruggevind. Verdere proefwerk is aan die gang met die doel om die merkplaatjies op te spoor nog voordat die vis in die fabriek aankom.

Gedurende die jaar is verdere pogings aangewend om die daaglikse, weeklikse en seisoenswisseling in die oliegehalte van die skoolvissoorte, sardyne en maasbankers, te wete te kom en om dit te korreleer met ander natuurlike veranderlikes. Die doel van hierdie werk is om een of ander middel te vind vir voorkennis van die tydperk van maksimum olie-opbrings waardeur die fabrieke in staat gestel kan word om te opereer wanneer maksimum-produksie moontlik is. Studies oor die wisseling in fabrieksolie-opbrings, en oor die oorvloed van plankton in die voerstreke het geen korrelasie tussen die twee aangetoon nie. Hoogtepunte in olie-opbrings kom vroeër in Suid-Afrika voor as in Suidwes-Afrika, en die syfers vir Suid-Afrika dui daarop dat stygende en dalende olie-inhoud in sardyne en maasbankers toegeskryf kan word aan dieselfde, maar tot nog toe onbekende, faktore.

advantages, previously found by the Institute and recommended to industry, of making sorting and packing separate operations, with a group of competent sorters, checking one after another through the fish as it passes to the packing tables, instead of requiring each individual packer to sort his own fish before placing it in the can. While substantial improvement results from this system, it is, nevertheless, felt that the search for objective physical or mechanical methods of sorting should continue. The problem is proving a stubborn one, however, and several ideas, at first thought promising, have not born fruit. Research is continuing.

World interest has recently been aroused in the aesthetic and nutritional advantages of “pasteurized” canned foods. Many delicate products, which suffer undesirable changes when subjected to a “full” process, can be hermetically sealed in a can, given a mild heat treatment and then held and distributed in chilled storage. Tests have shown that this type of treatment is an excellent one for South African rock lobster tails.

Fish-meal and Oil

A large-scale fish-tagging programme was recently undertaken by the Division of Fisheries in an attempt to determine whether the pilchard fisheries at Walvis Bay and at St. Helena Bay are exploiting the same or two different populations. This Institute was asked to study the problem of tag recovery. As a result of a series of critical laboratory and factory tests, and of modifications to factory installations, most fish-meal plants in South Africa and South West Africa are now equipped with functioning and effective magnetic tag-recovery systems—and a number of tags have already been recovered. Further work is in progress with a view to recovery of tags before the fish enter the plant.

During the year, further efforts were made to understand and to correlate with other natural variables, the daily, weekly and seasonal fluctuations in the oil content of the shoal fish, pilchards and maasbankers. The object of this work is to obtain some means of anticipating the period of maximum oil yield, so as to enable factories to operate at times when maximum productivity is possible. Studies of fluctuations in factory oil yields and in the abundance of plankton on the feeding grounds have revealed no correlation between the two. Peak oil yields occur earlier in South Africa than in South West Africa, and the South African figures suggest that increasing and decreasing oil contents in both pilchards and maasbankers may be attributable to the same, as yet unknown, factors.

Navorsingswerk oor self-verhitting van vismeel is voortgesit. 'n Tweede proefbesending wat vanaf Walvisbaai na die Verenigde Koninkryk verskeep is, het goed geslaag en daardeur 'n duidelike bevestiging gegee aan die voordele en uitvoerbaarheid van die nuwe stapelmetodes wat deur die Instituut ontwerp en aanbeveel is. In ondersoek by fabriek is studies gemaak oor die snelheid van oksidasie in sardyn-perskoek, en oor wisselinge in temperatuur en voggehalte van die sakke verouderde vismeel wat aan lug blootgestel was, en die uitwerking van sulke faktore wanneer die sakke onder bedekking gebring is.

In die laboratorium is die snelheid van verhitting bestudeer in spesiaal ontwerpte adiabatiese kalorimeters. Dit is bevind dat die snelheid van verhitting vinnig daal onmiddellik na fabrikasie en daarna geskied dit heelwat stadiger. Hierdie studies het die Instituut se aanbevelings gestaaf dat Suid-Afrikaanse vismeel vir minstens drie weke verouderd moet word voor verpakking of verskeping. Aangesien selfontbranding van steenkool grootliks vertraag word indien dit in 'n atmosfeer van koolsuurgas opgeberg word, is soortgelyke toetse met vismeel uitgevoer, maar geen vermindering in snelheid van verhitting is opgemerk nie. Ook is die verhittingsnelheid van wit vismeel en walvismeel in die adiabatiese kalorimeters ondersoek. Hierdie produkte het betreklik min reaksie getoon.

Ander fundamentele laboratoriumstudies is daarop gemik om te bepaal watter uitwerking langdurige verhitting teen betreklik lae temperature op die voedingswaarde van vismeel het. Sardynmeel wat so behandel is dat geen vogverlies plaasvind nie, is deur sodanige verhitting nadelig geaffekteer: die verteerbaarheid van proteïene, sy biologiese waarde en sy Proteïen-kwaliteitsindeks (Almquist) het almal in 'n aansienlike mate verminder. Die vetgehalte het ook verminder. Daarteenoor was maasbanker, wat in oop panne verhit is en toegelaat is om uit te droog tot omtrent 1 persent vog, feitlik gladnie geaffekteer nie. Dit is tans nog onbekend of die opgemerkte verskille toe te skryf is aan die verskil in visspesies of aan die aanwesigheid of afwesigheid van vog, of aan beide faktore. Ondersoekwerk duur voort.

Vismeelblom

'n Vismeelblom wat reukloos en smaakloos is en 'n hoë biologiese waarde het, word nou gereeld op klein skaal kommersieël geproduseer ooreenkomstig 'n proses wat deur die Visnywerheidsnavorsingsinstituut ontwerp is. Alle verrykte bruin brood wat vandag in die Westelike Kaap verkoop word, bevat hierdie vismeelblom. Die bakkers sowel as verantwoordelike lede van die publiek het hul tevredenheid uitgespreek oor hierdie produk, wat die kwaliteit van die deeg verbeter gedurende menging, aan die brood 'n beter goedhouvermoë verskaf en dit 'n aantreklike goue kleur gee. Wat sy voedingswaarde

Work on the spontaneous heating of fish-meal was continued. A second test shipment from Walvis Bay to the United Kingdom was successfully carried out and clearly showed the advantages and the practicability of the new stacking methods developed and recommended by the Institute. In factory-floor investigations, studies were made of the rate of oxidation in pilchard press-cake, fluctuations in the temperature and moisture content of cured, bagged fish-meal exposed to atmospheric conditions, and the effect on these factors of covering the bags.

In the laboratory, the rate of heating was studied in specially designed adiabatic calorimeters. The rate of heating fell off rapidly immediately after manufacture and thereafter much more slowly. The work confirmed the Institute's recommendations that South African fish meal should be cured for at least three weeks before stacking or shipment. As the spontaneous heating of coal is greatly retarded when it is stored in an atmosphere of carbon dioxide, similar tests were made with fish meal but no reduction in the rate of heating was observed. Rates of heating in white fish meals and whale meals were also investigated in the adiabatic calorimeters. These products showed relatively little reactivity.

Other fundamental laboratory studies were aimed at determining the effect of prolonged heating at relatively low temperatures on the nutritive values of fish meal. Pilchard meal, so treated that no loss of moisture occurred, was adversely effected by such heating: the digestibility of the protein, its biological value and its Protein Quality Index (Almquist) all being seriously reduced. The fat content was also reduced. On the other hand, maasbanker, heated in open trays and allowed to dry to about 1 per cent. moisture, was hardly affected at all. It is not at present known whether the observed differences are due to differences in the species of fish or to the presence or absence of moisture, or to both factors. Investigations are continuing.

Fish Flour

Odourless and tasteless fish flour, of high biological value, prepared from crude fish meal by the F.I.R.I. process, is now in regular small-scale commercial production. Today all enriched brown bread sold in the Western Cape contains this fish flour. Both bakers and responsible members of the consuming public have expressed their satisfaction with the new product, which improves the dough quality during mixing, gives the bread better keeping qualities and imparts an attractive golden bloom to the loaf. On the nutritional side, animal tests have shown that fish flour substantially

betref, het proewe met diere getoon dat die vismeelblom die biologiese waarde van die proteïene in die nuwe verrykte brood aanmerklik verhoog.

Die produksie van vismeelblom is onder die algemene tegniese toesig van die Instituut sover dit betref die kwaliteit van die rou materiale en die finale produkte, die ekonomie van installasie-ontwerp en toesig, en vir sover die bereidingsproses die voedingsgehalte van die produk raak.

Laboratoriumwerk oor spesiale aspekte van produksie duur voort. Byvoorbeeld, verdere studies word uitgevoer oor die snelheid van ekstraksie ten opsigte van die temperatuur van die oplosmiddel en die korrelgrootte van die meel. Alternatiewe metodes vir die „was” van die geëkstraheerde meel word ondersoek, en verdere navorsingswerk word uitgevoer oor die suiwering van aktiewe houtskool besmet met vet- en visreuk.

LEERNYWERHEIDNAVORSINGSINSTITUUT

Direkteur: DR. S. G. SHUTTLEWORTH

Die 1956-vergadering van die Navorsingsadviesraad van die Leernywerheidsnavorsingsinstituut is gekies as 'n gepaste geleentheid vir die herdenking van die 21ste verjaarsdag van Leernavorsing in Suid-Afrika, en dit was aangenaam dat daar by die geleentheid ook sommige van die nyweraars aanwesig kon wees wat verbonde was met die totstandkoming van die Instituut in 1935. Die vergadering is ook bygewoon deur die President van die W.N.N.R. wat by sy gelukwense aan die Instituut met sy 21ste verjaarsdag ook melding gemaak het van die groei van die Instituut vanaf die aanvanklike toekenning van £30 deur die Leernywerheid tot 'n wêreldbekende organisasie met 'n inkomste van £56,000.

Fundamentele Navorsing

Die ontdekking dat die groter fraksies van wattlelooistof omgeskep kan word tot helder rooi antosianidiene het gelei tot verdere oorspronklike werk oor die identifikasie van verskeie sintetiese en natuurlik-voorkomende antosianidiene. Die mening is dat hierdie werk 'n groot voorwaartse stap is vir 'n verklaring van die struktuur van wattlelooistof. Verdere vordering is gemaak met die studies oor die molekulêrgewig van wattlelooistof en die uitwerking van oksidasie en chemiese behandelings op korrelgrootte. 'n Interessante studie oor die bas van verskillende ouderdomme het aangetoon dat looistof in die jongste bas in net so 'n hoë polimeriserende staat neergelê is as die wat in kommersiële ekstrak gevind word.

Nuttige ontdekkings is gedoen in verband met die oplosbare proteïene van huide in verhouding tot die ouderdom van die dier en die proteïene in die bloed-

increases the biological value of the protein in the new enriched loaf.

Fish flour production is under the general technical supervision of the Institute, in regard to the quality of the raw materials and finished products, the economics of plant design and care, and in so far as processing affects the nutritional quality of the product.

Laboratory work on special aspects of production continues. For instance, further studies have been made of the rate of extraction in relation to the temperature of the solvent and the particle size of the meal. Alternative methods of "washing" the extracted meal are being investigated and further work has been done on the purification of active charcoal contaminated with fat and fish odours.

LEATHER INDUSTRIES RESEARCH INSTITUTE

Director: DR. S. G. SHUTTLEWORTH

The 1956 L.I.R.I. Research Advisory Council meeting was chosen as the fitting occasion for the commemoration of the 21st birthday of Leather Research in South Africa, and it was gratifying to have present some of the industrialists who had been associated with the early development of the Institute in 1935. The meeting was also attended by the President of the C.S.I.R. who, in congratulating the Institute on its 21st birthday, described the growth of the Institute from an initial grant of £30 from the tanning industry to a world-renowned research organization with an income of £56,000.

Fundamental Research

The discovery that the major fractions of wattle tannin could be converted to brilliant red anthocyanidins, has led to further original work on the identification of the various synthetic and naturally occurring anthocyanidins. It is believed that this work constitutes a major step forward in the elucidation of the structure of wattle tannin. Further progress has been made on molecular weight studies of the wattle tannins and the effects of oxidation and chemical treatments on particle size. An interesting study on bark of various ages has revealed that the tannin is laid down even in the youngest bark in a similarly highly polymerised state to that found in the commercial extract.

Useful discoveries regarding the soluble proteins of hides in relation to the age of the animal and the proteins in the blood stream were made and it was demonstrated

stroom, en daar is aangetoon hoe maklik hierdie proteïene onoplosbaar word gedurende bereiding van die huid, as gevolg waarvan die kwaliteit van die leer benadeel word. Navorsingswerk is voortgesit oor die meganisme van die looiproces met plantaardige stowwe en oor die teorie van die kroomlooiproses.

Verdere bewyse oor voetgroei is versamel in verband met kaalvoet- en skoendragewoontes, en oor ras- en omgewingsinvloede op voetvorm.

Huide- en Vellenywerhede

Uitbreiding van navorsingswerk oor oplosbare proteïene in huide en velle tot praktiese bereiding is nog in die laboratoriumstadium, maar dit het reeds gelei tot die produksie van 'n nuwe tipe leer van lae digtheid wat nou op proef gestel word deur middel van looptoetse. Ander navorsingswerk ten bate van die huide en vellenywerheid wat in veldproewe in Suidwes-Afrika uitgevoer is en bedoel is vir gebruik by die bereiding van karakoelvelle, hou beloftes in vir 'n gekombineerde insek- en bakteriedoder. In Oos-Londen en Durban is ook veldproewe uitgevoer met twee belowende nuwe insekdodende mengsels vir die voorkoming van insekbeskadiging wat gedurende die somermaande groot geldelike verliese aan die nywerheid veroorsaak.

Wattel- en Looinywerhede

Die wattel- en looinywerhede het te staan gekom voor 'n heftige mededinging deur kunsoolmateriale en deur die nuwe skoenmaaktegnieke, soos die gevulkaniseerde soolproses waar leer deur rubbersool vervang word. Beide nywerhede is ten volle bewus van die belangrikheid van navorsing in hul stryd vir voortbestaan, en het dus hul finansiële steun aan die Instituut verdubbel.

Gedurende die jaar het die Instituut besonderhede gepubliseer oor 'n verdere ontwikkeling in die vinnige ekonomiese produksie van hoëgraadse wattelbas gelooide sool leer, en dit word alreeds met sukses op groot skaal toegepas. Vordering is ook gemaak met die gebruik van wattel vir die herlooiing van kroomleer. Die Instituut se handboek (van 230 bladsye) oor watteltannin (wat sy weg na looierye in alle dele van die wêreld gevind het), en sy talryke wattelbas-publikasies in tegniese en wetenskaplike tydskrifte was tot groot hulp vir die nywerheid teen oorsese kompetisie in verband met mededingende looistofmateriale. Rapporte van oorsee dui aan dat daar toenemende gebruik gemaak word van die L.N.N.I. se looimetodes vir sool en binnesool.

Deur middel van gekombineerde looiprosesse en deur impregnering met kunstowwe is spesiale aandag gegee aan metodes vir vermindering van wateroplosbare stowwe in buitessool en aan verbetering van dragehalte. Die Instituut het saamgewerk met die Suid-Afrikaanse Leerlooiersgenootskap en die Transvaalse en Oranje-Vrystaatse Kamer van Mynwese vir die daarstelling van 'n standaard vir waterdigte kroomsool leer, en dit het 'n groot invloed

how easily these proteins become insoluble during curing, thereby affecting the quality of leather.

Research work has been continued into the mechanism of vegetable tannage and on the theory of chrome tannage.

Further evidence on the growth of the foot has been accumulated under bare-foot and shoe-wearing conditions and on racial and environmental influences on foot shape.

Hides and Skins Industries

Extension of work on soluble proteins in hides and skins to practical curing is still in the laboratory phase, but has already led to the production of a new low-density leather which is being tested in wear trials. Other work for the hides and skins industry undertaken in field trials in South West Africa and intended for use in curing of Karakul skins, has given promise of a combined insecticide and bactericide. Field trials have also been carried out in East London and Durban on two promising new insecticidal mixtures for prevention of insect damage which costs the industry large sums of money during the summer months.

Wattle and Tanning Industries

The wattle and tanning industries are faced with fierce competition from synthetic soling materials and from new techniques of footwear manufacture, such as the vulcanised sole process where rubber soles have replaced leather. Both these industries are very conscious of the importance of research in their fight for survival, and have doubled their financial support of the Institute.

During the year the Institute published details of a further development in rapid economical production of high-grade wattle-tanned sole leather, and this is already being applied on the large scale with success. Progress has also been made on the use of wattle in retannage of chrome leather. The Institute's 230 page text book on Wattle Tannin (which has found its way to tanneries all over the world), and its numerous publications on wattle in technical and scientific journals, are assisting the industry in its overseas competition with rival tanning materials. Reports from overseas indicate growing use of L.I.R.I. sole and insole methods of tanning.

Special attention has been given to methods of reducing water solubles in outsole leather, and to improvement of wearing quality by combination tannages and by impregnation with synthetics. The Institute has collaborated with the South African Tanners' Association and the Transvaal and Orange Free State Chamber of Mines in setting up a standard for waterproof chrome sole leather, and this has had a major effect

gehad op die duursaamheid van hierdie tipe leer wat vinnig op weg was om deur rubbersool verdring te word.

Skoeyisel

Die Britse besitter van die vrystelling vir die gebruik van die Instituut se „Liripuff“-proses het 'n spesiale masjien ontwerp vir die aanwending van kunshars op die Liripuff-stowwe wat baie sal bydra tot aanmoediging van 'n wêreldwye aanvaarding van hierdie Suid-Afrikaanse tegniek vir die hardmaking van toonkappe en agterkappe van skoeisel. Vrystellingsooreenkomste is aangegaan met Australiese en Nieu-Seelandse organisasies vir die verskaffing van Liripuffs aan hierdie afsetgebiede, en onderhandelings met organisasies in ander dele van die wêreld is aan die gang. Die Suid-Afrikaanse handel word bedien deur 'n nuwe maatskappy wat vir hierdie doel deur die Federasie van Skoeiselfabrikante gestig is. Hierdie maatskappy, bekend as „Liri Components Ltd.“, het sy eerste jaar van goed geslaagde afset voltooi met 'n toenemende uitbreiding in verkopings. Verdere ontwikkelingswerk is uitgevoer oor die probleem van 'n betroubare „Dra-Indeks“ vir soolles en oor die standarde van binnesoolmateriale.

Bedryfsnavorsing

Die Instituut se sukses met die verskaffing van stipte statistiese inligting aan die skoeisel- en looinywerhede, het daartoe gelei dat die Departement van Sensus en Statistiek hierdie werk aan die Instituut toevertrou het. Dit is te betwyfel of enige ander nywerheid êrens in die wêreld so deeglik en stiptelik van vergelykende statistiese inligting voorsien word, en 'n studie van *Footwear Facts and Figures* (1917-1956) verskaf bewyse van verbruiks- en werkverskaffingstendense wat wye belangstelling uitgelok het. Volgende op die ontdekking dat ongeveer 50 persent van die skoeverbruik in die Unie afkomstig is van die nie-blankes, word daar tans 'n analise gemaak van gegewens wat uit gesinsbegrotings van uitgesoekte groepe nie-blankes verkry is in verband met skoeiselaankope.

'n Landswye toepassing van aansporingsloontoelae in die skoeiselywerheid ondergaan tans 'n tydperk van besinking. Daar word gebruik gemaak van opgegaarde gegewens vir die opstel van 'n verslag oor formules in verband met patroonoppervlak in verhouding tot snytyd.

'n Amptenaar van die Instituut het 'n spesiale opleiding oorsee ontvang in tegnieke vir bestudering van bewegings in bedryfsprosesse en werk op hierdie gebied is nou aan die gang. 'n Studie is aan die gang oor die uitwerking van stylveranderinge (en gevolglike versteuring in gerasionaliseerde produksie) op skoefabriekskoste.

Publikasies

Sedert sy vorige verslag, het die Instituut 11 artikels vir wetenskaplike en 21 vir Suid-Afrikaanse tydskrifte bygedra, en 14 gedrukte en 20 mimeograafverslae uitgereik.

on the durability of this type of leather which was rapidly being eliminated by rubber soles.

Footwear

The British franchise holder of the Institute's "Liripuff" process has developed a special machine for applying synthetic resin to the Liripuff fabrics, which will do much to encourage the world-wide adoption of this South African technique for hardening toes and heels of footwear. Franchise agreements have been concluded with Australian and New Zealand organizations for the supply of Liripuffs to these markets, and negotiations with organizations elsewhere in the world are proceeding. The South African market is being supplied by a new company, formed for this purpose by the Footwear Manufacturers' Federation. This company, known as "Liri Components Ltd.", has completed its first year of very successful operation with steadily expanding sales. Further development work has been done on the problem of a reliable "Wear Index" for sole leather, and on standards for insoling materials.

Operations Research

The Institute's success in supplying the footwear and tanning industries with prompt statistical information, has led to the handing over of this work to the Institute by the Department of Census and Statistics. It is doubtful whether any other industry anywhere in the world is so well and promptly supplied with collated statistical information and a study of *Footwear and Figures* (1917-1956) provides evidence of consumption and employment trends which has been of wide interest. Following up the discovery that about 50 per cent. of consumption of footwear in the Union is by non-Europeans, data has now been obtained on footwear purchases in the family budgets of selected non-European groups, and is being analysed.

The nation-wide introduction of wage incentives in the footwear industry is now undergoing a period of digestion. Use has been made of accumulated data in preparing a report on formulae for relating pattern area to clicking times. An officer of the Institute has received special overseas training in motion study techniques, and work in this field is under way. A study is being made of the effects of style variations (and consequent interference with rationalized production) on footwear factory costs.

Publications

Since the last report, the Institute has contributed 11 papers to scientific journals, 21 to South African journals, and has published 14 printed and 20 mimeographed reports.

VERFNYWERHEIDNAVORSINGSINSTITUUT

Direkteur: G. M. HAMILTON

Vir die afgelope vyf jaar het die Instituut ondersoek gedoen na die werkverrigting van verfstowwe by buite-blootstelling in Durban, veral met betrekking tot Suid-Afrikaanse grondstowwe. Dit kan verklaar word dat hulle oor die algemeen gelykwaardig aan die ingevoerde artikel is. Die toename van hierdie ondersoekwerk kan beoordeel word uit die feit dat die 6 blootstellingsopstalle in 1953 nou vermeerder het tot 36, en dat sowat 700 verfoorte, meer as 150 vernisse en meer as 2,000 panele gemaak, blootgestel en die waardebehalings daarvan gemaak is.

Verformules is so uiteenlopend van aard en daar is so baie aanpassings wat toegepas kan word dat hierdie tipe werk nooit werklik tot finaliteit gebring kan word nie, maar tog kan sekere gevolgtrekkings gemaak word oor die maanklike duursaamheid van verskillende tipiese verftipes. Sulke kennis, indien behoorlik toegepas, kan van onskatbare finansiële waarde wees en die gebruiker van die verfoort in staat stel om die duursaamheid van die verf te laat aanpas by sy vereistes en om die koste van materiaal en arbeid te laat balanseer met die verwagte bestandheidsduur van die verf.

Die samestellings van die materiale wat getoets is, word aangegee in die verslae wat deur die Instituut gepubliseer is. Die volgende opsommings van bevindings is uit hierdie verslae gemaak.

Die duursaamheid van olieverwe in Durban is ongeveer een jaar. Pigmentasie het 'n invloed, en Timonox is die beste van die wat op proef gestel is. Visolies het 'n swak duursaamheid, maar geskeide sonneblomsaadolie is gelykstaande aan en soms beter as rou lynolie.

Die beste resultate met bestandheidsduur is verkry van verfoorte gebaseer op alkiedhars wat 'n duursaamheid van drie-en-'n-half jaar en langer vir meeste van die pigmente getoon het. Timonox en basiese loodsulfaat het veral goeie resultate gegee. Min verskil is opgemerk tussen soja-, sonneblom- en lynsaad-alkiede, maar die wat gebaseer is op kasterolie het nie so goed vertoon nie. Baie beter resultate is verkry met 100 persent fenolhars as met die gemodifiseerde tipe, maar die resultate het nog nie die stadium bereik waarby die maanklike bestandheidsduur bepaal kan word nie.

Wat die grondverwe vir staal betref het die ondersoek van vyftig formules aangedui dat besonder goeie resultate verkry kan word met sinkchromaat in alkiedmedia en rooilood in olie, wat beide vir byna vier jaar reeds op proef gestel is. In teenstelling hiermee, is sommige formules reeds al na agt maande uit die proewe onttrek.

Gedurende die verslagjaar is 726 monsters in die laboratorium ontvang en ondersoek as 'n diens aan die nywerheid.

PAINT INDUSTRIES' RESEARCH INSTITUTE

Director: G. M. HAMILTON

For the past five years the Institute has been investigating the performance of paints on exterior exposure at Durban, with particular reference to South African raw materials. It can be stated that in general these are equal to the imported article. The growth of this work can be judged by the fact that the six exposure stands available in 1953 have now increased to 36, and that some 700 paints, over 150 varnishes and over 2,000 panels have been made, exposed and evaluated.

Paint formulations are so varied, and there are so many adjustments which can be made, that such work is never really finalized, but certain conclusions on the probable life of different typical types of paint can now be drawn. Such knowledge, properly applied, can be of inestimable financial importance, enabling the paint user to equate the life of the paint with his requirements and to balance material and labour costs with the expected life of the paint.

The compositions of the materials tested are set out in the various test reports issued by the Institute. The following summary of observations is taken from these reports.

The life of oil paints in Durban is about one year. Pigmentation has an effect, Timonox being the best of those tested. The marine oils give poor durability, but segregated sunflower seed oil is equivalent to and sometimes superior to linseed oil.

The best results for durability were obtained with paints based on alkyds, which have a life of three and a half years and upwards for most pigments. Timonox and basic lead sulphate, especially, gave good results. Little difference was observed between the soya, sunflower and linseed alkyds, but those based on dehydrated castor oil have not shown up so well. Much better results were obtained with 100 per cent. phenolic resins than with the reduced type, but tests have not yet reached the stage at which the probable life can be assessed.

In so far as primers for steel are concerned, examination of nearly fifty formulae has indicated that outstanding results can be obtained with zinc chrome in alkyd media and red lead in oil, both of which have now been under test for nearly four years. In contrast, some formulations were withdrawn at eight months.

During the year under review, 726 samples were received in the laboratory and examined as a service to industry.

SUIKERFABRIKASIE-NAVORSINGSINSTITUUT

Direkteur: DR. K. DOUWES DEKKER

Gedurende hierdie verslagtydperk kon die Instituut meer aandag aan navorsingswerk wy as wat die geval in vorige jare was, deurdat 'n beperking ingestel is op die hoeveelheid tyd wat aan advies- en roetine toetswerk gegee mag word. Daar is ook reëlings getref vir die aanstelling van addisionele personeel wie se hoof funksie sal wees om suiwer navorsingswerk te onderneem op probleme wat van groot belang vir die suikernywerheid geword het. 'n Nuwe laboratorium word by die bestaande gebou gevoeg.

Skeikundige Afdeling

Daar dit al meer en meer geblyk het dat silika een van die nie-suikers is wat die raffineringkwaliteit van ru-suiker nadelig beïnvloed, en daar sy gedrag gedurende prosesering nie altyd bevredigend verklaar kan word nie, is 'n ondersoek uitgevoer vir die bepaling van die oplosbaarheid van SiO_2 in sukrose oplossings van verskillende konsentrasies en temperature. 'n Verhandeling oor hierdie aangeleentheid is in die begin van 1957 gepubliseer.

'n Volledige ontleding van die samestelling van die eindmelasse van alle fabriekes het nie alleen 'n rykdom van nuttige gegewens vir referensiedoeleindes gelewer nie, maar dit het ook interessante inligting verskaf oor die verskil tussen die sulfatasie- en defekasieproses in verband met die afskeiding van nie-suikers deur die suiwing. Bowendien is daar 'n enigsins onverwagte verskil gevind tussen die uitputting van melasse in die fabriek gedurende die middel en weer tydens die einde van die seisoen. Stelselmatige toetsing van ru-suikermonsters en kook-eksperimente in die Laboratorium het 'n beter insig gegee in die onderskeie uitwerkings van sekere nie-suikers op die filtreerbaarheid van hierdie tipe suiker. Verdere navorsing is nodig oor die opneming van hierdie nie-suikers in die suikerkorrels. Indien dit egter prakties is om hierdie nie-suikers te kan afskei voordat die sapsmengsel chemies behandel word, kan 'n verbetering in die gehalte van die suiker moontlik op 'n eenvoudige wyse bewerkstellig word. Met hierdie doel voor oë, is toetse by een van die suikermeulens uitgevoer deur middel van sentrifugasie van koue sapsmengsels deur gebruikmaking van 'n deurlopende soliede trommel sentrifuge. Die roetine analiese van monsters wit-, ru- en Goewermensgraad-suiker het voortgeduur in 1956. Die versamelde gegewens het nuttig geblyk omdat dit lig gewerp het op sommige van die klagtes oor die kwaliteit van Natalse suiker.

Aandag is geskenk aan die samestelling van stoomketelvoedingswater en stoomketelwater, aan die bepaling van olie in kondensate en aan die samestelling van ketelsteen wat in stoomketels en superverhitters voorkom. Die bereiding van stoomketelvoedingswater by suikerfabrieke is 'n saak wat in die toekoms meer aandag moet kry.

SUGAR MILLING RESEARCH INSTITUTE

Director: DR. K. DOUWES DEKKER

In the year under review more attention could be paid to research work than in previous years, due to a restriction of the time spent on advisory work and routine testing. Moreover, plans were made for the appointment of additional staff whose main function will be proper research into problems which are becoming of major interest to the sugar industry. A new laboratory will be added to the building.

Chemical Division

As it is becoming increasingly clear that silica is one of the non-sugars whose presence adversely affects the refining quality of raw sugar and, since its behaviour during processing cannot always satisfactorily be explained, an investigation was carried out to determine the solubility of SiO_2 in sucrose solutions of various concentrations and temperatures. A paper on this subject was published early in 1957.

A detailed analysis of the composition of the final molasses of all the factories yielded not only a wealth of useful data for later reference, but also provided interesting information on the difference between the sulphitation and defecation process in respect of the removal of non-sugars by the clarification process. Moreover, a somewhat surprising difference was noticed between the exhaustions of the molasses achieved by the factories in the middle and towards the end of the season.

Systematic testing of raw sugar samples and boiling experiments in the Laboratory gave a better insight into the respective effects of certain non-sugars on the filterability of this type of sugar. Further research is required on the occlusion of these non-sugars into the sugar crystals. If, however, it is feasible to remove these non-sugars before mixed juice is treated chemically, an improvement of the quality of the sugar can probably be effected by simple means. With this purpose in mind, tests have been carried out at one of the mills, involving the centrifugation of cold mixed juice using a solid bowl, continuous centrifuge. The routine analysis of samples of white, raw and Government grade sugar was continued in 1956. The collected data were useful in throwing light on some complaints about the quality of Natal sugar.

Attention was paid to the composition of boiler feed water and boiler water, to the determination of oil in condensates and to the composition of some scales which occurred in boilers and superheaters. The conditioning of boiler feed in sugar factories is a subject which will have to receive more attention in the future.

Tegnologiese Ontwikkeling

'n Kleinskaalse deurlopende diffusietenk is by een van die meulens opgerig en 'n reeks diffusie-eksperimente is uitgevoer as 'n maatreeël om sukrose uit die suikerriet te ekstrakteer. Pogings om die resultate van hierdie toetse rekenkundig in 'n paar konstantes te vertolk, het nie geslaag nie, maar daar is tog nuttige inligting verkry oor 'n aantal aangeleenthede waarvan die belangrikheid nie ten volle uit die beskikbare kennis in die literatuur bepaal kon word nie. Die toetse sal voortgesit word en dit word gehoop dat 'n verbeterde tipe diffusie-apparaat deur 'n ingenieursfirma beskikbaar gemaak kan word vir toetswerk in die toekoms.

Aan beamptes van die Nasionale Chemiese Navorsingslaboratorium is hulp verleen met 'n ondersoek by een van die meulens vir 'n bepaling van die mate van rivierbesoedeling deur afloopwater van die meul, en oor maatreëls om dit te verminder.

Die uitwerking van verskillende metodes om suiker in die sentrifuges te was, is by een van die meulens bestudeer, en nuttige gevolgtrekkings kan uit die resultate hiervan verkry word.

Die bestaande granuleringsmetodes van kooksels het weer die onderwerp van 'n ondersoek gevorm. Met die doel om die reëlmatigheid van die korrels te verbeter, is 'n nuwe metode ontwikkel wat in die praktyk deur 'n aantal meulens uitgetoets sal word. In die nuwe tegniek word nie van stoom gebruik gemaak gedurende die beginstadium van granulering nie.

Op versoek van een van die meulens, het die Instituut hulp verleen by stoomketeltoetse wat op 'n nuwe tipe stoomketel uitgevoer is.

Advieswerk en Fabrieksbeheer

Die aantal besoeke aan meulens vir bespreking van vervaardigingsprobleme, planne vir apparaatverbetering, of verandering van fabriekstegnieke was minder as die van die vorige jaar. Die aantal tegniese verslae wat deur die meulens uitgereik is, was ook minder.

As 'n middel om kontak met die meulens te handhaaf, is voortgegaan met die publikasie van weeklikse fabrieksgegewens. Opsommings van *Maandeliks Gegewens* is ook gepubliseer, en die *Jaarlikse Samevatting* is breedvoerig op die Jaarvergadering van die Suid-Afrikaanse Vereniging van Suikertegnoloë (S.A.S.T.A.) bespreek en daarna in die *Proceedings* van hierdie Organisasie gepubliseer.

Algemeen

Gedurende die verslagtydperk is vier *Communications from the S.M.R.I.* gepubliseer, drie verhandelings gelewer voor die kongres van die S.A.S.T.A., en ses artikels gepubliseer in die *South African Sugar Journal*.

Die Direkteur het die Negende Kongres van die Internasionale Genootskap van die Suikerrietegnoloë in Nieu-Delhi, sowel as die Jaarkongres van die Verein Deutscher Zuckertechniker in Freudenstadt bygewoon.

Technological Development

A small-scale continuous diffusion tank was installed at one of the mills, and a series of tests carried out on diffusion, as a means of extracting sucrose from cane. Attempts to express the results of these tests mathematically in a few constants were not successful, but useful information was obtained on a number of points whose importance could not fully be assessed from available knowledge in literature. The tests will be continued and it is hoped that an improved type of diffuser will be made available by an engineering firm for future testing.

Assistance was given to officers of the National Chemical Research Laboratory in an investigation carried out at one of the mills into the rate of pollution of a river by the mill's effluents and into means of reducing it.

The effect of various methods of washing sugar in the centrifugals was studied at one of the mills and useful conclusions could be drawn from the results.

The available methods of graining of strikes were again a subject of investigation. With the purpose of improving the regularity of the grain, a new method was developed and is to be tried out in actual practice by a number of mills. In this new technique no steam is used during the initial stage of the development of the crystals.

At the request of one of the mills, the Institute assisted in boiler tests carried out on a new type of boiler.

Advisory Work and Factory Control

The number of visits paid to mills for the discussion of manufacturing problems, plans for improvement of plant, or alteration of manufacturing technique was less than in the previous year. The number of technical reports issued to the mills was also less.

As a means of maintaining contact with the mills, the publication of weekly factory data reports was continued. Summarised *Monthly Data* were also published and the *Annual Summary* was extensively discussed at the Annual Meeting of the South African Sugar Technologists' Association (S.A.S.T.A.) and published in the *Proceedings* of this organisation.

General

During the period under review, four *Communications from the S.M.R.I.* were published, three papers read before the S.A.S.T.A. Congress, and six papers published in the *South African Sugar Journal*.

The Director attended the Ninth Congress of the International Society of Sugar Cane Technologists in New Delhi, and also the Annual Congress of the Verein Deutscher Zuckertechniker in Freudenstadt.

SUID-AFRIKAANSE WOLTEKSTIEL- NAVORSINGSINSTITUUT

Direkteur: DR. C. C. KRITZINGER

Die sewende jaar van die Instituut se bestaan is hoofsaaklik gewy aan reorganisasie volgende op die terugslag gedurende die vorige jaar. Hierdie reorganisasie is in vooruitsig gestel in die vorige Jaarverslag.

Akkommodasie

Die Suid-Afrikaanse Woltekstielnavorsingsinstituut was gehuisves in die Ingenieursgebou van die Rhodes-universiteit, en die Raad van Beheer het as 'n eerste stap besluit om hierdie baie geskikte gebou aan te koop. Die onderhandelings hieroor was binne 'n paar maande afgehandel en die laboratoriumgebou is op 31 Desember 1956 in besit geneem. Behalwe hierdie gebou het die Instituut ook die Universiteit se Werkswinkel bekom en dit sal later gebruik word vir die installing van die droogproses se masjinerie. Die volle grootte van die terrein is byna twee *acres* en 'n nuwe gebou word nou opgerig vir die natproses-afdeling van die voorgenome proefskaaltoerusting. Vier kamers van die hoofgebou is in uitstekende laboratoriums omgeskep deur die aanbring van permanente toebehore.

Die koste van die eiendom wat van die Universiteit verkry is, kom op ongeveer £32,500 te staan, terwyl die nuwe gebou iets meer as £15,000 sal kos na dit voltooi is.

Die akkommodasie wat op hierdie wyse verkry is, sal ruim genoeg vir baie jare wees, en sal 'n aanmerklike uitbreiding in personeelsterkte toelaat.

Toerusting en Personeel

Die Raad van Beheer het goedkeuring gegee vir die aanskaffing van laboratoriumapparaat en die masjinerie vir die proefskaaltoerusting tot 'n bedrag van £10,000 vir die jaar. Hoewel hierdie toerusting in die basiese behoeftes van die navorsingspersoneel sal voorsien, sal daar tog nog 'n aantal gespesialiseerde items aangekoop of in die werkswinkel vervaardig moet word.

As gevolg van nuwe aanstellings in die vakante poste wat die vorige jaar ontstaan het, is die personeel nou op volle sterkte gebring binne die raamwerk van die Instituut se inkomste, en bestaan tans uit die Direkteur, ses navorsingsbeamptes, vier laboratoriumassistente, 'n werkswinkel-tennikus, twee administratiewe beamptes en twee natuurlike werkers.

Hoewel die personeel miskien nog te min is om aan al die verskillende behoeftes van die nywerheid te voldoen, is dit nietemin goed gebalanseerd en vorm 'n goeie kern waaromheen uitbreiding opgebou kan word.

SOUTH AFRICAN WOOL TEXTILE RESEARCH INSTITUTE

Director: DR. C. C. KRITZINGER

The seventh year of the Institute's existence was largely devoted to reorganization following upon a set-back during the previous year. This reorganization was forecast in the previous annual report.

Accommodation

SAWTRI had been housed in the Engineering Building rented from Rhodes University, and, as a first step, the Board of Control decided to purchase this very suitable building. The negotiations were completed after a few months, and possession was taken of the laboratory building on 31st December 1956. In addition to this building, SAWTRI also acquired the University Workshop which will later be used to house dry-process machinery. The total land is nearly two acres in extent, and a new building is now being erected to house the wet-processing section of the projected pilot-scale factory. Four rooms in the main building were converted into excellent laboratories by the provision of permanent fittings.

The cost of the property acquired from the University is approximately £32,500, whilst the new building will cost over £15,000 when completed.

The accommodation thus provided should prove ample for a number of years, and will allow of a considerable increase in the staff.

Equipment and Staff

The Board of Control sanctioned the acquisition of laboratory apparatus and pilot-scale machinery valued at more than £10,000 during the year. Whilst this equipment will provide for the basic needs of the research staff, a number of specialized items still remain to be bought or constructed in the workshops.

With the filling of vacancies created during the previous year, the staff was brought to full strength within the frame-work of the Institute's income, and now comprises the Director, six research officers, four laboratory assistants, a workshop technician, two administrative officers and two Native office boys.

Whilst this staff is perhaps too small to cater for the diversified needs of the industry, it is nevertheless well balanced and will provide a sound nucleus around which expansion can take place.

Finansies

Om uitvoering aan die ontwikkelingsplan te gee, was dit nodig om die ondersteuners van die Instituut te nader vir 'n verhoging van hul toekennings. Sowel die Wolraad as die Bokhaar-Adviesraad het hul toekennings gedurende die afgelope jaar verdubbel, terwyl daar verhogings gemaak is in die nywerheidstoekennings vir die nuwe jaar. Die totale inkomste sal dus toeneem van ongeveer £15,000 in 1955 tot £30,000 in 1957.

Die aard van wolkstielnavorsing is egter van so 'n aard dat 'n groot kapitaaluitgawe daarvoor vereis word, wat op sy beurt weer 'n groter personeel nodig maak indien ekonomiese gebruik van sulke gelde gemaak moet word.

Navorsing

Op 20 Februarie 1957 is 'n belangrike stap vir die ontwikkeling van die Instituut gedoen toe die Tegnieese Advieskomitee 'n navorsingsprogram ontwerp het wat beskou kan word as die bloudruk van die volgende twintig jaar se werksaamhede.

Gedurende die verslagtydperk kon baie min navorsingswerk onderneem word, aangesien die personeel-uitbreiding eers aan die einde van die jaar plaasgevind het. Ook is daar gedurende die jaar spesiale pogings aangewend vir verbetering van die tegnieese dienste aan die nywerheid, en met genoegdoening kan melding gemaak word van die aanmerklike toename in die aantal navrae wat in die laboratorium behandel is sowel as in die aantal besoeke wat personele aan fabriek gebring het op laasgenoemde se versoek.

Navorsingswerk oor veselgroei is voortgesit in samewerking met die Grootfonteinse Landboukollege en dit nader nou voltooiing. Belangwekkende verskille kom voor tussen wol van goed gevoede en die van swakgevoede skape.

Studies oor kleurabsorpsie deur verskillende woltipes het gelei tot 'n ondersoek van die invloed van vertering op wol. Een van die belangrikste bevindings tot hiertoe is dat vertering in 'n sekere mate selfs in die middelste gedeelte van 12-maande wol voorkom, en dus 'n verklaring bied vir die afwykende resultate wat vantevore met studies oor verkleuring verkry is. In 'n parallelstudie is 'n ondersoek ingestel na die gebruik van ninhidrien as 'n middel om die mate van vertering te bepaal. Navorsingswerk is begin oor die vilthoedanighede van Suid-Afrikaanse wol, wat algemeen beskou word dat dit makliker vilt as vergelykbare oorsese tipes. Die eerste stap in hierdie rigting was om 'n metode uit te werk vir die skatting van die viltbaarheid, en daar is bevind dat veselfynheid blykbaar nie die vilthoedanighede affekteer nie, maar dat die aantal kartels per duim in wol van dieselfde deursnee een van die bepalende faktore kan wees. Dus sal sagte, of liewer papperige, wol baie gereideliker vilt.

Finance

In order to carry out these development plans, it was found necessary to approach subscribers with a request for considerable increases in their contributions. Both the Wool Board and the Mohair Advisory Board made available doubled grants during the past year, whilst increases in the industrial grants will be made in the new year. The total income will increase from about £15,000 in 1955 to £30,000 in 1957.

The nature of wool textile research is, however, such that a large capital outlay is required, which in turn will necessitate a large staff to make economic use of such investments.

Research

An important step in the development of the Institute was taken on 20th February 1957, when the Technical Advisory Committee prepared a research programme which may be considered as a blue-print for the next twenty years' activity.

During the year under review very little research work could be undertaken, since the staff was only augmented at the end of the year. In addition, special efforts were made during the year to improve the technical service to industry, and it is gratifying to note a marked increase in the number of enquiries dealt with in the laboratories as well as the number of visits paid by staff members to factories at the latter's request.

Work on the growth of fibres was continued, in collaboration with Grootfontein Agricultural College, and is nearing completion. Interesting differences are present between wools from sheep receiving a high and a low plane of feeding.

Studies on dye absorption of different wools led to an investigation into the effect of weathering upon wool. One of the most important findings to date is that weathering may occur to some extent even in the middle portion of twelve months' wool, thus explaining some of the anomalous results previously obtained in dyeing studies. In a parallel study, the use of ninhydrin was investigated as a means of determining the degree of weathering.

Work was started on the felting characteristics of South African wool, which is generally believed to felt more readily than comparable overseas types. As a first step, a method was devised for estimating feltability. In this work it was found that the fineness of the fibre does not appear to affect feltability, but that the number of crimps per inch in wools of the same diameter may be one determining factor. Thus, soft or rather flabby wools felt more readily.

Verdere navorsingswerk is gedoen oor merkstowwe en daaruit het geblyk dat alle merkstowwe geneig is om hardnekkig aan alle wol van die swartpunt-tipe vas te kleef. Baie min van die kommersiële merkstowwe wat getoets is kan uit die oogpunt van uitwas as bevredigend geklas word.

Ondersoeke oor die chemie-absorpsie van wol en sybokhaar is voortgesit en daaruit het dit duidelik geword dat daar 'n aanmerklike afwyking is in die absorpsie van suur deur die verskillende tipes sybokhaar.

In verdere studies oor die struktuur van kambol is bevind dat kambol volgens die Franse stelsel 'n periodisiteit van 40 m.m. toon in die aantal leidende veselpunte, in vergelyking met 14.5 m.m. in kambol wat volgens die Bradford-stelsel gekam is. Geen periodisiteit is opgemerk in 'n Franse-stelsel sintetiese vesel kambol met 'n vierkant-stapeldiagram nie.

Further work was done on branding fluids, from which it emerged that all fluids tend to adhere tenaciously to wool of the "tar-tip" type. Very few of the commercial fluids tested could be classed as satisfactory from the scouring point of view.

Investigations on the chemi-sorption of wool and mohair were continued, from which it became clear that there is considerable variation in the absorption of acid by different types of mohair.

In further studies on the structure of tops it was found that French-combed wool tops show a periodicity of 40 m.m. in the number of fibre leading ends as compared with 14.5 m.m. in Bradford-combed tops. No periodicity was observed in a synthetic French-combed top with a square staple diagram.

Research Bursaries and Assistantships

Awarded by the C.S.I.R. during 1957

Navorsingsbeurse en Assistenteskappe

wat deur die W.N.N.R. gedurende 1957 toegeken is

GENERAL RESEARCH—ALGEMENE NAVORSING

BURSARIES—BEURSE

Senior Bursaries/Senior Beurse (£200–£1,000)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
BARNARD, Dr. K. H. B.A. 1908, M.A. 1913 (Cantab.), D.Sc. 1924 (Cape Town). Honorary Curator of Marine Collections. S.A. Museum £650	University of Cape Town	Preparation of a monograph of the South African marine mollusca on the lines of and as companion to Connolly's monograph on non-marine mollusca (Annals A. Mus. XXXIII, 1939). Opstel van 'n monografie van die Suid-Afrikaanse see-mollusca in navolging van en as bybehorende deel van Connolly se monografie oor nie-seemollusca. (Annals A. Mus. XXXIII, 1939).
BOTTO, Dr. G. D. L. D.Phil. Research Bursar £480	Transvaal Museum	Catalogue and card index of Southern African coleoptera. (Previous awards 1954–1956.) Katalogus en kaartindeks van coleoptera van Suidelike Afrika. (Vorige toekennings 1954–1956.)
EWER, Dr. (Mrs.) R. F. B.Sc. (1st Class Hons. in Zool. (Birmingham) 1936 Ph.D. (Zoology) (Birmingham) 1940. Senior Bursar £500	Rhodes University	Neuromuscular physiology of vertebrates other than frog and mammal. (Previous awards 1953–1956.) Spiersenufisiologie van werwelidre anders as die padda en die soogdier. (Vorige toekennings 1953–1956.)
JUBB, R. A. B.Sc. (Rhodes) 1930 Hon. Scientific Asst. £500	Rhodes University	Freshwater fishes of Southern Africa. Varswatervissoorte van Suidelike Afrika.
KRUPKO, Dr. S. Ph. D. (Warsaw) 1924 Retired Lecturer in Botany £800	University of the Witwatersrand	1. Embryo-sac development in <i>restionaceae</i> (continuation). Part I. <i>Hypodisous aristetus</i> . 2. Karyology of some <i>hyparrhenia</i> species, especially those from Basutoland. (Previous award 1956.) 1. Kiemsakontwikkeling by <i>restionaceae</i> (vervolg). Deel I. <i>Hypodisous aristetus</i> . 2. Kariologie van sommige <i>hyparrhenia</i> soorte, veral die van Basoetoland. (Vorige toekennings 1956.)
OMER-COOPER, Dr. (Mrs.) J. B.A.(Cantab.) 1925 Ph.D.(Dunedin) 1931 Hon. Lecturer in Zoology £500	Rhodes University	Dytiscidae of Southern Africa. (Previous awards 1955–1956.) Dytiscidae van Suidelike Afrika. (Vorige toekennings 1955–1956.)

<i>Name and Qualifications</i> <i>Naam en Kwalifikasies</i>	<i>Where tenable</i> <i>Waar geldig</i>	<i>Subject of Research</i> <i>Onderwerp van Navorsing</i>
PIETERSE, P. H. B.Sc.(Stell.) 1947 M.Sc.(Stell.) 1949 D.Sc. Student in Fisika. £250	Universiteit van Stellenbosch	Die bepaling van die f-waarde van Fe 1-lyne met hoë opwekkingspotensiale. (Vorige toekennings 1954-1956.) The determination of the f-value of Fe-1 lines with high generative potentials. (Previous awards 1954-1956.)
SCOTT, Dr. (Mrs.) K. M. F. B.Sc.(Cape Town) 1933 M.Sc.(Cape Town) 1934 (1st Class Honours) Ph.D.(Cape Town) 1938 Zoology. F.R.E.S. Senior Bursar £800	University of Cape Town	<ol style="list-style-type: none"> 1. Taxonomic study of South African caddis flies (<i>trichoptera</i>). 2. Taxonomic and ecological study of South African Chironomidae. (Previous awards 1954-1956.) <ol style="list-style-type: none"> 1. Taksonomiese studie van Suid-Afrikaanse kokerjuffers (<i>trichoptera</i>). 2. Taksonomiese en ekologiese studie van Suid-Afrikaanse chironomidae. (Vorige toekennings 1954-1956.)
SMITH, Prof. J. L. B. B.A., M.Sc., Ph.D., F.R.S.(S.A.) Research Professor £1,300	Rhodes University	Fishes. (Previous awards 1950-1956.) Visse. (Vorige toekennings 1950-1956.)
TAGER, Dr. J. M. B.Sc.(Agric.) met lof (U.P.) 1947 Ph.D.(Univ. van Kalifornië) 1952 Senior Beurshouer £1,000	Universiteit van Pretoria	<ol style="list-style-type: none"> 1. Die metabolisme van vrugte. 2. Die oksidasie van anorganiese sulfiet deur plant-mitochondria. 3. Die isolering en suiwing van plant-mitochondriale ensieme. 4. Veranderings in die aktiwiteit van hawer-mitochondria op verskillende tye van die jaar. (Vorige toekennings 1954-1956.) <ol style="list-style-type: none"> 1. The metabolism of fruit. 2. The oxidation of anorganic sulphite by plant mitochondria. 3. The isolation and purification of plant mitochondrial enzymes. 4. Changes in the activity of oats mitochondria at different times of the year. (Previous awards 1954-1956.)
WINTERBOTTOM, Dr. J. M. B.Sc.(London) 1926 Ph.D.(London) 1932 Honorary Ornithologist S.A. Museum, Cape Town £650	University of Cape Town	Geographical and ecological distribution of birds of Western Cape Province including systematic revisions where necessary. Geografiese en ekologiese verspreiding van voëls van die Westelike Kaapprovinsie met inbegrip van 'n sistematiese hersiening waar nodig.
WRIGHT, Dr. (Mrs.) W. G. B.Sc.(London) 1912 D.I.C. Royal College of Science) 1915 Ph.D.(Natal) 1954 Research Bursar £250	University of Natal	The alkaloids of amaryllidaceae. (Previous awards 1953-1955.) Die alkaloïde van amaryllidaceae. (Vorige toekennings 1953-1955.)

Senior Bursaries (Overseas)/Senior Beurse (Oorsee)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
CORMACK, A. M. B.Sc.(Cape Town) Dist. 1944, M.Sc.(Cape Town) 1st Class Hons. 1945 Lecturer in Physics £800	Harvard University Cambridge, Mass., U.S.A.	Scattering of polarised protons by protons and helium in the energy range 90 to 160 mev. (Previous award 1949.) Verstrooiing van gepolariseerde protone deur protone en helium in die energiegebied 90 tot 160 mev. (Vorige toekenning 1949.)
GÖLDNER, Dr. S. R. F. B.Sc.(Stell.) (<i>cum laude</i>) 1936 M.Sc.(Stell.) (<i>cum laude</i>) 1937, Ph.D.(New York) 1949 Senior Lektor in Wiskunde £800	Universiteit van New York, V.S.A.	Navorsing insake die oplossing van sisteme van hiper- boliese partiële differentiaalvergelykings. Research on the solution of systems of hyperbolic partial differential equations.
MALAN, Dr. H. P. B.Sc.(<i>cum laude</i>) (Stell.) 1936 M.Sc.(Stell.) 1937, M.Ed. (<i>cum laude</i>) (Stell.) 1939, D.Ed. (Stell.) 1950 A.I.E. (Univ. London) 1952 Senior Lektor in Skeikunde £800	Universiteit van Washing- ton, St. Louis, Missouri, V.S.A.	Radiochemiese ondersoek in verband met moontlike nuwe bepalings- en skeidingsmetodes vir uraan en thorium (en/of een van hulle klowingsprodukte). Radio-chemical research in connection with possible new determination and separation methods for uranium and thorium (and/or one of their fission products).
PRINSLOO, Dr. L. A. B.Sc.(U.P.) 1934, M.Sc.(U.P.) 1936 H.O.D.(U.P.) 1936, D.Sc.(U.P.) 1955 Senior Lektor in Fisika £600	1. Tegiese Univ. Zurich, Switserland (Des. 1957- Junie 1958). 2. Tegiese Univ. Darm- stadt, Duitsland (Julie 1958-Des. 1958).	Ondersoek in verband met sagte X-strale. Research on soft X-rays.

Student Bursaries/Studente Beurse

Physics/Fisika		
DU PLESSIS, N. M. B.Sc.(Stell.) 1955 Student £250	Universiteit Stellenbosch	Die opwekking en waarneming van atoomstrale. The generation and observation of atomic rays.
FIEDELDEY, H. B.Sc.(U.P.) 1956 Student £150	Universiteit van Pretoria	Ondersoek van geabsorbeerde atome op wolfram met behulp van die veldelektron-mikroskoop. Research on absorbed atoms on tungsten with the aid of the field electron microscope.
HENNING, J. J. B.Sc.(1955) P.U. vir C.H.O. Student £250	Potchefstroomse Universi- teit vir C.H.O.	Die anomale verstrooiing van U-mesone. (Vorige toe- kenning 1956.) The anomalous scattering of U-mesons. (Previous award 1956)
ISEBECK, K. B.Sc.(Rand) 1955 Student £250	University of the Witwatersrand	Interaction of colour centres and dislocations in alkali halides. Wisselwerking van kleursentrums en verplasings by alkalihalide.

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LEASK, M. J. M. B.Sc.(Natal) 1953 B.Sc.(Chem. tech.) (<i>cum laude</i>) (Natal) 1954, B.Sc.(Hons.) (<i>cum laude</i>) (Natal) 1955 Student £187 10s. 0d.	University of Natal	A study of Auger electron yields. (Previous award 1956.) Shell Bursar 1957. 'n Studie van Auger-elektronlewerings. (Vorige toekening 1956.) Shell-Beurshouer 1957.
MCGILLIVRAY, G. B.Sc.(Rhodes) 1954 B.Sc.(Hons.) (Rhodes) 1955 Student £62 10s. 0d.	Rhodes University	The synthesis of new ion exchange Resins and their evaluation. (Previous award 1956.) Die sintese van nuwe ione-wisselingsharse en die waarde-bepaling daarvan. (Vorige toekening 1956.)
PIENAAR, H. J. B.Sc.(<i>cum laude</i>) (Stell.) 1954 Student £250	Universiteit van Stellenbosch	Die interaksie-potensiaal funksie vir die α, n wisselwerking. Die potential function for the α, n interaction.
PISTORIUS, C. W. F. T. B.Sc. met lof (U.P.) 1954 Student £300	Universiteit van Pretoria	Verstrooiingsprosesse van protone in gasse. (Vorige toekening 1956.) The scattering process of protons in gases. (Previous award 1956.)
RAUBENHEIMER, L. J. B.Sc.(Stell.) 1955 met onderskeiding Student £250	Universiteit van Stellenbosch	Die bepaling van die voggehalte van verskillende materiale deur die meting van neutronintensiteite. The determination of the moisture content of different materials by the measurement of neutron intensities.
ROUX, J. P. B.Sc.(Stell.) 1955 Student £250	Universiteit van Stellenbosch	Die bepaling van die kernmoment van die proton deur die waarneming van die kernparamagnetiese effek vir water; of die bepaling van die elektriese kwadrupool en die magnetiese dipool momente van Na^{23} deur gebruikmaking van die dubbel-resonansie metode van Kastler (1949). The determination of the proton nuclear moment by the observation of the nuclear paramagnetic effect of water; or the determination of the electrical quadrupole and the magnetic dipole moments of Na^{23} by the use of the double resonance method of Kastler (1949).
SHUTER, W. L. H. B.Sc.(Rhodes) 1955 Student £250	Rhodes University	Observations of the characteristics of solar radio noise outbursts and their correlation with solar and ionospheric phenomena. (I.G.Y. project.) Waarnemings van die kenmerke van radiogeraasuitbarstings deur die son veroorsaak, en die korrelasie daarvan met son- en ionosferiese verskynsels. (I.G.J.-projek.)
SOLE, M. J. B.Sc.(Rhodes) 1954 B.Sc.(Hons.) (Rhodes) 1955 Teacher £250	Rhodes University	The thermal decomposition of solids (with special attention to permanganates) after nucleation by thermal neutrons or high energy gamma rays. Die termiese ontbinding van vaste stowwe (met spesiale aandag aan permanganate) na kernvorming deur termiese neutrone of gammastrale van hoë energie.

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VAN DER MERWE, E. J. B.Sc.(Stell.) 1955 Student £250	Universiteit van Stellenbosch	Die bou van 'n fotovermenigvuldigerbuis eenheid aan 'n een-meter-roosterspektrograaf en die aanwending van die apparaat vir die direkte spektrografiese bepaling van Au, Pd, Pt en Rh in ertse. The construction of a photo multiplier tube unit on a one meter grid spectrograph, and the application of the apparatus to the direct spectrographical determination of Au, Pd, Pt and Rh in ores.
VAN DER MERWE, P. du Toit B.Sc. met lof (U.P.) 1955 Student £250	Universiteit van Pretoria	Die sekondêre strale van Co ⁶⁰ - gamma-strale. The secondary rays of Co ⁶⁰ - gamma rays.
VAN DER WALT, C. M. B.Sc.(U.P.) 1956 Student £150	Universiteit van Pretoria	Ondersoek van die verandering van die geleidingsvermoë van die halfgeleierlagies met temperatuur. Investigation of the changes in the conductivity of the semi-conductor layers with changes of temperature.
VAN VUUREN, H. S. J. B.Sc. (1955) P.U. vir C.H.O. Student £250	Potchefstroomse Universiteit vir C.H.O.	Direkte paarvorming deur gelaaiete deeltjies. (Vorige toekennings 1955-1956.) Direct pairing of charged particles. (Previous awards 1955-1956.)
WIECHERS, G. Student £150	Universiteit van Pretoria	Ondersoek van reaksie-meganismes m.b.v. C ¹⁴ . Investigation of reaction mechanisms with the aid of C ¹⁴ .
Chemistry/Chemie		
BROOKS, G. L. B.Sc.(Rhodes) 1953 B.Sc.(Hons.) (Rhodes) 1954 Analytical Chemist £250	University of Natal	The equations of state of the gaseous boron halides. Die vergelyking van toestand van die gasagtige boronhalide.
CRAGG, G. M. L. B.Sc.(Rhodes) 1955 Student £250	Rhodes University	Phenolic constituents of <i>Leonotis Leonurus</i> . Fenoliese bestanddele van <i>Leonotis Leonurus</i> .
CRUYWAGEN, J. J. B.Sc.(Stell.) 1954 M.Sc.(Stell.) 1955 D.Sc. Student £50	Universiteit van Stellenbosch	Faktore wat die molibdeenblou- en fosfomolibdeenblou-vorming beïnvloed. (Vorige toekennings 1955-1956.) Factors influencing molybdenite blue and phosphomolybdenite blue formation. (Previous awards 1955-1956.)
DALE, D. H. B.Sc.(Rhodes) 1955 Student £250	Rhodes University	The measurement of the streaming potentials generated across ion-selective membranes. Die meting van die stromingspotensiale oor ioon-selektiewe membrane ontwikkel.
DAVIDSON, R. J. B.Sc.(Rhodes) B.Sc.(Hons.) (Rhodes) Student £250	Rhodes University	A critical study of the determination of boron in plant material. 'n Kritiese studie van die bepaling van boron in plantstowwe.
DU PLESSIS, M. P. B.Sc. P.U. for C.H.E. 1953 Student £250	University of Natal	Absorption of sulphur dioxide and hydrogen sulphide from stack gases in a spray chamber. Absorpsie van swaweldioksied en swawelwaterstof van skoorsteengasse in 'n spuitkamer.

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ELLIS, C. P. B.Sc.(Hons.) (London) 1928 F.R.I.C. 1944 Student £250	University of Natal	The viscosity of gases at high temperatures. (Previous award 1956.) Die viskositeit van gasse by hoë temperatuur. (Vorige toekenning 1956.)
FRANKISH, (Miss) D. D. B.Sc. (1954) B.Sc.(Hons.) 1955 Student £250	University of Natal	Alkaloids of the <i>Amaryllidaceae</i> . Alkaloïde van die <i>Amaryllidaceae</i> .
GRAY, A. B.Sc.(<i>cum laude</i>) (Stell.) 1952 M.Sc.(<i>cum laude</i>) (Stell.) 1954 Student £300	University of Cape Town	The influence of various substituents of the absorption spectra of phenazines. (Previous award 1954.) Die invloed van verskillende vervangers van die absorpsiespektra van fenasiere. (Vorige toekenning 1954.)
GORE, W. T. B.Sc.(Rhodes) 1954 B.Sc.(Hons.) (Rhodes) 1955 Student £250	Rhodes University	The polarographic and colorimetric determination of molybdenum in plant and soil material. (Previous award 1956.) Die polarografiese en kolorimetriese bepaling van molibdeen in plantstowwe en grond. (Vorige toekenning 1956.)
HART, P. M. G. B.Sc.(Cape Town) 1955 Student £250	University of Cape Town	Adsorption isotherms and heats of adsorption on zinc oxide with and without valency induction. (Previous award 1956.) Absorpsie-isotermes en absorpsiehitte op sinkoksied met en sonder valensieinduksie. (Vorige toekenning 1956.)
HOLZAPFEL, C. W. B.Sc.(Stell.) 1955 (<i>cum laude</i>) Student £250	Universiteit van Stellenbosch	Die kinetiese van die homogene reaksie tussen Cu^{++} en 1^- in afwesigheid van lug. The kinetics of the homogeneous reaction between Cu^{++} and 1^- in the absence of air.
HOWARD, A. S. B.Sc.(Rhodes) 1955 Student £250	Rhodes University	The constitution of cotyledon toxin. Die samestelling van cotyledontoksien.
JOHN, E. V. O. B.Sc.(Wits.) (Chem.) Student £250	University of the Witwatersrand	A study of the Von Pechmann reaction. (Previous award 1956.) 'n Studie van die Von Pechmann-reaksie. (Vorige toekenning 1956.)
JOUBERT, J. B.Sc.(Rand) 1955 Cullen Medal 1955. Awarded Shell post-graduate Bursary of £300 to do Chem. Hons. in 1956. £250	University of the Witwatersrand	The study of some substituted acetoacetanilides. Die studie van sommige vervange acetoacetanilides.
MUTCH, R. E. B.Sc.(Natal) Student £250	University of Natal	The synthesis and geometrical configurations of the 2-methylpent-3-ene-3-carboxylic acids. Die sintese en geometriese konfigurasies van die 2-metieelpunt-3-een-3-karboksielsure.

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PREEN, B. V. B.Sc.(Chem. Phys.) (Natal) 1955 Student £250	University of Natal	Production of cresylic acid from refinery spent caustic by neutralisation with flue gas. Produksie van krieselsuur deur geraffineerde uitgeputte bytmiddels deur middel van neutralisering met rookgas.
REES, L. W. B.Sc.(Natal) 1955 Student £250	University of Natal	Synthesis of heliotricinic acid. Sintese van heliotriensuur.
SCHNEIDER, D. F. B.Sc.(Stell.) 1955 Student £250	Universiteit van Stellenbosch	'n Herondersoek na die katalitiese werking van Cu I op die snelheid van die reaksie tussen Fe ⁺⁺⁺ en I ⁻ . A re-investigation of the catalytic action of Cu I on the reaction speed between Fe ⁺⁺⁺ and I ⁻ .
VAN DER MERWE, K. J. B.Sc.(Stell.) 1955 Student £250	Universiteit van Stellenbosch	'n Ondersoek na die moontlike invloed van die kondensasiegraad van wolframsuur op die reduksie na wolframblou in verdunde oplossings. An investigation of the possible influence of the degree of condensation of tungstic acid on the reduction of tungsten blue in diluted solutions.
Zoology/Dierkunde		
ALEXANDER, (Miss) A. J. B.Sc.(Natal) 1953 B.Sc.(Hons.) (Natal) 1954 Student £125	Rhodes University	Further observations and experimentation on the behaviour and biology of the scorpion. <i>O. Latimanus</i> . (Previous awards 1955-1956.) Verdere waarnemings en proefnemings in verband met die gedrag en biologie van die skerpioen. <i>O. Latimanus</i> . (Vorige toekennings 1955-1956.)
BOWMAKER, A. P. B.Sc.(U.C.T.) 1955 Student £250	University of Cape Town	The effect of pollution on the biota of the Black River, Cape Peninsula. Die uitwerking van besoedeling op die biota van die Swartrivier, Kaapse Skiereiland.
DENNIS, C. R. B.Sc.(Hons.) (Rhodes) 1956 Student £125	University College of Fort Hare	The morphology of the weberian apparatus of <i>Labeo Umbratus</i> Smith. (Previous award 1956.) Die morfologie van die swempootapparaat van <i>Labeo Umbratus</i> Smith. (Vorige toekenning 1956.)
FOURIE, S. B.Sc.(Stell.) 1952 M.Sc.(Stell.) 1955 Student £250	Universiteit van Stellenbosch	Die skedelmorfologie van die cynodontier. <i>Thrinaxodon</i> . (Vorige toekenning 1956.) The cranial morphology of the cynodontia. <i>Thrinaxodon</i> . (Previous award 1956.)
GRINDLEY, J. R. B.Sc.(U.C.T.) 1955 B.Sc.(Hons.) (U.C.T.) 1956 Student £250	University of Cape Town	Estuarine and marine plankton with particular reference to copepoda. Riviermond- en see-plankton met spesiale verwysing na copepoda.
THELEJANE, T. S. B.Sc.(Hons.) (Rhodes) Student £125	University College of Fort Hare	A correlation of the feeding habits of some of the golden moles of South Africa with their type of teeth and their jaw musculature. (Previous award 1956.) 'n Korrolasie van die eetgewoontes van sommige van die kruipmolle van Suid-Afrika met hul tandtipe en kakebeen-spierselsel. (Vorige toekenning 1956.)

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Geology/Geologie		
BAHNEMANN, K. P. B.Sc.(U.P.) 1956 Student £150	Universiteit van Pretoria	'n Ondersoek van die lood-koper-sink ertse van Sanyati, Suid-Rhodesië. An investigation of the lead, copper and zinc ores of Sanyati, Southern Rhodesia.
CLOETE, D. R. B.Sc.(U.P.) 1955 Student £250	University of Pretoria	Dolerite occurrences in the northern part of the Pilansberg and their relationship to the alkaline rocks. Die voorkoms van doleriet in die noordelike gebied van die Pilansberg en die verband tussen die voorkoms daarvan en die alkaligesteente.
DE WAAL, P. Student £150	Universiteit van Pretoria	Kleie in padboumateriaal (Bounavorsingsinstituut.) Clays in road building materials. (Building Research Institute.)
GERRARD, I. B.Sc.(U.C.T.) 1955 Student £250	University of Cape Town	Detailed investigation of the melilite basalt pipes in the S.W. Cape. 'n Uitvoerige ondersoek in verband met die basalttipe in Suidwes Kaapland.
GORSKY, Mrs. E. Diploma of University of Ljubljana, Yugoslavia 1933 Student £125	University of Natal	Microscopical and field study of the mineral and rocks from the Lebombo Range. (Previous awards 1955-1956.) Mikroskopiese en veldstudie van die minerale en rotse van die Lebombo-reeks. (Vorige toekennings 1955-1956.)
GORSKY, V. A. G. Dipl. Ing. 1926. Cand. Phil. Univ. of Ljubljana 1929 £125	University of Natal	Microscopical and field study of the minerals and rocks of the Lebombo Range. Mikroskopiese en veldstudie van die minerale en rotse van die Lebombo-reeks.
HARDIE, L. A. B.Sc.(Natal) 1955 Student £125	University of Natal	Zoning of the Table Mountain sandstone in the vicinity of Durban, Natal. Sone-indeling van die Tafelbergse sandsteen in die buurt van Durban, Natal.
HECKROODT, R. O. B.Sc.(U.P.) 1955 Student £250	Universiteit van Pretoria	Die platinumdraende Hortonolietyp op Driekop en die samestelling van olivien in die bosveld-stollingskompleks. The platinum bearing Hortonolite pipe at Driekop and the composition of olivine in the bushveld coagulation complex.
LAMBERT, J. F. B.Sc.(Natal) B.Sc.(Hons.) (with dist.) (Natal) Student £250	University of Natal	A petrographic and economic study of the ultrabasic rocks of the Tugela Valley, Natal. (Previous award 1956.) 'n Petrografiese en ekonomiese studie van die ultrabasiese rotse van die Tugelavallei, Natal. (Vorige toekenning 1956.)
SCHOCH, A. E. B.Sc.(Stell.) 1953 Student £150	Universiteit van Stellenbosch	Die kataklasiete van Noordwesbaai, Saldanha. The cataclastics of North West Bay, Saldanha.
STEWART, B. D. Student £150	University of the Witwatersrand	Geological investigation of the area surrounding the Kanneel Asbestos Mine north of Loskop dam. (Joint project by 3 students.) Geologiese ondersoek van die omliggende gebied van die Kanneelasbesmyn, noord van Loskopdam. (Gesamentlike projek deur 3 studente.)

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Civil Engineering/Siviele Ingenieurswese		
BARNARD, C. J. Student £250	University of the Witwatersrand	The flotation of soils having some measure of cohesion. Die flottering van grondsoorte met 'n mate van kohesie.
DEHLEN, G. L. Student £250	University of the Witwatersrand	Residual horizontal pressure in soils and its influence on the load-bearing capacity of the soil. Resterende horisontale druk by grondsoorte en die invloed hiervan op die draagvermoë van die grond.
LEVY, A. M. Student £250	University of the Witwatersrand	The effect of repetition of loads on the deformation of some soils. Die uitwerking van herhaalde belasting op die deformatsie van sommige grondsoorte.
LOWES, D. J. Student £250	University of the Witwatersrand	A study of the strength-maturity relationship for concrete made with South African cements. 'n Studie van die verhouding vastheidrypheid vir beton wat met Suid-Afrikaanse sementsoorte gemaak is.
MARAIS, G. van R. B.Sc.(Civil Eng.) U.C.T. 1955 Student Student £250	University of the Witwatersrand	Stress distribution in deep thin reinforced brickwork beams with openings. Spanningsverspreiding by diep, dun gewapende messelwerkbalke met openings.
Electrical Engineering/Elektriese Ingenieurswese		
KREFT, K. G. Student £250	University of the Witwatersrand	Noise and disturbance caused by lightning discharges on microwave telephone systems. Geraas en steurnis deur weerligontladings op mikro-golftelefoonstelsels veroorsaak.
Mechanical Engineering/Meganiese Ingenieurswese		
DE BURBURE, S. Student £250	University of the Witwatersrand	Brittle fracture. Bros breuk.
Entomology/Insektekunde		
COTTRELL, C. B. B.Sc.(Rhodes) 1954 B.Sc.(Hons.) (Rhodes) 1955 Student £250	Rhodes University	Studies on the physiology of the cuticle of ticks. Studies in verband met die fisiologie van die kutikel van bosluis.
Botany/Plantkunde		
BARTLETT, Miss J. E. Student £150	University of the Witwatersrand	Cytology and taxonomy of Witwatersrand orchids. Sitologie en taksonomie van Witwatersrandse orgideë.
GUDE, Miss E. N. B.Sc.(Wits.) 1956 Junior Lecturer in Botany £150	University of the Witwatersrand	Plant Biochemistry (for M.Sc.). A problem in carbohydrate metabolism. Plantbiochemie (M.Sc.). 'n Probleem by koolhidraat-metabolisme.

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Biology/Biologie JAMES, G. V. Student £150	University of the Witwatersrand	Bottom sediment studies on a stream or section of a stream. Studie van die bodemsediment van 'n stroompie of 'n gedeelte (deursnee) daarvan.
Forestry/Bosbou DU TOIT, A. J. B.Sc. Bosbou (Stell.) 1954 Student £250	Universiteit van Stellenbosch	Studie van die verskil in fisiese eienskappe en gedrag van pershout en normale hout. A study of the difference in physical properties and behaviour of pressed and normal wood.

Student Bursaries (Overseas)/Studentbeurse (Oorsee)

Chemistry/Chemie HAHN, H. H. B.Sc.(Pta.) 1951 M.Sc.(Pta.) 1954 Student £95 16s. 8d.	Technische Hochschule, Karlsruhe, West Germany	The composition of tar obtained as a by-product during the pressure-gassification (Lurgi-process) of South African coal (S.A.S.O.L.). (Previous awards 1955-1956.) Die samestelling van teer wat as newe-produk tydens die drukvergassing (Lurgiproses) van Suid-Afrikaanse steenkool (S.A.S.O.L.) verkry word. (Vorige toekennings 1955-1956.)
HAWTREY, A. O. B.Sc.(U.C.T.) 1956 Research Officer £150	University of Rochester, U.S.A.	1. Structural and kinetic studies on model enzyme systems (i.e. on co-enzyme A). 2. Degradative and synthetic studies on alkaloids. 1. Strukturele en kinetiese studie van modelensiem-sisteme (d.w.s. op mede-ensiem A). 2. Studie van die afbreking en sintese van alkaloides.
MORKEL, A. T. B.Sc.(Stell.) 1952 M.Sc.(cum laude) (Stell.) 1954 Navorsingsasst. £250	M.I.T., V.S.A.	Oksidasie kinetiek van koper na kupro-oksied. (Vorige toekennings 1954-1956.) Oxidation kinetics of copper to cupro oxide. (Previous awards 1954-1956.)
Structural Engineering/Strukturele Ingenieurswese		
LOUW, J. M. B.Sc.(Eng.) (Stell.) 1952 M.S. (Iowa State College) U.S.A. 1954 Research Asst. £250	Massachusetts Institute of Technology, U.S.A.	An investigation of the vibration of continuous-span highway bridges. (Previous awards 1954 and 1956.) 'n Ondersoek in verband met die vibrasie van hoofwegbrûe met 'n ononderbroke span. (Vorige toekennings 1954 en 1956.)
Civil Engineering/Siviele Ingenieurswese		
VAN ROOYEN, M. B.Sc.(Eng.) (U.S.) 1952 (Dist. in Maths.) M.Sc.(Iowa State College) 1956 Graduate Asst. £250	Princeton University, U.S.A.	Soil thermal resistivity and related problems associated with heat dissipation from underground cable systems. (Previous award 1955.) Die warmteweerstand van grond en verwante probleme in verband met hitte-afleiding van ondergrondse kabelsisteme. (Vorige toekenning 1955.)

<i>Name and Qualifications</i> <i>Naam en Kwalifikasies</i>	<i>Where tenable</i> <i>Waar geldig</i>	<i>Subject of Research</i> <i>Onderwerp van Navorsing</i>
Physics/Fisika FINKELSTEIN, N. P. B.Sc.(Rhodes) 1953 B.Sc.(Hons.) with dist. (Rhodes) 1954 Student £200	Liverpool University, England	Spallation reactions with 400 mev protons and meson induced reactions. (Previous awards 1955-1956.) Versplinteringsreaksies deur reaksies van protons en metons van 400 mev geïnduseer. (Vorige toekennings 1955-1956.)

ASSISTANTSHIPS/ASSISTENTSKAPPE (£450-£650)

(a) Grants for the employment of skilled research assistants/Toekennings vir die indiensneming van geskoolde navorsingsassistentente (£450-£650)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
<p>AHRENS, Prof. L. H. B.Sc.(S.A.) 1940 M.A.(Oxon.) 1954 D.Sc.(U.P.) 1944 F.R.I.C., F.G.S. (U.S.A. & U.K.) Professor of Inorganic and Physical Chemistry</p>	<p>University of Cape Town</p>	<p>1. Cosmic abundance—determination of abundances of all rare earth elements (+ some others) in meteorites, using enrichment procedure and spectrographic analysis. 2. Natural fission—extraction and concentration of Xe, Kr, La, Y, Sr, Ba., etc., in very ancient radioactive minerals. (No previous assistantship award.) 1. Kosmiese oorvloed-bepaling van die oorvloed van alle seldsame aard-elemente (en 'n paar ander) in meteoriete deur die toepassing van verrykingsproses en spektrografiese ontleding. 2. Natuurlike deling—uitloging en konsentrasie van Xe, Kr, La, Y, Sr., Ba., ens., by oeroue radioaktiewe minerale. (Geen vorige assistentskapstoekening nie.)</p>
<p>BADENHUIZEN, Prof. N. P. D.Sc.(Amsterdam) Professor of Botany</p>	<p>University of the Witwatersrand</p>	<p>Starch metabolism. (Previous awards 1954-1956.) Styselmetabolisme. (Vorige toekennings 1954-1956.)</p>
<p>BALINSKY, Prof. B. I. Doctor of Biological Sciences (Kiev) 1936. Fellow of the International Institute of Embryology 1949</p>	<p>University of the Witwatersrand</p>	<p>Analysis of factors controlling the size and differentiation of organ rudiments in amphibia. (No previous assistantship award.) Ontleding van faktore wat die grootte en differensiasie van onvolkome ontwikkelde organe by amphibia beheer. (Geen vorige assistentskapstoekening nie.)</p>
<p>BOZZOLI, Prof. G. R. B.Sc.(Eng.) (Rand) 1934 D.Sc.(Eng.) (Rand) 1947 Professor of Engineering</p>	<p>University of the Witwatersrand</p>	<p>1. Study of long sparks in the atmosphere. 2. Study of sparks in oil. 3. Study of corona on transmission lines. 4. Sphere gap calibrations. (Previous awards 1955-1956.) 1. 'n Studie i.v.m. lang vonke in die lug. 2. 'n Studie i.v.m. olievonke. 3. 'n Studie i.v.m. kroonlig op transmissielyste. 4. Bolvonkbrugkalibrerings. (Vorige toekennings 1955-1956.)</p>
<p>DART, Prof. R. A. M.Sc.(Q'P'd) MD.Ch.M.(Sydney) Hon. D.Sc. (Natal) Professor of Anatomy</p>	<p>University of the Witwatersrand</p>	<p>The recovery of all the fossils to be found in the bone breccia at the limeworks site in the Makapansgat Valley. (No previous assistantship awarded.) Die herwinning van alle fossiele in die beenbreksie by die kalkwerke in die Makapansgatvallei gevind. (Geen vorige assistentskapstoekening nie.)</p>
<p>DAY, Prof. J. H. Ph. D. (Liverpool) Professor of Zoology 2 Assistants</p>	<p>University of Cape Town</p>	<p>1. Ecological survey of South African estuaries and shallow bays. 2. The ecology of sandy beaches around the Cape Peninsula. 3. The collection of plankton and hydrographic data on the S.S. Natal during cruises around the South African coast. (Previous awards 1951-1956.)</p>
<p></p>	<p>I.G.Y. project I.G.J. projek</p>	<p>1. Ekologiese opname van Suid-Afrikaanse riviermondings en vlak baaie. 2. Die ekologie van sanderige strande rondom die Kaapse Skiereiland. 3. Die versameling van plankton- en hidrografiese gegewens op die S.S. Natal tydens vaarte om die Suid-Afrikaanse kus. (Vorige toekennings 1951-1956.)</p>

Name and Qualifications Naam en Kwalifikasies	Where tenable Waar geldig	Subject of Research Onderwerp van Navorsing
1. DU TOIT, Prof. C. A. M.Sc.(cum laude) (Stell.) 1931 Ph.D.(Kaapstad) 1934 Professor in Soölogie 2. MALAN, Dr. (Mej.) M. E. M.Sc.(cum laude) (Stell.) 1940 D.Sc.(Stell.) 1954 Senior Lektrise in Soölogie	Universiteit van Stellenbosch	1. Kraniologie van die anura. 2. Gastrulasie van die bergskilpad en skedelontwikkeling van die soogdiere. (Vorige assistentskaptoekennings 1954-1956.) 1. Craniology of the anura. 2. Gastrulation of the mountain tortoise and the cranial development of mammals. (Previous assistantship awards 1954-1956.)
GOULD, Prof. A. J. Ph.D.(Cantab.), D.Sc. (London), M.I.Mech.E. M.I.C.E., M.I.N.A. Professor of Mechanical Engineering	University of Natal	1. Corrosion fatigue of light alloys. 2. Fundamentals of the fatigue of metals (possible from new apparatus endowed by the C.S.I.R.) 3. Caustic cracking of boilers. 4. Stresses induced by fits of various tolerances. 5. Aerodynamics of gas flow and thermal consequences. (Previous awards 1954-1956.) 1. Korrosievermoedheid van ligte legerings. 2. Grondslae van die vermoedheid van metale, (moontlik gemaak deur nuwe apparaat deur die W.N.N.R. geskenk). 3. Loogkraakvorming in stoomketels. 4. Spannings veroorsaak deur passings van wisselende toleransies. 5. Lugdinamika van gasvloeiing en termiese gevolge. (Vorige toekennings 1954-1956.)
HALES, Dr. A. L. B.Sc.(U.C.T.) 1929 M.Sc.(U.C.T.) 1930 Ph.D.(U.C.T.) 1936 Dist. B.A.(Cambridge) 1933 M.A.(Cambridge) 1952 Wrangler in Math. Tripos Director, Bernard Price Institute for Geophysical Research 3 Assistants	University of the Witwatersrand Computing Assistant for I.G.Y. Project	1. Investigation of crustal structure by seismic observations of Witwatersrand earth tremors. (2 Assistants.) 2. Investigations relating to the structure of the crust of the earth and its history especially in the field of the paleomagnetism of sedimentary rocks. (2 Assistants.) 3. Study of the microseisms for International Geophysical Year. (Previous awards 1955-1956.) 1. Onderzoek van die korsstruktuur deur seismiese waarnemings van Witwatersrandse aardbewings. (2 Assistentie.) 2. Onderzoek van die struktuur van die aardkors en die geskiedenis daarvan veral met betrekking tot die paleomagnetisme van sedimentêre rotse. (2 Assistentie.) 3. Studie van die mikroseismes vir die Internasionale Geofisiese Jaar. (Vorige toekennings 1955-1956.)
HOLLIMAN, Prof. F. G. B.A.(Cantab.) 1941 M.A.(Cantab.) 1944 Ph.D.(Cantab.) 1944 Professor of Chemistry	University of Cape Town	Pigments of <i>pseudomonas aeruginosa</i> . (Previous awards 1955-1956.) Pigmente van <i>pseudomonas aeruginosa</i> . (Vorige toekennings 1955-1956.)
ISAAC, Prof. W. E. B.Sc. (1928) Harry Bolus Professor of Botany	University of Cape Town	Investigation on South African seaweeds: ecology, relevant taxonomy and distribution patterns of species and genera. Investigations north of Union where necessary in relation to distribution patterns. (Previous awards 1952-1956.) Onderzoek van Suid-Afrikaanse seewier: ekologie, betreklike taksonomie en verspreidingspatrone van spesie en geslag. Onderzoek Noord van die Unie waar nodig met betrekking tot verspreidingspatrone. (Vorige toekennings 1952-1956.)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
ISRAELSTAM, Dr. S. S. M.Sc.(cum laude) (Rand) Ph.D.(Rand) Senior Lecturer in Chemistry	University of the Witwatersrand	1. Reactions of tertiary alkyl hypohalites. 2. The Von Pechmann reaction. (No previous assistantship awarded.) 1. Reaksies van tersiere alkielhipohaliete. 2. Die Von Pechmann-reaksie. (Geen vorige assistentskapstoekening nie.)
KING, Dr. J. W. B.Sc.(S.A.) 1949 Hons. B.Sc.(S.A.) 1950 M.Sc.(Rhodes) 1952 Ph.D.(Cambridge) 1955 Hamilton Prize for Research on Radio Propagation Lecturer in Physics	Rhodes University	Intensive ionospheric research during the International Geophysical Year. (No previous assistantship awarded.) Intensiewe ionosferiese navorsing gedurende die Inter- nasionale Geofisiese Jaar. (Geen vorige assistent- skapstoekening nie.)
KRYGSMAN, Prof. B. J. Ph.D.(Utrecht) 1928 (1st Class Hons.) Associate Professor of Zoology	University of Cape Town	1. Salinity perception and osmo-regulation in aquatic animals. 2. Heat physiology: invertebrate animals. (Previous awards 1953-1956) 1. Die waarneming van die soutgehalte en osmoregu- lasie by waterdiere. 2. Hittefisiologie: ongewerwde diere. (Vorige toekennings 1953-1956.)
LE ROUX, Prof. L. J. B.Sc.(P.U.K.) 1935 M.Sc.(P.U.K.) 1937 met lof D.Sc.(U.P.) 1953 Professor en Hoof van die Dept. Fisiese Chemie	Universiteit van Pretoria	Die ondersoek van reaksie meganismes met behulp van radioisotope. The investigation of reaction mechanisms with the aid of radioisotopes.
LOGIE, Prof. H. J. B.Sc.(Rand), B.Sc. (Hons.) (1st Class) D.Sc.(Rand) Professor of experimental Physics	University of the Witwatersrand	Change of resistivity on plastic deformation of alloys. (No previous assistantship award.) Verandering van weerstandsvermoë in verband met plastiese vervorming van legerings. (Geen vorige assistentskapstoekening nie.)
LUTJEHARMS, Prof. Dr. W. J. Nat. Ph.D.(Leiden) 1936 Professor in Plantkunde en Hoof van die Dept. vir Bodembiologie	Universiteit van die O.V.S.	Mikrobiologie van die stikstofkringloop (veral sim- biotiese en nie-simbiotiese stikstofbinding, nitrifikasie en verdere stikstofomsettings, vernaamlik in grasveld en humus). (Vorige assistentskapstoekennings 1953- 1956.) (2 assistente.) Microbiology of the nitrogen cycle (particularly sym- biotic and non-symbiotic nitrogen fixation, nitrifi- cation and other nitrogen conversions, particularly in grassveld and humus.) (Previous assistantship awards 1953-1956.) (2 Assistants.)
PHILLIPS, Prof. W. E. B.Sc.(Eng.) 1929 M.Sc.(Eng.) 1933 D.Sc.(Eng.) 1947 S.A. A.M.I.E.E. (1936) M.I.E.E. (1949) Senior M.I.R.E. (1945) M.(S.A.)I.E.E. (1954) Professor of Electrical Engineering	University of Natal	1' Propagation of microwave radio energy. 2. Radio back-scatter from the ionosphere. (I.G.Y. project.) (No previous assistantship award.) 1. Voortplanting van mikrogolfradioenergie. 2. Radioreflaksie vanuit die ionosfeer (I.G.J.-projek.) (Geen vorige assistentskapstoekening nie.)

<i>Name and Qualifications</i> <i>Naam en Kwalifikasies</i>	<i>Where tenable</i> <i>Waar geldig</i>	<i>Subject of Research</i> <i>Onderwerp van Navorsing</i>
STACK-FORSYTH, Dr. E. F. B.Sc.(Natal) 1931 B.Sc.(Hons.) (Natal) 1950 PhD.(Natal) 1954 A.M.I.E.E. Lecturer	Rhodes University	An investigation of the dynamic spectra of solar radio noise outbursts. (International Geophysical Year project.) (No previous assistantship award.) 'n Ondersoek van die dinamiese spektra van sonradio-geluiduitbarstings. (Internasionale Geofisiese Jaarprojek.) (Geen vorige assistentskapstoekening nie.)
STEYN, W. J. A. M.Sc.(Univ. of S.A.) 1945 Senior Lecturer in Analytical Chemistry	Rhodes University	Mineral status of plants and soils. (Previous assistantship awards 1954-1956.) Mineraalstatus van plant- en grondsoorte. (Vorige assistentskapstoekennings 1954-1956.)
STOKER, Dr. P. H. M.Sc.(Ondersk.) (Kaapstad) 1948 D.Sc. (Vrije Univ. Amsterdam) 1952. Professor in Fisika	Potchefstroomse Universiteit vir C.H.O.	<p>Projekte van departementele navorsingswerk (van dosente en studente).</p> <ol style="list-style-type: none"> 1. Betaspektrum van positiewe en negatiewe Mu-mesone en röntgenstrale van Mu-mesoniese atome. 2. Energieverlies van Mu-mesone van hoë energie in kristalle. 3. Direkte paarvorming deur Mu-mesone ondersoek met 'n Wilsonkamer. 4. Anomale verstrooiing van Mu-mesone ondersoek deur 'n telbuischodoskoop. 5. Intensiteitsvariasies van die neutronkomponent van die kosmiese strale. (Die neutronmonitor is voltooi en sal gedurende die I.G.J. te Hermanus in werking wees.) 6. Ballonvlugte met kernemulsies om kerntransformasies deur hoogenergetiese kosmiese straaldeeltjies te ondersoek. (Vorige toekening 1956.) <p>Projects of departmental research work (lecturers and students).</p> <ol style="list-style-type: none"> 1. Beta spectrum of positive and negative Mu-mesons and Röntgen rays of Mu-mesonic atoms. 2. Loss of energy from Mu-mesons of high energy in crystals. 3. Direct pairing by an investigation of Mu-mesons with a Wilson chamber. 4. Investigation of anomalous scattering of Mu-mesons through a counter tube hodoscope. 5. Intensity variations of the neutron component of cosmic rays. (The neutron monitor has been completed and will be in operation at Hermanus during the I.G.Y.) 6. Balloon flights with nuclear emulsions for the investigation of nuclear transformations by means of highly energetic cosmic ray particles. (Previous award 1956.)
WARREN, Prof. F. L. B.Sc.(1927), D.I.C. (1928) Ph.D.(London) (1929) D.Sc.(London) (1951) A.R.C.S., F.R.I.C., F.R.S.A. Professor of Chemistry and Chemical Technology. 2 Research Assistants	University of Natal	Investigation on medicinal and toxic principles in South African plants. (Previous awards 1951-1956.) Ondersoek in verband met genesende en toksiese beginsels ten opsigte van Suid-Afrikaanse plantsoorte. (Vorige toekennings 1951-1956.)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
YOURGRAU, Dr. W. D.Phil.(Berlin) 1932 Awarded Lincoln Scholarship (Branch of Rockefeller) in 1930, sponsored by	University of Natal	A book entitled "The Nature of Constants". (No previous assistantship award.) 'n Boek getitel „The Nature of Constants”; (Geen vorige assistentskapstoekenning nie.)
Thomas Mann, Albert Einstein and Max Planck. Senior Lecturer in Philosophy of Science		

(b) Grants for the employment of unskilled research assistants/Toekennings vir die indiensneming van ongeskoolde navorsingsassistente (£350-£450)

LEISEGANG, Dr. E. C. B.Sc.(S.A. 1941) M.Sc.(S.A. 1947) Dist. Ph.D.(Natal) 1952 Senior Lecturer in Chemistry	University of Natal	Infra-red spectroscopy: 1. Chronophore identification re natural products. 2. Measurement and analysis of vibration/rotation data in respect of simple molecules; deuteromethanes and the ethylenes in the first instance. (Previous awards 1954-1956.) Infrarooi spektroskopie: 1. Chronofooridentifisering in verband met natuurlike produkte. 2. Meting en ontleding van vibrasie/rotasiegegevens met betrekking tot eenvoudige molekule; deuterometane en die etilene in die eerste plek. (Vorige toekennings 1954-1956.)
SCHAFFER, Dr. W. M.Sc. (Univ. of S.A.) 1936 Ph.D. (Univ. of S.A.) 1940 Associate Professor of Physics	University of Cape Town	Structure of crotonylidenepiperidinium chlorostannate. (No previous assistantship award.) Struktuur van crotonylidenepiperidinium-chlorostannaat. (Geen vorige assistentskapstoekenning nie.)
SMITH, Prof. J. L. B. B.A., M.Sc., Ph.D., F.R.S.(S.A.) Research Professor	Rhodes University	Fishes. (3 assistants.) (Previous awards 1950-1956.) Visse. (3 assistente.) (Vorige toekennings 1950-1956.)

**MEDICAL, DENTAL AND NUTRITION RESEARCH/
 MEDIESE, TANDHEELKUNDIGE EN VOEDINGNAVORSING**

BURSARIES/BEURSE

Senior Bursaries/Senior Beurse (£200-£1,000)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
ALBERTS, Mrs. M. A. Phil.Cand.Univ. of Lund, Sweden Research Officer £400	S.A.I.M.R.	Studies on the generation of aortic tissue in European and Bantu subjects. Studies in verband met die voortbrenging van slag-aarweefsel by blanke en Bantoe-proefpersone.
MUSPRATT, J. B.A.(Hons.) Natural Science Tripos. (Cambridge) 1933 C.S.I.R. Senior Bursar £800	S.A.I.M.R.	Arthropod-borne diseases of South Africa. (Previous awards 1950-1955.) Deur arthropoda oorgedraagde siektes in Suid-Afrika. (Vorige toekennings 1950-1955.)

Senior Bursaries (Overseas)/Senior Beurse (Oorsee)

DEAN, Dr. G. J. M.B.Ch.B.(Liverpool) 1942 M.R.C.P.(London) 1947 M.D.(Neurology) (Liverpool) 1951 Consultant Physician £600	Porphyria Research Units in Europe and the U.S.A.	<ol style="list-style-type: none"> 1. Research for an article that will prove that all the thousands of porphyrics in South Africa of Afrikaner stock inherit porphyria from one forbear who came to this country in 1686. 2. A comparative analysis of porphyria as it occurs in South Africa with the disease in Holland, Sweden, the U.S.A. and England. 3. A classification of porphyria. This will necessitate studying the disease in the countries mentioned. (Previous awards 1955-1956.) <ol style="list-style-type: none"> 1. Navorsing na 'n artikel om te bewys dat die duisende mense van Afrikaanse herkoms, wat in Suid-Afrika aan porfirie ly, porfirie van een voorouer geërf het wat in 1686 na hierdie land gekom het. 2. 'n Vergelykende ontleding van porfirie soos dit in Suid-Afrika met die siekte soos dit in Holland, Swede, die V.S.A. en Engeland voorkom. 3. 'n Klassifikasie van porfirie. 'n Studie van die siekte in bogenoemde lande sal vereis word. (Vorige toekennings 1955-1956.)
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ASSISTANTSHIPS/ASSISTENTSKAPPE (£450-£650)

Grants for the employment of skilled research assistants/Toekennings vir die indiensneming van geskoolde navorsingsassistentente

BARNARD, Dr. P. J. J. M.B.Ch.B.(Kaap) 1942 M.R.C.P.(Edinb.) 1947 M.D.(Pretoria) 1954 Senior Lektor in Patologiese Anatomie	Universiteit van Pretoria	Pulmonêre arteriosklerose. (Vorige assistentskap toekennings 1953-1956.) Pulmonary arteriosclerosis (Previous assistantship awards 1953-1956.)
COETZEE, Dr. J. N. M.B.Ch.B.(Engeland) 1947 M.D.(Engeland) 1952 Senior Lektor	Universiteit van Pretoria	'n Genetiese ondersoek van die stam Proteus. (Geen vorige assistentskap toekenning nie.) A genetic investigation of the tribe Proteus. (No previous assistantship award.)

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
<p>DE JAGER, Prof. C. L. B.A.(Univ. van S.A.) 1936 B.D.S.(Rand) 1949 Professor en Hoof, Dept. Patologie en histopatologie van die mondholte en mondchirurgie</p>	<p>Universiteit van Pretoria</p>	<p>(a) Kliniese ondersoek van S.A. inboorlinge. (b) Replika-ondersoeke. (c) Suurvorming in die mondholte met besondere ondersoek na invloed van voeding. (Vorige assistentskaptokennings 1955-1956.) (a) Clinical investigation of South African aborigines. (b) Replica investigations. (c) Acid formation in the oral cavity with special investigation of the influence of nutrition. (Previous assistantship awards 1955-1956.)</p>
<p>DERCKSEN, Prof. C. H. en groep. (Drs. J. BREMER, L. JORDAAN, T. J. MARAIS en F. A. K. VAN WYK) Prof. DERCKSEN, M.B.Ch.B. (Kaap) 1939 M.Ch.(U.P.) 1950 Dr. BREMER, M.B.,Ch.B. (Kaap) 1935 F.R.C.S.(Eng.) 1938 Dr. JORDAAN, M.B.Ch.B. (Kaap) 1948 Ch.M.(U.P.) 1956 (Onderskeiding alle eksamens) Dr. MARAIS, M.B.,Ch.B. (Kaap) 1945. M.Med. (Chir.) (U.P.) 1953 Dr. VAN WYK, M.B.,Ch.B. (U.P.) 1947. M.Med. (Chir.) (U.P.) 1953 Professor en Senior Kollegas</p>	<p>Universiteit van Pretoria</p>	<p>1. Arteriële-transplantate. 2. Vervaardiging van kunsmatige blaas. (Geen vorige assistentskaptokennings nie.) 1. Arterial transplantates. 2. Manufacture of artificial bladders. (No previous assistantship awards.)</p>
<p>1. DU TOIT, Dr. J. G. A. M.B.,Ch.B.(Kaap) 1940 M.Ch.(Kaap) 1944 F.R.C.S.(Edin.) 1946 Senior Lektor Ortopedie. Hoof van Ortopediese Dept., Pretoria Hospitaal 2. ZIADY, Dr. F. M.B.,Ch.B.(Kaap) 1937 M.D.(U.P.) 1947 M.R.C.P.(London) 1948 Senior Lektor, Interne geneeskunde</p>	<p>Universiteit van Pretoria</p>	<p>Etiologie van vet embolisme. (Geen vorige assistentskaptokennings nie.) Aetiology of fat embolism. (No previous assistantship awards.)</p>
<p>GELDENHUYS, Prof. F. G. M.B.,B.Ch.(Wits.) 1945 M.D.(Pretoria) 1950 (cum laude). Lid R.C.O.G. (London) 1952 Professor Ginekologie en Obstetrie</p>	<p>Universiteit van Pretoria</p>	<p>'n Studie van die ovariale funksie en metaboliese veranderinge in die liggaam na histerektomie. (Geen vorige assistentskaptokennings nie.) A study of the ovarian function and metabolic changes in the body after hysterectomy.</p>

<i>Name and Qualifications Naam en Kwalifikasies</i>	<i>Where tenable Waar geldig</i>	<i>Subject of Research Onderwerp van Navorsing</i>
<p>GOETZ, Prof. R. H. M.D.(Frankfurt) 1935 Ph.D.(Berne) 1936 M.B.,Ch.B.(Cape Town) 1944 Research Associate Professor of Surgery</p>	<p>University of Cape Town</p>	<ol style="list-style-type: none"> 1. The anatomy and physiology of the circulatory system in the giraffe. 2. The dynamics of various cardiac anomalies. 3. The surgical correction of valvular lesions of the heart. 4. Fibrinolysis in arteriosclerosis. (Previous awards 1947-1956.) <ol style="list-style-type: none"> 1. Die anatomie en fisiologie van die bloedsomloopstelsel van die kameelperd. 2. Die dinamika van verskeie hart-anomalië. 3. Die chirurgiese korreksie van hartklepletsels. 4. Fibronolise by arteriosklerose. (Vorige toekennings 1947-1956.)
<p>HEYNS, Dr. O. S. M.A., D.Sc., F.R.C.S. Professor of Obstetrics and Gynaecology</p>	<p>University of the Witwatersrand</p>	<ol style="list-style-type: none"> 1. Uterine contractility in general. 2. Effects of lowering of external pressure (atmospheric) on abdomen upon contractions in parturition. 3. Miscellaneous (related to 2) e.g. variable resistances of cervix, intra-abdominal pressure recordings. (Previous assistantship awards 1950-1956.) <ol style="list-style-type: none"> 1. Saamtrekbaarheid van die baarmoeder in die algemeen. 2. Uitwerking op sametrekings van die verlaging van eksterne druk (atmosferies) op die buik tydens bevalling. 3. Diverse (met betrekking tot 2) by wisselende weerstand van die baarmoedernek, registrering van binnebuikdruk. (Vorige assistentskapstoekennings 1950-1956.)
<p>KINNEAR, Dr. A. A. B.Sc., M.B., Ch.B., M.D., Ph.D. Senior Lektor Chemiese Patologie</p>	<p>Universiteit van Pretoria</p>	<p>Biochemie van melaatsheid. (Vorige assistentskapstoekennings 1955-1956.) Biochemistry of leprosy. (Previous assistantship awards 1955-1956.)</p>
<p>MARCHAND, Dr. P. M.B., Ch.B.(Wits.) 1944 F.R.C.S. (Royal College of Surgeons) 1947 Ch.M.(Wits.) 1952 Moynihan Prize 1953 Jacksonian Prize 1956 Thoracic Surgeon 2 Assistants</p>	<p>University of the Witwatersrand</p>	<p>Arterial grafting of the thoracic aorta. (Previous assistantship award 1956.) Slagaaroorplanting van die borsslagaar. (Vorige assistentskapstoekening 1956.)</p>

<i>Name and Qualifications</i> <i>Naam en Kwalifikasies</i>	<i>Where tenable</i> <i>Waar geldig</i>	<i>Subject of Research</i> <i>Onderwerp van Navorsing</i>
<p>MERSKEY, Dr. C. M.D.(Cape) 1947 M.R.C.P.(London) 1949 1st Assistant Dept. of Medicine, U.C.T.</p>	<p>University of Cape Town</p>	<p>Investigation of effects of fat and cholesterol on atheroma and coagulation: A. <i>Human Experiments.</i> Effect of fat feeding on coagulation time and prothombin consumption of whole blood and platelet rich or platelet poor plasma. B. <i>Rabbit Experiments.</i> Rabbits fed with cholesterol and other dietary supplements. To measure the effect on coagulation of rabbit blood. To assess the development of atheroma in these rabbits in relationship to these dietary supplements. (Previous assistantship award 1956.) Onderzoek van die uitwerking van vet en cholesterol op atheroma en stolling. A. <i>Proefnemings op mense.</i> Die uitwerking van vetvoeding op die stollingstyd en protombienverbruik van volbloed en bloedplaatjies wat ryk of arm is aan plasma. B. <i>Proefnemings op konyne.</i> Konyne met cholesterol en ander dieetaanvullings gevoed. Om die uitwerking van stolling op konynbloed te meet. Om die atheroma-ontwikkeling in hierdie konyne met betrekking tot hierdie dieetaanvullings te bepaal. (Vorige assistentskapstoekenning 1956.)</p>
<p>OETTLER, Dr. A. G. B.Sc.(Rand) 1938 B.Sc.(Hons.) (Rand) 1940 M.B., Ch.B.(Rand) 1942 (1st Class honours) Cancer Research Fellow</p>	<p>S.A.I.M.R.</p>	<p>The occurrence of spontaneous cancers in the multi-mammate mouse <i>Rattus (Mastomys) natalensis</i> and the factors influencing their development. (Previous assistantship awards 1955-1956.) Die voorkoms van spontane kanker by die veelborstige muis <i>Rattus (Mastomys) natalensis</i> en die faktore wat die ontwikkeling daarvan beïnvloed. (Vorige assistentskapstoekenning 1955-1956.)</p>
<p>PIJPER, Prof. A. M.D.(Leyden) 1913 D.Sc.(hon c) (Pretoria) 1933 D.Sc.(hon c) (Kaapstad) 1953 Emeritus Professor in Patologie</p>	<p>Universiteit van Pretoria</p>	<p>Beweeglikheid van bakteries en hul flagella. (Vorige assistentskapstoekenning 1950-1956.) The mobility of bacteria and their flagella. (Previous assistantship awards 1950-1956.)</p>

<i>Name and Qualifications</i> <i>Naam en Kwalifikasies</i>	<i>Where tenable</i> <i>Waar geldig</i>	<i>Subject of Research</i> <i>Onderwerp van Navorsing</i>
<p>SCHRIRE, Dr. V. M.Sc.(Hons.) 1938 Ph.D. 1940. M.B., Ch.B. (Cape Town) 1941 M.R.C.P. (London and Edinburgh) 1950 Physician Grootte Schuur Hospital and University of Cape Town</p>	<p>University of Cape Town</p>	<p>A. (i) The natural history of pericardial effusion—the incidence, results of treatment and long term follow up. (ii) Haemodynamic studies of pericarditis including cardiac catheterisation. (iii) The intracardiac pressures during and after the surgical procedure for relief of constrictive pericarditis. (iv) The role of auscultation in the diagnosis of pericarditis including phonocardiography and arterial and venous tracings. (v) The electrocardiographic and radiological diagnosis.</p> <p>B. (i) The natural history of beri-beri and myocardial failure of unknown aetiology. (ii) Haemodynamic studies.</p> <p>C. Studies in coronary vascular disease in Cape Town.</p> <p>D. The effects of long-term anticoagulants on the natural history of coronary vascular disease (together with Dr. C. Merskey).</p> <p>E. Studies in mitral stenosis. (No previous assistantships awarded.)</p> <p>A. (i) Die natuurlike verloop van hartsakuitstroming—die voorkoms en gevolge van behandeling en die langtermynopvolging daarvan. (ii) Haemodinamiese studies van hartsakontsteking met inbegrip van hartkateterisering. (iii) Die binnehartdruk gedurende en na die chirurgiese prosedure om verligting van vernouings-hartsakontsteking te bewerkstellig. (iv) Die rol van auskultering by die diagnose van hartsakontsteking met inbegrip van fonokardiografie en aar- en slagaarregistrering. (v) Die elektrokardiografiese en radiologiese diagnose.</p> <p>B. (i) Die natuurlike verloop van beri-beri en hartspierverlamming van onbekende etiologie. (ii) Hemodinamiese studies.</p> <p>C. Studies in verband met kroonvaatsiektes te Kaapstad.</p> <p>D. Die uitwerking van langtermyn-antikoaguleermiddels op die natuurlike verloop van kroonvaatsiektes (saam met dr. C. Merskey).</p> <p>E. Studies in verband met mitrale stenose. (Geen vorige assistentskapstoekening nie.)</p>

Publications

Publikasies

A.—C.S.I.R. PUBLICATIONS/W.N.N.R. PUBLIKASIES

Library and Information Division*C.S.I.R. Information* (monthly accession list).*Register of current scientific research at South African universities*, 1956.**National Institute for Personnel Research***Journal of the N.I.P.R.* (thrice yearly).**National Building Research Institute***Information Sheets* (Series DIS)—bi-monthly selections of technical enquiries with replies.
Bulletin (Series D.B.)—twice yearly.**National Telecommunications Research Laboratory***Monthly basic radio propagation predictions for Southern Africa.*
*Monthly bulletin of ionospheric characteristics observed at Johannesburg and Cape Town.***National Nutrition Research Institute***The Drying of Skimmed Milk.* Bulletin No. 1.**National Institute for Road Research***Full-scale Road Experiments with Surface Treatments*
Bulletin No. 2.**National Mechanical Engineering Research Institute**BOSMAN, D. L. *Timber Resources and Timber Utilisation in South Africa.* Pretoria, Council for Scientific and Industrial Research, 1956.**South African Bureau of Standards***Standards Bulletin* (monthly).**Liaison Division***Research Review* (quarterly).*Annual Report of the C.S.I.R.**Science News Selections*—weekly. (For the Technical and Daily Press in S.A.)**Biblioteek- en Inligtingsafdeling***W.N.N.R.-Inligting* (maandelikse Biblioteek-byvoegingslys).*Register van die huidige navorsing aan Suid-Afrikaanse universiteite*, 1956.**Nasionale Instituut vir Personeelnavorsing****Nasionale Bounavorsingsinstituut**

Technical enquiries with replies.

Nasionale Telekommunikasienavorsingslaboratorium*Monthly basic radio propagation predictions for Southern Africa.*
*Monthly bulletin of ionospheric characteristics observed at Johannesburg and Cape Town.***Nasionale Voedingnavorsingsinstituut****Nasionale Padnavorsingsinstituut***Volskaalse Padproewe met Oppervlaktebehandeling*
Bulletin Nr. 2.**Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese**

Pretoria, Council for Scientific and Industrial Research, 1956.

Suid-Afrikaanse Buro vir Standaarde*Standaarde-Bulletin* (maandeliks).**Skakelafdeling***Navorsingsoorsig* (driemaandeliks).*Jaarverslag van die W.N.N.R.**Keur van Wetenskaplike Nuus*—weekliks. (Vir die Tegnieuse en Daaglikse Pers in S.A.)

B.—PAPERS IN SCIENTIFIC JOURNALS BY MEMBERS OF THE C.S.I.R. STAFF

B.—ARTIKELS IN WETENSKAPLIKE TYDSKRIFTE DEUR LEDE VAN DIE W.N.N.R.-PERSONEEL

*As a result of the change-over in the period covered by the C.S.I.R. Annual Report the publications listed below cover only those of which reprints have been received during the period December 1956 to February 1957.**As gevolg van die oorskakeling in die tydperk wat gedek word deur die Jaarverslag van die W.N.N.R., bestaan die lys van publikasies hieronder slegs uit die waarvan herdrukke ontvang is gedurende die tydperk Desember 1956 tot Februarie 1957.***National Building Research Institute**FREAN, R. M. Aesthetics in the planning and layout of low-cost Native housing. *S. Afr. Arch. Rec.* vol. 42, no. 1, Jan. 1957, pp. 22-34.RENHACKKAMP, W. M. H. A graphical method for assessing artificial lighting requirements in rooms. *S. Afr. Elect. Rev.* vol. 47, no. 463, Dec. 1956, pp. 27-37.SAMSON, D. Research into the production problems of the building industry. *S. Afr. Arch. Rec.* vol. 41, no. 12, Dec. 1956, pp. 25-34.SAMSON, D. Building costs. Production planning and control on building sites. *S. Afr. Builder*, vol. 34, no. 12, Dec. 1956, pp. 13-27.VAN AARDT, J. H. P. Die chemiese verwerking van sementprodukte. *S. Afr. Industriële Chemikus*, deel 10, nr. 9, Sept. 1956.

- National Chemical Research Laboratory** **Nasionale Chemiese Navorsingslaboratorium**
 CARMAN, P. C. and L. H. Stein. Self-diffusion in mixtures. Part I—Theory and its application to a nearly ideal binary liquid mixture. *Trans. Farad. Soc.* no. 401, vol. 52, part 5, May 1956, pp. 619–627.
 CLINGMAN, A. L., J. R. Nunn and A. M. Stephen. Red-seaweed polysaccharides. Part I—*Gracilaria confervoides*. *J. Chem. Soc.* 34, Jan. 1957, pp. 197–203.
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 JOUBERT, F. J. Ultracentrifuge studies on castor bean proteins. *J. S. Afr. Chem. Inst.* vol. 9, no. 2, Oct. 1956, pp. 86–88.
 JOUBERT, F. J. A physico-chemical study of the proteins from the *Sterculia foetida* nut. *J. Appl. Chem.*, vol. 6, June 1956, pp. 252–256.
 NUNN, J. R. and M. M. van Holdt. A polysaccharide from *Porphyra capensis*. *Chem. Ind.* 1956, p. 467.
 SCHWARTZ, H. M. Kaffircorn malting and brewing studies. I.—The Kaffir beer brewing industry in South Africa. *J. Sci. Food Agric.* vol. 7, no. 2, Feb. 1956, pp. 101–105.
 STEIN, L. H. and P. C. Carman. Self-diffusion of the lower alkyl iodides and bromides. *J. S. Afr. Chem. Inst.* vol. 9 no. 1, March 1956, pp. 55–65.
 VAN DER WALT, J. P. Kaffircorn malting and brewing studies. II—Studies on the microbiology of Kaffir beer. *J. Sci. Food Agric.* vol. 7, no. 2, Feb. 1956, pp. 105–113.
 VAN DER WALT, J. P. The yeast *Kluyveromyces africanus* Nov. Spec. and its phylogenetic significance. *Antonie van Leeuwenhoek*, 22, 1956, pp. 321–326.
 VAN DER WALT, J. P. A note on the yeast incidence in carious teeth of urban Europeans and Bantu in South Africa. *J. Dent. Assoc. S. Afr.*, Jan. 1957, pp. 1–3.

- National Physical Research Laboratory** **Nasionale Fisiese Navorsingslaboratorium**
 BASSON, J. K. Absolute alpha counting of astatene—211. *Analytical Chem.* vol. 28, no. 9, Sept. 1956, pp. 1472–1474.

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 GRANT, W. L. The performance characteristics of the climatic chamber of the Chamber of Mines Applied Physiology Laboratory. *S. Afr. Mech. Eng.*, Nov. 1956, pp. 109–157.
 ROUX, A. J. A. Die Nasionale Navorsingsinstituut vir Meganiese Ingenieurswese. *Suid-Afrikaanse Boukonstruksie en Ingenieurswese*, jaargang 1, no. 8, Okt. 1956, bl. 16–22.
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 WHILLIER, A. Solar house heating—a panel. *Proceedings of the World Symposium on Applied Solar Energy*, Phoenix, Arizona, Nov. 1955.
 WHILLIER, A. The determination of hourly values of total solar radiation from daily summations. *Arch. Met. Geoph. Biokl.* Ser. B, Bd. 7, H.2, 1956, S. 197–204.
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C.—PAPERS PUBLISHED BY C.S.I.R. MEDICAL RESEARCH UNITS
C.—ARTIKELS DEUR W.N.N.R. MEDIESE NAVORSINGSEENHEDE

As a result of the change-over in the period covered by the C.S.I.R. Annual Report the publications listed below cover only those of which reprints have been received during the period December 1956 to February 1957.

As gevolg van die oorskakeling in die tydperk wat gedek word deur die Jaarverslag van die W.N.N.R., bestaan die lys van publikasies hieronder slegs uit die waarvan herdrukke ontvang is gedurende die tydperk Desember 1956 tot Februarie 1957.

Amoebiasis Research Unit
 King Edward VIII Hospital, Durban.

Amebiasenavorsingseenheid
 King Edward VIII-hospitaal, Durban.

ELSDON-DEW, R. *Perspectives in parasites*. Delivered to the 14th Annual Health Congress, Health Officials' Assoc. S. Afr., Durban, Oct. 1956.

Dental Research Unit
 University of the Witwatersrand, Johannesburg.

Tandheelkundige Navorsingseenheid
 Universiteit van die Witwatersrand, Johannesburg.

IRVING, J. T. Action of the hypophysis and of dietary protein on the calcifying tissues. *Nature*, vol. 178, Dec. 1, 1956, p. 1231.

SOLOMONS, C. C. and J. T. Irving. Availability to dinitrofluorobenzene of some amino groups in human dentin and oxhide collagen. *Nature*, vol. 178, Sept. 8, 1956, p. 548.

SOLOMONS, C. and J. T. Irving. N-terminal amino-acids of human dentin. *S. Afr. J. Med. Sci.* 21, 1956, p. 49.

Heart Research Unit
 Pretoria General Hospital.

Hartnavorsingseenheid
 Pretoriase Volkshospitaal.

BARNARD, P. J. and A. J. Brink. Supernumerary chambers to the left heart *Brit. Heart J.*, vol. 18, no. 3, July 1956, pp. 309–319.

Human Biochemistry Research Unit

South African Institute for Medical Research,
Johannesburg.

Navorsingseenheid vir Menslike Biochemie

Suid-Afrikaanse Instituut vir Mediese Navorsing,
Johannesburg.

- ANDERSSON, M. and A. R. P. Walker. Methionine concentration in South African Bantu breast milk. *Brit. J. Nut.* vol. 9, no. 2, 1955, pp. 197-199.
- ANDERSSON, M., A. R. P. Walker and H. C. Falcke. An investigation of the rarity of infantile scurvy among the South African Bantu. *Brit. J. Nut.* vol. 10, no. 2, 1956, p. 101.
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- WALKER, A. R. P. Does a low intake of calcium cause or promote the development of rickets? *Amer. J. Clin. Nut.* vol. 3, no. 2, 1955, pp. 114-120.
- WALKER, A. R. P. Diet and atherosclerosis. Letter to the Editor. *Lancet*, March 12, 1955, pp. 565-566.
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- WALKER, A. R. P. Some aspects of nutritional research in South Africa. *Nut. Rev.* vol. 14, no. 11, Nov. 1956, pp. 321-324.
- WALKER, A. R. P., E. S. P. Strydom, P. A. Reynolds and B. G. Grobbelaar. The composition and density of thoracic vertebral bodies from South African Bantu adults habituated to a very high iron intake. *S. Afr. J. Lab. Clin. Med.* vol. 1, no. 4, Dec. 1955, pp. 254-262.
- WALKER, A. R. P. and M. Andersson. The rarity of fatty liver in African Bantu alcoholics. Letter to the Editor. *Lancet*, Dec. 17, 1955, p. 1300.
- WALKER, A. R. P. and J. Higginson. Bantu siderosis. *Trans. Roy. Soc. Trop. Med. Hyg.* vol. 50, no. 1, 1956, pp. 102-103.
- WALKER, A. R. P., D. C. Fletcher, P. A. Reynolds, I. Bersohn and E. D. Sonnenfeld. Reduction to normal levels of the high erythrocyte sedimentation rates in apparently healthy South African Bantu men. *Nature*, vol. 177, March 10, 1956, pp. 480-481.
- WALKER, A. R. P. and I. Bersohn. Degenerative heart disease. *Lantern*, May 1956, pp. 317-319.

Nutrition Research Unit

University of the Witwatersrand, Johannesburg.

Voedingnavorsingseenheid

Universiteit van die Witwatersrand, Johannesburg.

- DU TOIT, D. S. Preliminary report on the excretion of pregnanediol during the menstrual cycle of the baboon. (*Papio ursinus*). *S. Afr. J. Med. Sci.* 21, 1956, pp. 47-48.
- GILLMAN, J. and C. Gilbert. Calcium, phosphorus and vitamin D as factors regulating the integrity of the cardio-vascular system. *Exp. Med. Surg.* vol. 14, no. 2-3, June-Sept. 1956, pp. 136-168.
- GILLMAN, J. and C. Gilbert. The failure of the fatty liver to develop in insulin-treated depancreatized baboons. *S. Afr. J. Med. Sci.* 21, 1956, pp. 46-47.

Tuberculosis Research Unit

King George V Hospital, P.O. Dormerton, Durban.

Teringnavorsingseenheid

King George V-hospitaal, Pk. Dormerton, Durban.

- FINE, F. H., P. Smit and S. E. Cruise. Pulmonary tuberculosis in rail and dock workers. A preliminary report. *S. Afr. Med. J.* vol. 30, Oct. 27, 1956, pp. 1039-1040.

Virus Research Unit

University of Cape Town.

Virusnavorsingseenheid

Universiteit van Kaapstad.

- LARGIER, J. F. Investigation of the tetanus toxin from two different strains of *Clostridium tetani*. *J. Immunol.* vol. 76, no. 6, June 1956, pp. 393-398.
- LARGIER, J. F. Purification of tetanus toxin. *Biochim. Biophys. Acta*, vol. 21, 1956, pp. 433-438.
- POLSON, A. Calculation of molecular weights from viscosity and diffusion data. *Biochim. Biophys. Acta*, vol. 21, 1956, pp. 185-187.
- POLSON, A. The isolation and purification of desoxyribonuclease by multi-membrane electrodecentation. *Biochim. Biophys. Acta*, vol. 22, 1956, pp. 61-65.
- VAN DEN ENDE, M. Active immunization against virus disease in man. A lecture. *S. Afr. Med. J.* vol. 30, July 21, 1956, pp. 675-678.

D.—PAPERS PUBLISHED BY C.S.I.R. BURSARS**D.—ARTIKELS DEUR W.N.N.R. BEURSHOUERS**

As a result of the change-over in the period covered by the C.S.I.R. Annual Report the publications listed below cover only those of which reprints have been received during the period December 1956 to February 1957.

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- BADENHUIZEN, N. P. and M. I. Malkin. Phosphorylase activity in relation to the layering of starch granules. *Nature*, vol. 175, June 25, 1955, p. 1134.
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- ENGLBRECHT, C. A. *Modelle van die atoomkern*. M.Sc. Tesis, Universiteit van Pretoria, Des. 1956.
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- HODSON, M. C. *The design of an aerial system for use in an investigation of the lower layers of the ionosphere employing the back scatter principle at fixed frequencies in the range 10 Mc./Sec. to 70 Mc./Sec.* M.Sc.(Elec.Eng.) Thesis, University of Natal, Dec. 1956.
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CAPITAL FUND

STATEMENT OF TRANSACTIONS FOR THE YEAR ENDED 31ST MARCH, 1957

EXPENDITURE	1956/57			Totals as at 31st March, 1957		
	£	s.	d.	£	s.	d.
(A) <i>Building and Reserve Capital Account—</i>						
Land and Buildings	279,246	18	2	940,883	0	5
Balance unexpended	19,423	16	9	254,183	2	10
TOTALS	£298,670	14	11	£1,195,066	3	3
(B) <i>Equipment Capital Account—</i>						
Furniture, Fittings and Office Equipment	20,561	10	5	139,850	10	3
Laboratory and Workshop Equipment	133,428	3	11	1,277,312	11	0
Work-in-progress (Partly finished equipment—S.A.B.S.)	236	17	8	2,401	10	11
Stores on Hand	34,532	3	9	115,979	15	10
Vehicles and Cycles	8,638	16	7	51,197	14	9
Subsidised Motor Vehicles (at cost less repayments)	(—)	3,044	3	2,416	5	10
Books and Journals	28,779	15	9	90,402	18	2
Buildings (Leasehold)	—	—	—	11,168	8	1
Cost of Assets	223,133	4	3	1,690,629	14	10
Balance unexpended	64,413	17	3	248,285	13	9
TOTALS	£287,547	1	6	£1,938,915	8	7
TOTALS OF (A) AND (B)	£586,217	16	5	£3,133,981	11	10

NOTES:

- (a) £940,883 0s. 5d. for land and buildings does not include value of site donated to Council by the Pretoria University which was valued at £23,900 on transfer purposes.
- (b) Expenditure for 1956/57 includes £28,719 13s. 6d. and £20,000 respectively for Stores Stock and Books and Journals purchased by the S.A. Bureau of Standards Running Expenses Account prior to 1/4/57 and transferred to capital expenditure to establish uniformity on segregation of C.S.I.R. and S.A.B.S. accounts.
- (c) £59,000 appropriation to the Equipment Capital Fund to finance the expenditure under (b) above and the purchase of further stores stock, including stationery.

RECEIPTS	1956/57			Totals as at 31st March, 1957		
	£	s.	d.	£	s.	d.
(A) <i>Building and Reserve Capital Fund—</i>						
(1) Parliamentary grant	282,000	0	0	1,092,600	0	0
(2) Transfer from Appropriation Account	16,670	14	11	98,466	3	3
(3) Interest on Investments	—	—	—	—	—	—
TOTALS	£298,670	14	11	£1,195,066	3	3
(B) <i>Equipment Capital Fund—</i>						
(1) Parliamentary Grant	226,520	0	0	1,590,308	0	0
(2) Transfer from Appropriation Account	59,000	0	0	286,614	18	11
(3) Reserve for subsidised cars	—	—	—	7,000	0	0
(4) Reserve for office mechanisation	—	—	—	5,000	0	0
(5) Interest on Investments	—	—	—	1,607	19	9
(6) Donations	945	0	0	28,434	10	9
(7) Revenue	1,082	1	6	19,949	19	2
TOTALS	£287,547	1	6	£1,938,915	8	7

£586,217 16 5 £3,133,981 11 10

ALLOCATION OF UNEXPENDED BALANCE	£ s. d.		
	£	s.	d.
(1) Firm commitments against Equipment Capital Fund	85,040	0	0
(2) Held by Universities for the purchase of capital equipment	24,811	4	5
(3) Reserve for subsidised cars	4,583	14	2
(4) Reserved for capitalisation of equipment manufactured in C.S.I.R. workshops and laboratories (excluding the S.A. Bureau of Standards)	26,575	0	0
(5) Not committed at 31/3/57, but earmarked pending receipt of quotations or further investigations regarding suitability of equipment	107,275	15	2
TOTALS	£248,285	13	9

S. M. NAUDE, President

A. J. MILLER-SMIT, Secretary/Treasurer

KAPITAALFONDS

STAAT VIR TRANSAKSIES VIR DIE JAAR GEËINDIG 31 MAART 1957

UITGAWE		1956/57		Totale op 31 Maart 1957	
Besonderhede		£	s. d.	£	s. d.
(A) Geboue- en Reservekapitaalrekening—					
Grond en Geboue	..	279,246	18 2	940,883	0 5
Onbestede saldo	..	19,423	16 9	254,183	2 10
TOTALE	..	£298,670	14 11	£1,195,066	3 3
(B) Toerustingkapitaalrekening—					
Meubels, toebehore en kantoortoerusting	..	20,561	10 5	139,850	10 3
Laboratorium- en werkwinkeltoerusting	..	133,428	3 11	1,277,312	11 0
Werk aan die gang (Gedeeltelik voltooide toerusting—S.A.B.S.)	..	236	17 8	2,401	10 11
Voorrade voorhande	..	34,532	3 9	115,979	15 10
Voertuie en fiense	..	8,638	16 7	51,197	14 9
Gesubsidieerde motorvoertuie (teen kosprys <i>min</i> terugbetalings)	..	(3,044)	3 10	2,416	5 10
Boeke en tydskrifte	..	28,779	15 9	90,302	18 2
Geboue (verpag)	..	—	—	11,168	8 1
Koste van bate	..	223,133	4 3	1,690,629	14 10
Onbestede Saldo	..	64,413	17 3	248,285	13 9
TOTALE	..	£287,547	1 6	£1,938,915	8 7
TOTALE VAN (A) EN (B)	..	£586,217	16 5	£3,133,981	11 10

OPMERKINGS:

- (a) £940,883 0s. 5d. vir grond en geboue sluit nie die waarde in van die terrein deur die Universiteit Pretoria aan die Raad geskenk nie, en vir oordragdoelende teen £20,900 gedeel.
- (b) Uitgawes vir 1956/57 sluit £28,719 13s. 6d. en £20,000 in, onderskeidelik vir voorrade en boeke en tydskrifte deur die S.A. Buro vir Standaardrekening teen Rekening van Uitgawes voor 1/4/57 aangekoop en oorgepra na kapitale uitgawes om eenvormigheid te skep (eens saamsmelting van W.N.N.R.- en S.A.B.S.-rekeninge).
- (c) £29,000 appropriasie na Toerustingkapitaalfondse dien om die uitgawes onder (b) hierbo en die aankoop van verdere voorrade, met inbegrip van skryf behoeftes, te dek.

ONTVANGSTE		1956/57		Totale op 31 Maart 1957	
Besonderhede		£	s. d.	£	s. d.
(A) Geboue- en Reservekapitaalfondse—					
Parlementêre toekennings	..	282,000	0 0	1,092,600	0 0
Oordrag van Appropriasie-rekening	..	16,670	14 11	98,466	3 3
Rente op Beleggings	..	—	—	—	—
TOTALE	..	£298,670	14 11	£1,195,066	3 3
(B) Toerustingkapitaalrekening—					
Parlementêre toekennings	..	226,520	0 0	1,590,308	0 0
Oordrag van Appropriasie-rekening	..	59,000	0 0	286,614	18 11
Reserwe vir gesubsidieerde karre	..	—	—	7,000	0 0
Reserwe vir kantoorameganisering	..	—	—	5,000	0 0
Rente op Beleggings	..	945	0 0	1,607	19 9
Skenkings	..	—	—	28,434	10 9
Inkomste	..	1,082	1 6	19,949	19 2
TOTALE	..	£287,547	1 6	£1,938,915	8 7
TOTALE VAN (A) EN (B)	..	£586,217	16 5	£3,133,981	11 10

TOEWYSING VAN ONBESTEDE SALDO

	£	s. d.
(1) Vaste verpligtings teen Toerustingkapitaalfondse	85,040	0 0
(2) Gehou deur Universiteit vir die aankoop van kapitaalroerusting	24,811	4 5
(3) Reserwe vir gesubsidieerde karre	4,583	14 2
(4) Reserwe vir kapitalisasie van toerusting deur W.N.N.R. werkplaaas en laboratoriums vervaardig (met uitsondering van die S.A. Buro vir Standaardrekening)	26,575	0 0
(5) Nie op 31/3/57 verbind nie, maar toegewys in afwagting op ontvangs van prysopgawes of verdere ondersoek i.v.m. geskiktheid van toerusting	107,275	15 2
TOTALE	£248,285	13 9

S. M. NAUDÉ,
President

A. J. MILLER-SMIT,
Sekretaris/Tesourier

Pretoria, 29 Oktober 1957.

STATEMENT No. 3

RUNNING EXPENSES ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1957

	£	s.	d.	1956/57	£	s.	d.	1956/57	£	s.	d.
To—											
Headquarters and Administration, including rent and general services to laboratories	173,281	16	6	151,776	0	0			1,387,390	0	0
Less: Transport charges received from Laboratories	21,505	16	6						240,550	18	4
									48,564	11	1
									10,264	15	2
Liaison Division				26,374	5	3					
London Office				12,449	15	6					
Washington Office				10,554	15	6					
Cologne Office				3,716	1	8					
Library and Information Division				17,630	16	2					
Central Workshops				54,090	19	8					
South Africa Bureau of Standards				510,608	19	5					
National Building Research Institute				110,508	4	2					
National Physical Research Laboratory				153,292	0	0					
National Telecommunications Research Laboratory				31,979	4	2					
National Chemical Research Laboratory				160,639	17	5					
National Nutrition Research Institute				58,194	10	5					
National Institute for Personnel Research				93,317	7	7					
National Mechanical Engineering Research Institute				100,714	4	6					
Defence Research				18,222	17	9					
Prenatalosis Research Unit				57,670	12	9					
National Institute for Road Research				29,488	1	0					
Medical Research Administration				3,001	17	3					
Grants and Subsidies				205,380	0	0					
(c) Research Grants to Universities, Museums and other General Sciences				69,498	0	2					
(i) General											
(ii) Medical Research											
(b) Medical Research Units and S.A.I.M.R.	68,513	9	2								
(c) Industrial Research Institutes	67,368	10	8								
Less: Running Expenses capitalised in equipment manufactured											
									1,809,610	10	2
									13,948	14	3
Balance being excess of revenue over expenditure transferred to Appropriation Account									1,795,661	15	11
									214,886	4	5
									<u>£2,010,548</u>	<u>0</u>	<u>4</u>
By—											
Parliamentary Grant											
Investigations, tests and services											
Standardization mark permit fees											
Levies: Compulsory standard specifications											
Contributions towards the cost of—											
Preparing specifications									9,925	0	0
Research investigations									6,376	3	5
Revenue from Fellowships and Grants											
Appportioned from 1955/56									£18,438	15	10
Receivable during 1956/57									148,334	3	0
Less: Apportioned to 1957/58									166,772	18	10
									32,843	11	8
Sale of radioactive isotopes											
Royalties											
Publications									9,249	10	10
Administrative services to laboratories financed by sponsors									387	2	10
Sundry revenue									3,630	16	9
Allocated from Appropriation Account in terms of Section 14(4) of Act 33 of 1945									5,075	0	9
Allocated from Appropriation Account in terms of Section 13(4) of the Standards Act No. 24 of 1945 (as amended)									1,444	12	6
									104,260	1	6
									49,500	0	0
									<u>£2,010,548</u>	<u>0</u>	<u>4</u>

NOTE: The following are firm commitments of the Council at 31/3/57:

	£	s.	d.
(i) For Running Expenses (estimated)	76,752	0	0
(ii) For Research Grants	23,577	15	10
	<u>£102,329</u>	<u>15</u>	<u>10</u>

Pretoria, 29th October, 1957.

S. M. NAUDÉ,
PresidentA. J. MILLER-SMIT,
Secretary/Treasurer

REKENING VAN LOPENDE UITGAWES VIR DIE JAAR GEËINDIG 31 MAART 1957

	£	s.	d.	1956/57	£	s.	d.
Aan—							
Hoofkantoor en Administrasie, insluitende huur en algemene dienste aan laboratoriums	173,281	16	6	151,776	0	0	
<i>Min:</i> Vervoerkoste verhaal van laboratoriums	21,505	16	6				
Skakelafdeling				26,374	5	3	
Wondense Sending				12,449	13	6	
Washingtonse Sending				10,554	13	6	
Krentiese Sending				3,716	1	8	
Biblioteek en Inligtingsafdeling				17,630	16	2	
Seniële Werkplaa				54,090	19	8	
Suid-Afrikaanse Buro vir Standaard				510,608	19	5	
Nasionale Bounavorsingsinstituut				110,308	4	2	
Nasionale Fisiologiese Navorsingslaboratorium				133,292	0	0	
Nasionale Telekommunikasie-navorsingslaboratorium				31,979	4	2	
Nasionale Chemiese Navorsingslaboratorium				160,639	17	5	
Nasionale Voedingnavorsingsinstituut				38,194	10	5	
Nasionale Instituut vir Personeelnavorsing				33,317	7	7	
Nasionale Navorsingsinstituut vir Werktuigkundige Ingenieurswese				100,714	4	6	
Verdedigingsnavorsing				18,222	1	9	
Pneumokoklose Navorsingsseenheid				57,670	12	9	
Nasionale P. radnavorsingsinstituut				29,488	0	0	
Mediese Navorsing Administrasie				3,001	17	3	
Toekennings en Subsidies				203,380	0	0	
(d) Navorsingtoekennings aan Universiteite, Museums en andere	69,498	0	2				
(i) Algemene wetenskappe				457,161	0	11	
(ii) Mediese navorsing				12,336	19	3	
(b) Mediese Navorsingsseenhede en S.A.I.M.N.	68,513	9	2				
(c) Nywerheidsnavorsingsinstitute	67,368	10	8				
<i>Min:</i> Bedryfskoste gekapitaliseer in toerusting vervaardig				1,809	610	10	2
				13,948	14	3	
Saldo, n.l. bedrag waarmee inkomste uitgawe oorskry, oorgegedra na die appropriasie-rekening				1,795,661	15	11	
				214,886	4	5	
				£2,010,548	0	4	

	£	s.	d.
1956/57	1,387,390	0	0
Parlementêre toekennings	240,550	18	4
Ondersoeke, toecise en dienste	48,364	11	1
Permitgelyde vir Standaardmerke	10,264	15	2
Bydraes vir—			
Opstel van spesifikasies	9,925	0	0
Navorsingsondersoeke	6,376	3	5
Inkomste uit beurse en toekennings	£18,438	15	10
Ontvangbaar gedurende 1956/57	148,334	3	0
<i>Min:</i> Oorgegedra na 1957/58	166,772	18	10
	32,843	11	8
Verkoop van radio-aktiewe isotope	9,249	10	10
Tantieme	387	2	10
Publikasies	3,630	16	9
Administratiewe dienste aan laboratoriums deur ondersteuners finansier	5,075	0	9
Diverse inkomste	1,444	12	6
Toewysing uit appropriasie-rekening ingevolge artikel 14(4) van Wet No. 33 van 1945	104,260	1	6
Toewysing uit appropriasie-rekening ingevolge artikel 13(4) van die Wet op Standaard No. 24 van 1945 (soos gewysig)	49,500	0	0

OPMERKING: Onderstaande is die Raad se vaste verpligting op 31/3/57:

	£	s.	d.
(i) Onder Rekening van Lopende Uitgawe (geskat)	76,752	0	0
(ii) Vir Navorsingtoekennings	25,577	15	10
	£102,329	15	10

Pretoria, 29 Oktober 1957.

S. M. NAUDÉ,
President

A. J. MILLER-SMIT,
Sekretaris/Tesourier

STATEMENT No. 4

APPROPRIATION ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1957

To—	£	s.	d.	1956/57	£	s.	d.
Allocation by Council to—							
Running Expenses Account	..	..	..	104,260	1	6	
				<u>£104,260</u>	<u>1</u>	<u>6</u>	
Allocation by Council to—							
(a) S.A.B.S. Central Stores Stock Reserve Account	..	5,500	0	55,000	0	0	
(b) Running Expenses Account	..	49,500	0				
Balance carried forward to amalgamation	..	..	..	51,805	15	11	
				<u>£106 805 15 11</u>			
Allocation by Council to—							
(a) Equipment Capital Fund with approval of the Minister of Finance	..	..	..	75,670	14	11	
(b) Building and Reserve Capital Fund	..	59,000	0				
				<u>16,670</u>	<u>14</u>	<u>11</u>	
Balance for allocation by Council in terms of Section 14(4) of Act No. 33 of 1945—							
as proposed below:							
(a) Capital Funds with approval of the Minister of Finance (Building and Reserve Capital Fund £25,000; Equipment Capital Fund £25,000)	..	50,000	0	50,000	0	0	
(b) Running Expenses Account—provision for	..	102,330	0	102,330	0	0	
(i) Firm commitments at 31/3/57	..	102,670	0	102,670	0	0	
(ii) Firm commitments in 1957/58 not covered by income	..	10,192	0	10,192	0	4	
(iii) Contingencies	..	..	..	
				<u>£340,862 15 3</u>			
By—							
Balance brought forward for allocation in terms of Section 14(4) of Act No. 33 of 1945	..	..	..	104,260	1	6	
				<u>£104,260</u>	<u>1</u>	<u>6</u>	
Balance brought forward for allocation in terms of Section 13(4) of the Standards Act No. 24 of 1945 (as amended)	..	..	..	106,805	15	11	
				<u>£106,805 15 11</u>			
Balance brought forward to amalgamation for allocation in terms of Section 14(4) of Act No. 33 of 1945	..	..	..	51,805	15	11	
Interest on investments for allocation to Building and Reserve Capital Fund	..	16,670	14	16,670	14	11	
S.A.B.S. Central Stores Stock Reserve Account for allocation to Equipment Capital Fund	..	37,500	0	37,500	0	0	
Estimated value of S.A.B.S. books and journals for allocation to Equipment Capital Fund	..	20,000	0	20,000	0	0	
Excess of revenue over expenditure transferred from Running Expenses Account	..	..	..	214,886	4	5	
				<u>£340,862 15 3</u>			

S. M. NAUDE,
President

A. J. MILLER-SMIT,
Secretary/Treasurer

Pretoria, 29th October, 1957.

APPROPRIASIEREKENING VIR DIE JAAR GEËINDIG 31 MAART 1957

Aan—	£	s.	d.	1956/57	£	s.	d.
Toewysings deur die Raad aan—							
Rekening van Lopende Uitgawes				104,260	1	6	
				<u>£104,260</u>	<u>1</u>	<u>6</u>	
Per—							
Saldo oorgedra vir toewysing ingevolge Artikel 14(4) van Wet No. 33 van 1945				104,260	1	6	
				<u>£104,260</u>	<u>1</u>	<u>6</u>	
Per—							
Saldo oorgedra vir toewysing ingevolge Artikel 13(4) van die Wet op Standaard No. 24 van 1945 (soos gewysig)				106,805	15	11	
				<u>£106,805</u>	<u>15</u>	<u>11</u>	
Per—							
Saldo oorgedra op amalgamasie				55,000	0	0	
Toewysings deur die Raad aan—							
(a) S.A.B.S. Reserwerekening vir Voorrade in Sentrale Magasyn	5,500	0	0				
(b) Rekening van Lopende Uitgawes	49,500	0	0				
				<u>51,805</u>	<u>15</u>	<u>11</u>	
Saldo oorgedra op amalgamasie							
				<u>£106,805</u>	<u>15</u>	<u>11</u>	
Per—							
Saldo oorgedra op amalgamasie vir toewysing ingevolge Artikel 14(4) van Wet No. 33 van 1945				51,805	15	11	
Rente op beleggings vir toewysing aan Geboue- en Reserwekapitaalrekening	16,670	14	11				
S.A.B.S. Reserwerekening vir Voorrade in Sentrale Magasyn vir toewysing na Toerustingkapitaalfonds	37,500	0	0				
Beraamde waarde van S.A.B.S. boeke en tydskrifte vir toewysing na Toerustingkapitaalfonds	20,000	0	0				
Bedrag waarmee inkomste die uitgawes oorskry, oorgedra van die Rekening van Lopende Uitgawes	214,886	4	5				
				<u>£340,862</u>	<u>15</u>	<u>3</u>	
Per—							
Saldo oorgedra op amalgamasie				75,670	14	11	
Toewysings deur die Raad aan—							
(a) Toerustingkapitaalfonds met goedkeuring van die Minister van Finansies	59,000	0	0				
(b) Geboue- en Reserwekapitaalrekening	16,670	14	11				
Saldo vir toewysing deur Raad ingevolge Artikel 14(4) van Wet No. 33 van 1945							
soos hieronder voorgestel:							
(a) Kapitaalfonds met goedkeuring van Minister van Finansies (Geboue- en Reserwekapitaalfonds £25,000; Toerustingkapitaalfonds £25,000)	50,000	0	0				
(b) Rekening vir Lopende Uitgawes—voorsiening vir							
(i) Vaste verpligtings op 31/3/57	102,330	0	0				
(ii) Vaste verpligtings in 1957/58 nie deur inkomste gedek nie	102,670	0	0				
(iii) Onvoorsiene uitgawes	10,192	0	4				
				<u>265,192</u>	<u>0</u>	<u>4</u>	
				<u>£340,862</u>	<u>15</u>	<u>3</u>	

S. M. NAUDÉ,
President

A. J. MILLER-SMIT,
Sekretaris/Tesourier

Pretoria, 29 Oktober 1957.

