

SUID-AFRIKAANSE
WETENSKAPLIKE NYWERHEID-
NAVORSINGSRAAD

SOUTH AFRICAN
COUNCIL FOR SCIENTIFIC
AND INDUSTRIAL RESEARCH

A G S T E
JAARVERSLAG

E I G H T H
ANNUAL REPORT

1952 — 1953

P R E T O R I A

UNIE VAN SUID-AFRIKA

UNION OF SOUTH AFRICA

Posbus 395, Pretoria

5 Oktober 1953.

Meneer,

Ek het die eer om aan u voor te lê die Agste Jaarverslag van die Wetenskaplike en Nywerheidsnavorsingsraad vir die jaar geëindig 4 Oktober 1953.

'n Balansstaat en 'n staat van inkomste en uitgawe vir die boekjaar eindigende 31 Maart 1953, soos nagegaan deur die Kontroleur en Ouditeur-Generaal, word ook voorgelê.

Dienswillig die uwe,

S. M. NAUDÉ

President: Wetenskaplike en Nywerheidsnavorsingsraad

Sy Edele E. H. Louw,

Minister van Ekonomiese Sake,

Paul Hof,

Minnaarstraat,

PRETORIA.

P.O. Box 395, Pretoria

5th October, 1953.

Sir,

I have the honour to present to you the Eighth Annual Report of the Council for Scientific and Industrial Research, for the year ended October 4th, 1953.

A balance sheet and statement of income and expenditure for the financial year ended 31st March, 1953, certified by the Controller and Auditor-General, is also presented.

I have the honour to be,

Sir,

Your obedient Servant,

S. M. NAUDÉ

President: Council for Scientific and Industrial Research

The Hon. E. H. Louw,

Minister of Economic Affairs,

Paul Hof,

Minnaar Street,

PRETORIA.

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APPENDIX II

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DR. P. J. DU TOIT, F.R.S.

Tweede President van die W.N.N.R. van
Oktober 1950 tot Oktober 1952.

Second President of the C.S.I.R. from
October, 1950 to October, 1952.

Lidmaatskap en Vergaderings van die Raad

Gedurende die jaar was die lidmaatskap van die Raad as volg :—

DR. S. M. NAUDÉ (PRESIDENT)
DR. T. B. DAVIE
DR. F. J. DE VILLIERS
MNR. F. J. DU TOIT
MNR. P. E. ROUSSEAU
DR. B. F. J. SCHONLAND
PROF. E. T. STEGMANN
MNR. T. P. STRATTEN
DR. E. TABERNER
DR. H. J. VAN ECK
DR. R. W. WILCOCKS
MNR. J. E. WORSDALE

Membership and Meetings of the Council

Membership of the Council during the year was :

DR. S. M. NAUDÉ (PRESIDENT)
DR. T. B. DAVIE
DR. F. J. DE VILLIERS
MR. F. J. DU TOIT
MR. P. E. ROUSSEAU
DR. B. F. J. SCHONLAND
PROF. E. T. STEGMANN
MR. T. P. STRATTEN
DR. E. TABERNER
DR. H. J. VAN ECK
DR. R. W. WILCOCKS
MR. J. E. WORSDALE



Die Wetenskaplike en Nywerheidsnavorsingsraad in sitting.

The Council for Scientific and Industrial Research in session.

(l.n.r./left to right) Dr. R. W. Wilcocks, Mnr./Mr. F. J. du Toit, Dr. T. B. Davie, Mnr./Mr. P. E. Rousseau, Mrs./Mev. P. N. Botha (notuleerder/recorder), Mnr./Mr. J. R. Sorrie (Sekretaris-Tesourier/Secretary-Treasurer), Dr. S. M. Naudé (President), Mnr./Mr. E. W. Dohse (Vise/Vice President), Dr. E. Taberner, Dr. P. J. du Toit, Dr. B. F. J. Schonland, Dr. H. J. van Eck, Dr. E. T. Stegmann, Dr. F. J. de Villiers.

Dr. S. M. Naudé is aangestel as President van die Raad vir 'n tydperk van drie jaar vanaf 5 Oktober 1953 in die plek van dr. P. J. du Toit. Dr. P. J. du Toit is nie langer lid van die Raad nie maar bly nog daaraan verbonde in die kapasiteit van adviseur van die President vir 'n tydperk van een jaar vanaf 5 Oktober 1952.



Dr. S. M. Naudé.

Dr. B. F. J. Schonland en mnre. P. E. Rousseau en J. E. Worsdale is benoem deur die Goewerneur-Generaal as lede van die Raad vir 'n tydperk van drie jaar vanaf 5 Oktober 1952.

Die Raad het drie keer in Pretoria vergader.

Lidmaatskap en Vergaderings van die Uitvoerende Komitee:

Die Uitvoerende Komitee het ses keer vergader. Die lede van die Komitee was :—

- DR. S. M. NAUDÉ (VOORSITTER)
- DR. F. J. DE VILLIERS
- DR. H. J. VAN ECK

Mnre. F. J. du Toit en J. E. Worsdale as plaasvervangers vir beide drs. de Villiers en van Eck.

Vise-Presidentskap van die Raad

Mnr. E. W. Dohse is aangestel as Vise-President van die Raad en het op 1 Julie 1953 diens aanvaar.

Dr. S. M. Naudé was appointed President of the Council for three years from 5th October, 1952, in succession to Dr. P. J. du Toit. Dr. P. J. du Toit relinquished membership of the Council but has retained his connection with it by accepting appointment as adviser to the President for a year from 5th October, 1952.

Dr. B. F. J. Schonland and Messrs. P. E. Rousseau and J. E. Worsdale were re-appointed by the Governor-General as members of the Council for three years from 5th October, 1952.

The Council met three times in Pretoria.

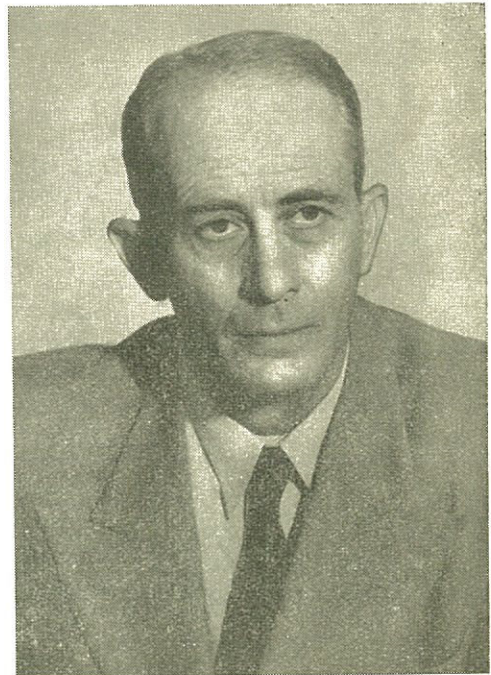
Membership and Meetings of the Executive Committee

The Executive Committee met six times. The members of the Committee were :

- DR. S. M. NAUDÉ (CHAIRMAN)
- DR. F. J. DE VILLIERS
- DR. H. J. VAN ECK
- Messrs. F. J. du Toit and J. E. Worsdale floating alternates to Drs. de Villiers and van Eck.

Vice-Presidency of the Council

Mr. E. W. Dohse was appointed as Vice-President of the Council and assumed duty on 1st July, 1953.



Mnr./Mr. E.W. Dohse.

Algemene Oorsig - Die Betekenis van Navorsing

Die leek aanvaar die wonderlike fasiliteite van die moderne lewe maar wonder selde hoe hulle ontstaan het. Die voedsel wat ons eet, die water wat ons drink, die klere wat ons dra, die gebou wat ons huisvesting verleen, inderdaad byna alles wat nodig is vir die handhawing van ons sogenaamde lewenstandaard, was eenmaal die voorwerp van wetenskaplike navorsing en is wat hulle is as gevolg van daardie navorsing. In die toekoms sal ons lewenswyse weer die navorsing weerspieël wat tans in die laboratoriums uitgevoer word.

In die volgende paragrawe sal sommige van die werksaamhede van die Wetenskaplike en Nywerheidsnavorsingsraad gedurende die afgelope jaar vermeld word en 'n poging sal aangewend word om aan te toon in watter verband hulle tot ons daaglikse lewe staan.

Daar is gewoonlik drie stadiums in die ontdekking van 'n wetenskaplike feit en sy toepassing in 'n vorm waarin dit vir ons van direkte nut is. Die eerste is dié van fundamentele navorsing wat slegs terwille van kennis as sulks onderneem word sonder enige gedagte aan die moontlike nut wat dit mag hê. In die tweede stadium, nl. dié van toegepaste navorsing, word dié basiese kennis aangewend vir die oplossing van alledaagse probleme. In die finale stadium, nl. tegnologiese ontwikkeling, word die tegnieke wat voortspruit uit toegepaste navorsing, gewysig om hulle geskik te maak vir volskaalse produksie.

Baie navorsing wat deur die Raad onderneem of gesteun word, val in die kategorie van fundamentele of langtermynnavorsing wat miskien nie onmiddellike resultate oplewer nie. Gedurende die jaar bv. is aansienlike vordering gemaak met die bou van 'n siklotron. Hierdie instrument sal aangewend word om lig te werp op die basiese struktuur van materie en, afgesien van die bykomstige produksie van radio-isotope wat vir mediese geneeskunde gebruik sal word, word nie verwag dat dit kennis sal oplewer wat onmiddellik in ons daaglikse lewe aangewend kan word nie. Op die lange duur egter kan dit nie anders as om ons in staat te stel om beter gebruik te maak van die stowwe en kragte tot ons beskikking deur dat dit ons kennis aangaande die samestelling van materie uitgebrei het. Ander voorbeelde sal gevind word in die breedvoerige verslae van die laboratoriums. Dit is miskien moeilik om te besef hoe die duistere begrippe van kernfisika of die ingewikkelde prosedure van organiese sintese ons daaglikse lewe kan beïnvloed, maar dit is belangrik om in gedagte te hou dat baie van die ontdekkings wat ons tans as doodgewoon beskou, gemaak is deur een of ander wetenskaplike wat geen ander motief gehad het as die bevrediging van sy eie ingebore nuus-

General Review the Impact of Research

The layman accepts the marvellous facilities of modern living, yet seldom wonders how they came into existence. The food we eat, the water we drink, the clothes we wear, the buildings we use for shelter, and, in fact, almost everything that goes to maintain what we call our standard of living have at some time been the subject of scientific research, and they are what they are because of that research. In the future our way of life will again reflect the research undertaken in the laboratories of today.

In the following paragraphs reference is made to some of the activities of the Council for Scientific and Industrial Research during the past year and an attempt is made to show how they are related to our everyday lives.

There are generally three stages in the discovery of a scientific fact and its application in a form in which it is of direct benefit to us. The first is that of fundamental research which is undertaken merely for the sake of knowledge without any thought of the use to which that knowledge may eventually be put. In the second stage, that of applied research, use is made of this basic knowledge in the solution of everyday problems. In the final stage, technological development, the techniques resulting from the applied research are modified to render them suitable for full-scale production.

Much of the research undertaken or supported by the Council falls into the category of fundamental or long-term research which may have no immediate results. During the year, for example, substantial progress was made with the building of a cyclotron. This instrument will be used to elucidate the basic structure of matter and, apart from the incidental production of radio-isotopes which will be used in medical therapy, is not expected to produce knowledge that can be applied immediately to our daily lives. In the long run, however, by increasing our knowledge of the composition of matter, it cannot but enable us to make better use of the materials and forces of energy at our disposal. Other examples will be noted in the detailed reports from the laboratories. It is perhaps difficult to conceive how the abstruse concepts of nuclear physics or the complex procedures of organic synthesis can affect our daily lives, but it is important to remember that many of the discoveries which we now accept as commonplace were made as the result of the work of some scientist who had no other motive than to satisfy his innate curiosity. Fundamental research provides the basic knowledge without which the applied scientist could make no progress toward the greater utilization of our natural resources for better living.

kierigheid nie. Fundamentele navorsing verskaf die basiese kennis waarsonder die toegepaste wetenskaplike geen vordering sou kon maak wat betref die omvattender aanwending van ons natuurlike hulpbronne vir die verkryging van beter lewensomstandighede nie.

Op die gebied van die toegepaste navorsing raak die werksaamhede van die Wetenskaplike en Nywerheidsnavorsingsraad omtrent al die behoeftes van die mens.

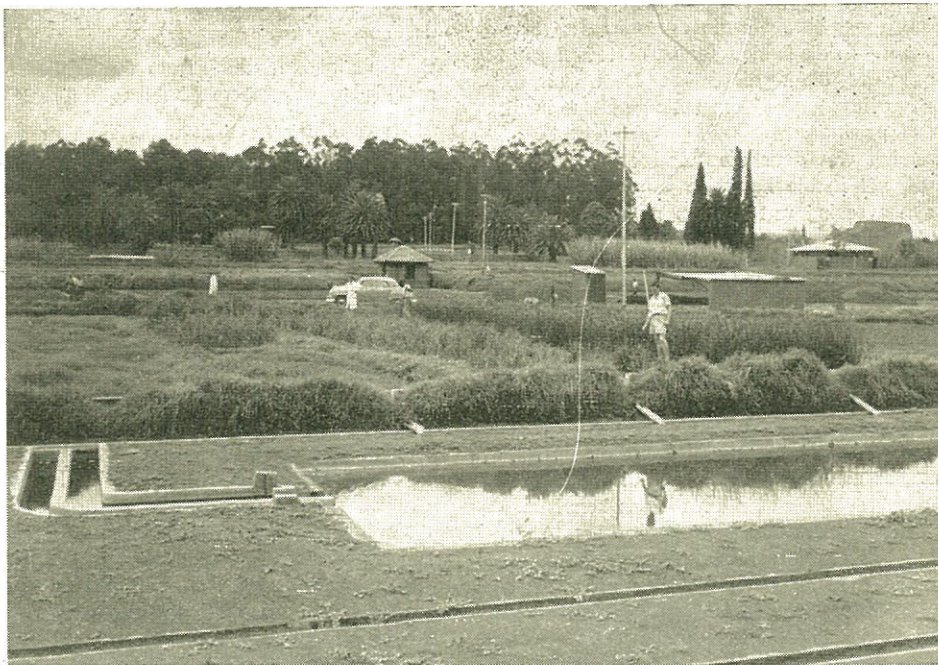
Water

Een van die twee basiese vereistes vir lewensonderhoud is water, die voorsiening waarvan in Suid-Afrika baie probleme oplewer. Ons waterbronne lê inderdaad ons ekonomiese ontwikkeling aan bande. Ons is nog nie in staat om ons reënval te verhoog nie, hoewel dit in die toekoms moontlik mag word. Voorlopig is dit dus nodig dat die beste gebruik van ons bestaande voorrade gemaak word. Baie ryk bronne van grondwater in Suid-Afrika en veral in Suidwes-Afrika, kan nie gebruik word nie omdat hulle brak is. Indien hulle op 'n goedkoop manier ontsout kan word, sou hulle 'n nuttige aanvulling van ons voorrade wees. Navorsing op hierdie probleem is gedurende die jaar begin deur die Nasionale Chemiese Navorsingslaboratorium wat 'n deskundige uit Nederland ingevoer het

On the side of applied research the activities of the Council for Scientific and Industrial Research affect almost every aspect of human needs.

Water

One of the two basic necessities for the maintenance of life is water, which in South Africa presents many difficult supply problems. Indeed, our water resources limit our economic development. We are not yet able to increase our rainfall, though this may be possible in future, so that for the present it is necessary to ensure that the fullest use is made of our existing supplies. Many abundant sources of ground water in South Africa, and particularly in South West Africa, cannot be used because they are saline. If they could be demineralised cheaply they would be a useful addition to our supplies, and research into this problem was started during the year, with a fair prospect of success, by the National Chemical Research Laboratory, which has imported an expert from the Netherlands to lead



Kunsmatige vlei, visdam en stroom by die Munisipale Rioolslykwerke, Pretoria vir proewe i.v.m. die suiwering van die uitlope by riolskemas. Die navorsing word gedoen deur die Afdeling vir Waterbehandeling van die Nasionale Chemiese Laboratorium.

Artificial vlei, fish pond and stream at the Pretoria Municipal Sewage Disposal Works for experiments on the purification of sewage works effluents. This research is being carried out by the Water Treatment Unit of the National Chemical Research Laboratory.

om die navorsing te lei. Die kans op sukses lyk redelik goed. 'n Proses wat alreeds in die laboratoriums van die Raad ontwikkel is, maak dit moontlik om fluorsoute goedkoop uit watervoorrade te verwyder.

'n Tweede belangrike navorsingskema wat gedurende die jaar deur die Nasionale Chemiese Navorsingslaboratorium aangepak is, is gemik op die ontwikkeling van metodes om rioolafloop te behandel. Laasgenoemde vorm 'n waterbron wat tot dusver oor die hoof gesien is. Die laboratorium hoop om dit moontlik te maak om die afloop te suiwer. Aangesien 70 persent van die water wat oor lang afstande gepomp en deur die groter stadsrade vir huishoudelike sowel as nywerheidsdoel-eindes gebruik word, ten slotte in riole beland, besit hierdie navorsing nogal aansienlike ekonomiese potensiale.

Voedsel

Die tweede basiese vereiste vir lewensonderhoud is voedsel. Die werksaamhede van die Raad t.o.v. voedselnavorsing, het 'n nuwe tydperk aan die begin van Junie betree, toe 'n spesiale afdeling binne die Nasionale Chemiese Navorsingslaboratorium gestig is om aan die navorsingsbehoefes van die Departement Voeding te voldoen. Tot dusver het die W.N.N.R. sy steun gegee aan 'n aansienlike hoeveelheid navorsing i.s. voeding. Benewens 'n aantal navorsingskemas in die Nasionale Chemiese Navorsingslaboratorium met betrekking tot sulke aangeleenthede soos visprodukte, vette, proteïenes en aminosure, word steun ook gegee aan 'n aantal mediese navorsingseenhede wat besig is met verskillende aspekte van voedingsnavorsing. Die Raad gaan ook voort om sy steun te verleen aan twee nywerheidsnavorsingsinstitute wat direk gemoeid is met voedselproduksie: die Visnywerheidsnavorsingsinstituut in Kaapstad en die Suikermeulenvorsingsinstituut in Durban. 'n Nuwe gebou vir lg. is gedurende April deur die Minister van Ekonomiese Sake ge-open.

Klere

Na voedsel en drank, is klere seker die belangrikste behoefte van die mens. Gedurende die afgelope jaar, het die Nasionale Chemiese Navorsingslaboratorium sy fundamentele ondersoek na die samestelling van wolwesels voortgesit. Die Suid-Afrikaanse Woltekstielnavorsingsinstituut, gesteun deur die Raad, is op 25 April as 'n nie-winsgewende maatskappy ingelyf en is tans in werking aan die Rhodes Universiteit te Grahamstad.

Onder hierdie hoof dien ook melding gemaak te word van die eerste industriële navorsingsinstituut wat deur die W.N.N.R. gesteun word nl. die Leernywerheidsnavorsingsinstituut wat voortgaan om die leerlooierye en vervaardigers van skoeisel te dien en, deur hulle, ook die volk van Suid-Afrika. Opnames van

the research. A process already developed in the Council's laboratories makes it possible to remove fluorides from water supplies economically.

A second major research project begun by the National Chemical Research Laboratory during the year is aimed at developing methods for treatment of effluents from sewage works. These constitute a hitherto neglected source of water. The laboratory hopes to make it possible to purify the effluents. As about 70 per cent. of the water pumped over long distances and used in the larger municipalities for both domestic and industrial purposes eventually finds its way into sewers, the economic potentialities of this research are considerable.

Food

The second basic necessity for the maintenance of life is food. The Council's activities in food research entered a new phase at the beginning of June when a special section was established within the National Chemical Research Laboratory to cater for the research needs of the Department of Nutrition. Hitherto the C.S.I.R. has supported a considerable amount of research in nutrition. In addition to several research projects in the National Chemical Research Laboratory relating to such things as fish products, fats, proteins and amino acids, support is given to a number of medical research units, which are engaged in various aspects of nutrition research. The Council has also continued its support of two industrial research institutes directly concerned with food production—the Fishing Industry Research Institute in Cape Town and the Sugar Milling Research Institute in Durban. A new building for the latter was opened by the Minister for Economic Affairs during April.

Clothing

After food and drink, clothing is perhaps the most important necessity for the human race. During the past year the National Chemical Research Laboratory has continued its fundamental studies of the constitution of wool fibres. The S.A. Wool Textile Research Institute, supported by the Council, was incorporated on the 25th April as a non-profit company and is now in full operation at Rhodes University in Grahamstown.

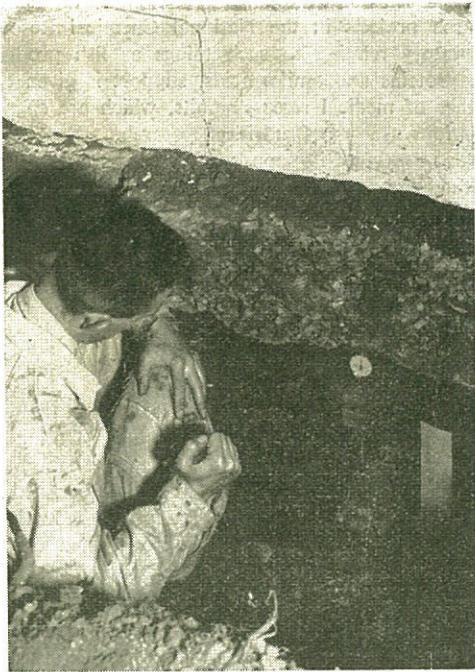
Under this heading, some mention should also be made of the first of the industrial research institutes to be supported by the C.S.I.R., the Leather Industries Research Institute, which has continued to serve the tanneries and footwear manufacturers and, through them, the people of South Africa. Surveys of foot shapes have led to the design of special lasts for the

voetvorms het gelei tot die ontwerp van spesiale leeste vir die maak van skoene wat beter aanpas by die voete van die gemiddelde Suid-Afrikaner as dié wat van oorsee ingevoer word. Navorsing op looimetodes belooft ook beter leer van die velle van Suid-Afrikaanse beeste.

So sal die werk van die Raad en sy verwante institute nie alleen lei tot geriefliker en duursame kleding en skoeisel nie, maar ook tot 'n meer doeltreffende gebruik van twee van sy belangrikste landbouprodukte.

Huisvesting

Die mens het skuiling nodig teen die elemente. Dis 'n ontsaglike gebied waarby die Wetenskaplike en Nywerheidsnavorsing nou betrokke is. Dit sluit in die ontwerp van huise, boumetodes en die uitlê van dorpe. Gedurende die afgelope jaar was die Nasionale Bounavorsingsinstituut van die Raad baie besig met die probleem van Naturellebehuising. Deur middel van 'n reeks sosio-ekonomiese opnames het hulle 'n wetenskaplike basis daargestel vir die ontwerp van model-Naturelledorpe wat beide goedkoper en geskikter is vir die behoeftes van die bewoners as dié wat in die verlede deur plaaslike owerhede gebou is. Nuwe metodes vir die gebruik van ongeskoolde en halfge-



Strukturele toets van huise wat volgens onortodokse metodes gebou is.

Structural testing of houses built by using unorthodox methods.

manufacture of shoes better adapted to the feet of the average South African than those imported from overseas, and research into tanning methods promises better leather from the hides of South African cattle.

Thus the work of the Council and its associated institutes will lead not only to more comfortable and durable clothing and footwear, but also the to more efficient use of two of its principal agricultural products.

Shelter

Man needs shelter from the elements. This is a vast field in which the Council for Scientific and Industrial Research is deeply involved. It includes the design of houses, methods of building, and the layout of townships. During the past year the Council's National Building Research Institute was much occupied with the Native housing problem and, aided by a series of socio-economic surveys, has established a scientific basis for the design of model Native townships which are both less costly and better suited to the needs of the inhabitants than those which have been built by local authorities in the past. New methods devised by the Institute for the use of unskilled and semi-skilled labour in building, may contribute much towards the reduction in cost and overcoming the present shortage in the training of Native building workers.

The "heaving soils" which cause many houses to crack soon after they are completed, particularly on the new O.F.S. goldfields, have been studied, and research which the Institute is now conducting may soon lead to structural designs which will overcome this problem. Research into building materials is another important section of the work of the National Building Research Institute and investigations into the methods of production of the high-magnesia limes common in South Africa have enabled manufacturers to overcome the difficulties previously associated with the use of this type of lime in building.

Health

Medical research is the foundation upon which all health services are built. During the past year the Council has continued its support of the South African Institute for Medical Research, and nine medical research units attached to hospitals and universities. It is also served by honorary medical liaison officers reporting from Chicago and London. These two officers ensure that news of the latest advances in medical science overseas reaches South African doctors without delay.

The use of radio-active isotopes is becoming increasingly important in medical research and treatment. During the past year the National Physical Laboratory imported isotopes to the value of £4,600 for various hospitals, doctors and universities, and in addition

skoolde arbeid in die boubedryf wat deur die Instituut ontwerp is, mag veel daartoe bydra om die huidige tekort aan die opleiding van geskoolde natuurle-bouers aan te vul.

Die „rys van grond” wat veroorsaak dat baie huise bars kort nadat hulle voltooi is, veral op die nuwe goudvelde van die O.V.S., is ondersoek en navorsing wat tans deur die Instituut onderneem word, mag spoedig lei tot strukturele ontwerpe wat hierdie probleem sal oplos. Navorsing na boustowwe is nog ’n belangrike aspek van die werk van die Nasionale Bounavorsings-instituut en ondersoek na die produksiemetodes van kalk met ’n hoë magnesiumgehalte wat algemeen in Suid-Afrika voorkom, het vervaardigers in staat gestel om die moeilikhede wat voorheen met die gebruik van hierdie soort kalk gepaard gegaan het, uit die weg te rum.

Gesondheid

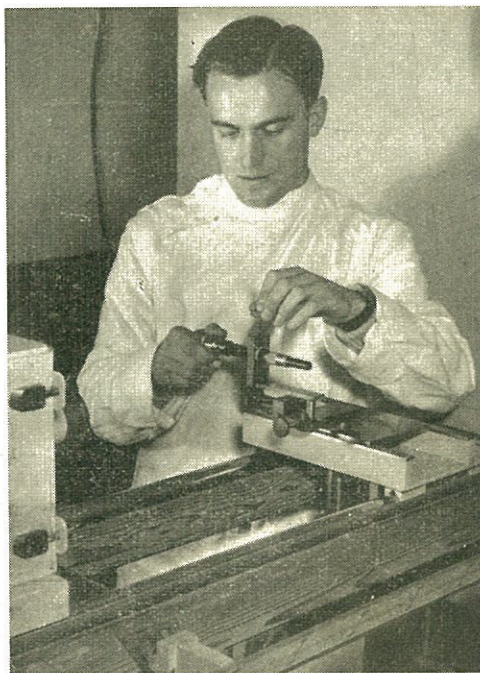
Mediese navorsing is die fondament van alle gesondheidsdienste. Gedurende die afgelope jaar het die Raad weereens sy steun gegee aan die Suid-Afrikaanse Instituut vir Mediese Navorsing en nege mediese navorsingseenhede verbonde aan hospitale en universiteite. Die Instituut word ook bedien deur ere-mediese skakel-beamptes in Chicago en Londen. Die twee beamptes sorg dat nuus van die jongste vooruitgang op die gebied van die mediese wetenskap oorsee, Suid-Afrikaanse dokters onverwyld bereik.

Die gebruik van radio-aktiewe isotope word van steeds groter belang op die gebied van mediese navorsing en behandeling. Gedurende die afgelope jaar het die Nasionale Fisiese Laboratorium isotope ter waarde van £4,600 vir verskillende hospitale, dokters en universiteite ingevoer en het baie van hulle bowendien nog bygestaan by die nodige voorbereiding en navorsing. ’n Skema wat deur die Laboratorium ontwerp is vir die invoer van radio-isotope in die vlerkpunte van vliegtuie waardeur die noodsaaklikheid van swaar loodhouers uitgeskakel word, het die koste van invoer per vliegtuig aansienlik verminder en sal eersdaags in werking gestel word ten einde plaaslike verspreiding in die Unie te vergemaklik.

Menslike Hulpbronne

Die lewenstandaard van ’n land staan in direkte verhouding tot die produktiwiteit van sy bewoners en produktiwiteit is op sy beurt weer afhanklik van die doeltreffende gebruik van menslike hulpbronne. Dit is die gebied van die personeelnavorsing waarop die Nasionale Instituut vir Personeelnavorsing van die Raad belangrike bydraes lewer, nie alleen deur die ontdekking van nuwe kennis aangaande menslike gedrag nie, maar die toepassing daarvan vir die voordeel van Suid-Afrika.

assisted many of them with the necessary preparation and research. A scheme developed by the Laboratory for the import of isotopes in the wingtips of aircraft, thus eliminating the necessity for heavy lead containers, has considerably reduced the cost of importation by air, and is shortly to be introduced to facilitate local distribution in the Union.



Die kalibrering van X-straal dosimeters wat gebruik word om die doeltreffendheid van X-straalstelle wat in hospitale gebruik word, te toets.

The calibration of X-ray dose meters used to measure the efficiency of X-ray sets used in hospitals.

Human Resources

The standard of living a country enjoys is directly proportional to the productivity of its people, and productivity in turn depends on the efficient use of human resources. This is the field of personnel research in which the Council's National Institute for Personnel Research is making important contributions, not only in the discovery of new knowledge of human behaviour, but in its application for the benefit of South Africa.

During the year the Institute assisted a number of firms in the selection of artisan apprentices, and administrative trainees from all parts of the Union were selected for a large industrial corporation. Extensive use was made by the Union Defence Force of tests devised by the Institute for the selection and classification of personnel for special duties and training. This type of

Gedurende die jaar het die Instituut bystand verleen aan 'n aantal firmas by die keuring van leerlingambagslui en administratiewe leerlinge uit al die dele van die Unie is vir 'n groot nywerheidskorporasie gekeur. Die Unie-Verdedigingsmag het op groot skaal gebruik gemaak van toetse wat deur die Instituut opgestel is



'n Opvolgingstoets wat deur die N.I.P.N. ontwikkel is vir die keuring van werkers in die klerebedryf.
A pursuit test developed by die N.I.P.R. for the selection of operatives for the clothing industry.

vir die keuring en klassifikasie van personeel vir besondere pligte en opleiding. Hierdie soort werk sal daartoe lei dat elke man tot die beste van sy vermoë en in sy eie belang sowel as in dié van die land as geheel gebruik sal kan word deur die regte man op die regte plek te kry. Verlede jaar het meer as 40,000 Naturelle-mynwerkers deur keuringsentra gegaan wat gebruik maak van metodes wat op die Instituut se navorsing gebaseer is.

Die behoefte aan navorsing na die gebruik van nie-Blanke arbeid is besonder dringend en gedurende die jaar is 'n Naturelle-arbeidsnavorsingspan gevorm as die eerste stap in die rigting van 'n Departement vir Naturellestudies. Dié sal hom nie alleen besig hou met probleme rakende die gebruik van Naturelle-arbeid nie, maar ook met basiese studies van plaaslike Naturelle-stamme.

Baanbrekerswerk in personeelbestuur en -produktiwiteit word deur die Leernywerheidsnavorsings-instituut uitgevoer. Praktiese resultate in die fabriek dui op 'n potensieële besparing van ten minste £500,000 per jaar vir die bedryf as geheel. Bowendien het die feit dat werkers meer geld kan verdien deur verhoogde produktiwiteit, bygedra tot 'n tydperk van vyf jaar van betreklike bestendigheid in basiese lone.

work, by getting the right man into the right job, will result in each man being used to the best of his ability in his own interests as well as those of the country as a whole. Last year more than 40,000 Native mine workers passed through selection centres which use methods based on research carried out by the Institute.

The need for research into the use of non-European labour is particularly urgent, and during the year a Native labour research team has been established as a first step towards a Native Studies Department. This will concern itself not only with problems relating to the use of Native labour, but also with basic studies of the indigenous Native peoples.

Pioneer work in personnel management and productivity is being carried out by the Leather Industries Research Institute. Practical results in the factories indicate a potential saving of at least £500,000 per annum for the industry as a whole, and in addition, the fact that workers can earn more money by increased productivity has contributed to a five-year period of comparative stability in basic wages.

Scientific Manpower

Without the trained men and women to solve the technical problems associated with their development and conversion to useful products, South Africa's wealth in natural resources could not be exploited. In Industry, research institutions, and Government agencies there is an increasing demand for scientists with adequate post-graduate training, and one of the most important tasks of the C.S.I.R. is to ensure that this demand will be met.

During the past year the Council awarded £6,800 for post-B.Sc. and post-M.Sc. bursaries to aid in the training of graduates in research techniques. In addition the directed research bursary scheme mentioned in the 7th Annual Report has been continued. This scheme is designed to encourage young scientists to make themselves proficient in particular subjects, selected because the existing supply of trained workers is inadequate and no appropriate training facilities exist in South African universities. In this way the Council is gradually filling the gaps in South Africa's scientific manpower.

Science is never static; knowledge is growing at an ever-increasing rate and the teachers of science must also be learners. The Council therefore makes grants each year to lecturers and professors in the universities to enable them to continue their research, and by so doing to maintain a fresh outlook on their subjects. In some cases these grants enable them to employ technical assistance or to purchase specialized items of equipment not normally available in university laboratories. Publication grants were made to ensure that the results of research are made generally available.

Wetenskaplike Mannekrag

Sonder opgeleide manne en vroue om die tegniese probleme wat met hulle ontwikkeling en omskepping in nuttige produkte gepaard gaan, sou Suid Afrika se rykdom aan natuurlike bronne nie ten volle benut kon word nie. In die Industrie, Nywerheidsnavorsings-inrigtings en Regeringsdepartemente is daar 'n toenemende aanvraag vir wetenskaplikes met afdoende nagraadse opleiding en een van die belangrikste take van die W.N.N.R. is om seker te maak dat aan hierdie aanvraag voldoen sal word.

Gedurende die afgelope jaar het die Raad £6,800 aan na-B.Sc.- en na-M.Sc.-beurse toegeken om te help met die opleiding van gegradueerdes in navorsingstegniese. Bowendien is die beursskema vir gespesifiseerde navorsing waarvan melding gemaak is in die *7de Jaarverslag*, voortgesit. Die skema is bedoel om jong wetenskaplikes aan te moedig om hulle te bekwaam in bepaalde rigtings wat gekies word omdat die bestaande voorraad opgeleide werkers onvoldoende is en daar geen geskikte opleidingsfasiliteite aan Suid-Afrikaanse universiteite bestaan nie. Op hierdie wyse vul die Raad geleidelik die gapings in Suid-Afrika se wetenskaplike mannekrag.

Die wetenskap staan nooit stil nie; kennis brei steeds vinniger uit en wetenskaplike dosente moet ook leerling wees. Daarom doen die Raad jaarlikse toekennings aan lektore en professore aan die Universiteite om hulle in staat te stel om hulle navorsing voort te sit en sodoende 'n fris uitkyk op hulle vakke te behou. In sommige gevalle stel hierdie toekennings hulle in staat om tegniese assistente aan te stel of gespesialiseerde toerusting aan te koop wat nie normaalweg in universiteitslaboratoriums aangetref word nie. Publikasietoekennings is gemaak om te verseker dat die navorsingsresultate algemeen toeganklik gemaak kon word. Gedurende die afgelope jaar het navorsingstoekennings aan werkers in universiteite en ander inrigtings £10,540 beloop vir mediese navorsing en £35,042 vir ander wetenskappe.

Minerale Rykdom

Die rykdom van 'n land berus grootliks op sy minerale hulpbronne. In hierdie opsig is Suid Afrika ryklik bedoel en die Raad het baie aandag gewy aan doeltreffender ontginning van hierdie minerale van die bodem.

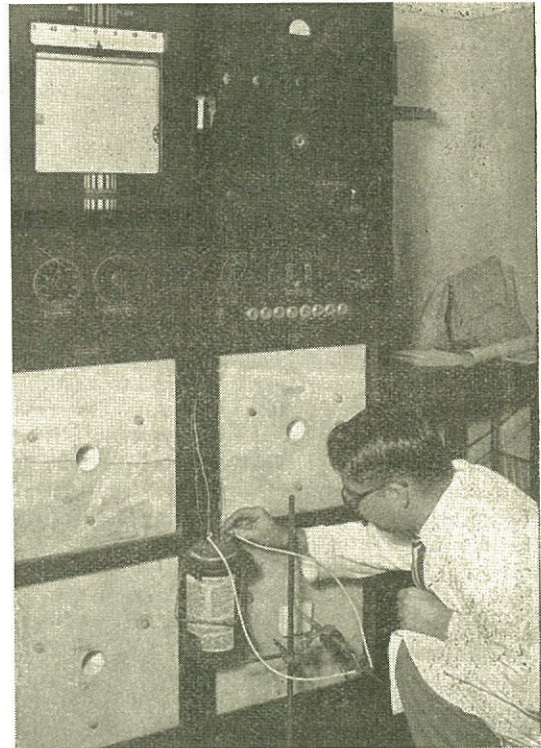
Op die oomblik staan die goudmynbedryf voor twee groot probleme—die toename in temperatuur namate die diepte toeneem en die voorkoms van rotsstortings wat meer en meer toeneem namate die myne dieper ontgin word. Die Raad se Navorsingseenheid vir Werktuigkundige Ingenieurswese is betrokke in albei hierdie probleme. 'n Klimaatskamer wat dit moontlik maak om mense onder verskillende temperatuurs- en

During the past year research awards made to workers in the universities and other institutions amounted to £10,540 for medical research and £35,042 for other sciences.

Mineral Wealth

The wealth of a country depends largely on its mineral resources. In this regard South Africa is abundantly blessed, and the Council has devoted much attention to the more efficient winning of these minerals from the earth.

At present two major problems confront the gold mining industry—the increase of temperature with increase in depth, and the incidence of pressure-bursts which also are becoming more frequent as mining goes deeper. The Council's Mechanical Engineering Research Unit is concerned in both these problems. A climatic chamber, which enables human subjects to be exercised under various conditions of temperature and humidity closely similar to those likely to be encountered underground, has been designed and will be used by the Chamber of Mines research team to find out the limit



Apparaat vir differensiële termiese ontleding wat gebruik word vir navorsing i.v.m. kleiminerale.

Apparatus for the differential thermal analysis used in research on clay minerals.

vogtigheidsstoestand wat baie na aan die ondergrondse is, te laat werk, is ontwerp en sal deur die navorsingspan van die Kamer van Mynwese gebruik word om uit te vind wat die perk van menslike uithouvermoë is wat 'n beheerende faktor in diepvlakontginning sal wees. Terselfdertyd is die Eenheid besig met navorsing na die lugreëling in myne wat uiteindelik mag lei tot doeltreffender ondergrondse verkoeling. Aansienlike vordering is gedurende die afgelope jaar gemaak t.o.v. die oplossing van die probleem van rotsstortings wat nie slegs huidige verliese aansienlik sal verminder nie maar miskien ook die effektiewe lewensduur van goudmyne met baie jare mag verleng.

In medewerking met die Geologiese Opname, het die Nasionale Chemiese Navorsingslaboratorium die ondersoek van kleinerslae van potensiele ekonomiese belang in baie dele van die Unie voortgesit. 'n Groot neerslag van attapulgit of Fullersaarde wat baie nywerheidsgebruike besit, b.v. as 'n „draer” van insekdoende bestuivingsmiddels, is op die Springbokvlakte aangetref. Werk i.v.m. 'n veelbelowende proses vir die produksie van chroom uit Suid-Afrikaanse ertse, is gedurende die jaar voortgesit.

Vervoer

Doeltreffende vervoer is 'n moderne noodsaaklikheid. Elke jaar word sowat £1,135,000 bestee aan die bou en onderhoud van die bitumineuse bolae van ons nasionale en provinsiale paaie en van die 16,300,000 gelling teer en bitumens wat vir hierdie doel gebruik word, word sowat 10,700,000 in Suid-Afrika vervaardig. Navorsing na die verbetering van die plaaslik-vervaardigde bolaagemateriaal wat deur die Navorsingseenheid vir Bitumineuse Bindstof onderneem word, is potensieel dus van groot praktiese belang. Gedurende die afgelope jaar het die Eenheid twee grootskaalse padleggingsproewe onderneem wat nuttige inligting sal verstrek waarop die ontwerp van beter paaie gebaseer kan word.

Van minder onmiddellike belang op die oomblik maar van aansienlike waarde vir die toekoms, is werk in verband met die ontwikkeling van die gasturbine wat deur die Navorsingseenheid vir Werktuigkundige Ingenieurswese onderneem word. Vir Suid-Afrika het hierdie soort masjien die dubbele voordeel dat dit nie groot hoeveelhede water verbruik soos stoomlokomotiewe nie en dat dit verder ook aangepas kan word vir die brand van steenkool waarmee Suid-Afrika ryk bedeele is. Gedurende die afgelope jaar het die Eenheid 'n toestel ontwerp bekend as 'n termo-akoestiese ossilleerder wat dit moontlik maak om vergruisde steenkool met veel groter doeltreffendheid te gebruik as in die verbrandingskamer van 'n gewone gasturbine. Die gerief van passasiers wat per trein reis, kan verhoog word deur die gebruik van nuwe soorte ventilators wat aanvaar is na toetse wat deur die Eenheid in sy windtunnel uitgevoer is.

of human endurance which will be a controlling factor in mining at deeper levels. At the same time the Unit is conducting research into mine ventilation which may eventually result in more efficient cooling underground. Considerable progress was made during the last year towards the solution of the pressure-burst problem, which will not only reduce current losses considerably but may have the result of extending the effective life of the gold mines by many years.

In co-operation with the Geological Survey the National Chemical Research Laboratory continued to examine clay deposits of potential economic importance in many parts of the Union. A large deposit of attapulgit or fullers' earth which has many industrial uses, such as a "carrier" for insecticide dusts, was found on the Springbok Flats. Work was continued during the year on a promising process for producing chromium from South African ores.

Transport

Efficient transport is a modern essential. Each year some £1,135,000 is spent on constructing and maintaining the bituminous surfacings on our national and provincial roads, and of the 16,300,000 gallons of tars and bitumens used for this purpose some 10,700,000 is produced in South Africa. The research into the improvement of these locally produced road surfacing materials undertaken by the Bituminous Binder Research Unit is therefore potentially of considerable practical importance. During the past year this unit has conducted two large-scale road-laying experiments which will provide useful information on which the design of better roads can be based.

Of less immediate interest, but of considerable future importance, is work being undertaken by the Mechanical Engineering Research Unit on the development of the gas turbine. For South Africa this type of machine has the double advantage that it does not consume large quantities of water as do steam engines and it can be adapted to burn coal of which we have ample supplies. During the past year the Unit has invented a device known as a thermo-acoustic oscillator which makes it possible to use pulverised coal much more efficiently than in the combustion chamber of a gas turbine of conventional design.

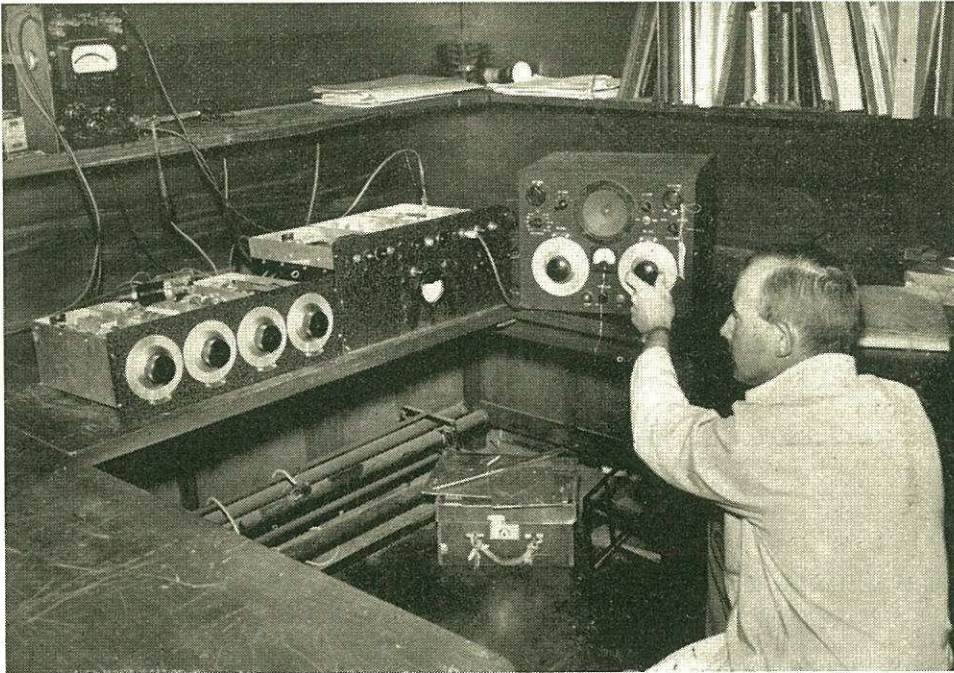
The comfort of railway passengers may be improved by the use of new types of coach ventilators selected after tests by the Unit in its wind tunnel.

Kommunikasie-middele

Kommunikasie-middele in die moderne wêreld vertoon 'n toenemende neiging om op die radio te steun. Die Telekommunikasie-navorsingslaboratorium van die W.N.N.R. het 'n nuwe soort kristalbeheerde ontvang-toestel ontwerp wat 'n groot verbetering is op die bestaande apparaat. Gedurende die afgelope jaar het die Laboratorium die beginsel van kristalbeheer uitgebrei tot 'n frekwensieopwekker wat 'n besonder noukeurige beheer van radiosenders moontlik maak. Opwekkers van hierdie ontwerp is met groot sukses deur die Postkantoor gebruik en is ook van belang vir die Suid-Afrikaanse Uitsaai-korporasie en die Afdeling Burgerlike Lugvaart.

Communications

Communications in the modern world tend more and more to rely on radio. The C.S.I.R.'S. Telecommunications Research Laboratory has developed a new type of crystal-controlled receiver which is a considerable advance on anything in existence. During the past year the Laboratory has extended the principle of crystal control to a frequency generator which makes possible the very accurate control of radio transmitters. Generators of this design have been used with considerable success by the Post Office, and are also of importance to the South African Broadcasting Corporation and the Department of Civil Aviation.



'n Kristalbeheerde frekwensieopwekker wat deur die Telekommunikasie Navorsingslaboratorium ontwikkel is vir gebruik by radiosenders.

A crystal-controlled precision frequency generator invented by the Telecommunications Research Laboratory for use with radio transmitters.

Die Laboratorium handhaaf 'n maandelikse radio-frekwensie en voorspellingsdiens wat die owerhede verantwoordelik vir radioverbindinge, die uitsaaidienste en lugvaartowerhede in staat stel om die beste golflengtes te bepaal vir 'n radio-uitsending op 'n bepaalde tyd. Gedurende die afgelope jaar was die Laboratorium besig met 'n opname van die aardkonstantes wat die beweging van radiogolwe beïnvloed oor die hele Unie en Suidwes-Afrika. Die opname sal aansienlik bydra tot die daarstelling van gekoördineerde uitsaaidienste

The Laboratory maintains a monthly radio frequency prediction service which helps the authorities responsible for radio communications, the broadcasting services, and aviation authorities to decide on the best wavelengths to use for radio transmission at a particular time. During the past year it was engaged in a survey covering the whole of the Union of South Africa and South West Africa of the ground constants which affect the travel of radio waves. This survey will aid considerably in setting up co-ordinated broadcasting systems to

wat nie alleen 'n beter ontvangs vir burgerlike uitsending sal waarborg nie maar ook van groter hulp sal wees vir die lugvaart.

Direkte Dienste aan die Nywerheid en die Regering

Dit is in hierdie verband dat die W.N.N.R. miskien die meeste kan doen om die volk van diens te wees. In 'n nuut-geïndustrialiseerde land soos die Unie van Suid-Afrika, is navorsing op 'n doeltreffende skaal gewoonlik bokant die vermoë van individuele firmas aangesien dit fynafgewerkte en dikwels duur toerusting vereis sowel as die dienste van hoog-opgeleide wetenskaplikes. Hierdie fasiliteite is egter beskikbaar in die laboratoriums van die W.N.N.R. en word gebruik vir die oplossing van probleme waarmee die Nywerheid sowel as Regeringsdepartemente te kampe het.

Die werksaamhede van die laboratoriums raak byna elke aspek van nywerheidsproduksie. Gedurende die afgelope jaar het hulle meer as 1,000 navrae om wetenskaplike en tegniese inligting en raad behandel. Die tydperk is gekenmerk deur die toenemende hoeveelheid ondersoekingswerk wat onder kontrak gedoen is en die verhoogde gebruik van ander dienste soos die yking van wetenskaplike instrumente. Die toenemende bedrae wat jaarliks aan die W.N.N.R. toegeken word vir ondersteunde navorsing in die vorm van beurse, toelae en ondersoeke onder kontrak sowel as vir tegniese dienste wat deur die laboratoriums onderneem word, lewer afdoende bewys hiervan :

1946/47	£3,880
1947/48	£14,230
1948/49	£20,628
1949/50	£24,920
1950/51	£27,690
1951/52	£48,179
1952/53	£73,479

Hierdie enkele voorbeelde toon hoedat die werksaamhede van die Wetenskaplike en Nywerheidsnavorsingsraad die lewens van die Suid-Afrikaanse volk verryk. 'n Deel van die werk wat tans gedoen word, sal 'n byna onmiddellike invloed op ons daaglikse lewe hê; baie daarvan sal egter eers oor baie jare vrugte afwerp en 'n klein deel daarvan sal waarskynlik niks meer doen as om ons kennis te verryk nie.

In die stukke wat volg, word vollediger verslae deur elk van die nasionale laboratoriums en die ander afdelings van die Raad gegee.

give better reception, not only for entertainment broadcasting, but also for navigational aids to aviation.

Direct Services to Industry and Government

It is here that the C.S.I.R. can perhaps do most to serve the nation. In a newly industrialized country like the Union of South Africa, research on a worthwhile scale, needing elaborate and often expensive equipment and the services of highly trained scientists, is generally beyond the means of individual firms. These facilities, however, are available in the C.S.I.R.'s laboratories and are used for the solution of the problems encountered by both industry and Government departments.

The activities of these laboratories have touched on almost every aspect of industrial production. During the past year they dealt with over 1,000 enquiries for scientific and technical information and advice. The period was marked by the increasing amount of investigational work done on contract and the increased use of other services such as the calibration of scientific instruments. This is well illustrated by the increasing amounts subscribed annually to the C.S.I.R. for sponsored research in the form of fellowships, grants-in-aid and contract investigations, and for technical services undertaken by the laboratories :

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These few examples illustrate how the activities of the Council for Scientific and Industrial Research are enriching the lives of the people of South Africa. Some of the work now being done will have an almost immediate effect on our daily lives, much of it will not bear fruit for many years to come, and a little will perhaps do no more than extend the bounds of knowledge.

In the sections which follow detailed reports are given by each of the national laboratories and the Council's other divisions.

Die Bouprogram

Opeenhoping in die huidige huisvesting van die W.N.N.R. het nou 'n akute stadium bereik. Dit is dus verblydend om aan te kondig dat aansienlike vordering met die geboue op die nuwe perseel, sewe myl oos van Pretoria gedurende die afgelope jaar gemaak is. Die windtonnel was dwarsdeur hierdie tydperk in volle gebruik en aanliggende geboue het huisvesting verskaf aan die Navorsingseenheid vir Werktuigkundige Ingenieurswese.



Die President en Vice-President met 'n model van die rangskikking van geboue op die nuwe terrein van die W.N.N.R.

The President and Vice-President with a model of the arrangement of buildings on the C.S.I.R.'s new site.

Die siklotronsaal is voltooi en 'n begin is gemaak met die installering van die swaarder dele van die siklotron self. Die kernfisikagebou maak goeie vordering en behoort gereed te wees teen die einde van 1954.

Die eerste groot gebou, die een vir die Nasionale Bounavorsingsinstituut, is nou goed op pad en behoort April, 1954 klaar te wees.

Die gebou vir die huisvesting van die Afdeling Akoestiek van die N.F.L. het aan die einde van die tydperk onder bespreking 'n aanvang geneem en tenders sal vroeg in 1954 gevra word vir die biofisikagebou en die hoofgebou van die Nasionale Fisiese Laboratorium.

Planne vir die Hoofkantooradministrasie- en Biblioteekgeboue is tans onder bespreking en daar word gehoop om gedurende 1954 met die bou daarvan te begin.

The Building Programme

Congestion in the present accommodation of the C.S.I.R. has now reached the acute stage, so that it is gratifying to record that considerable progress has been made during the past year in connection with the building programme on the new site seven miles east of Pretoria. The wind tunnel has been in full use throughout the period and adjacent buildings have provided accommodation for the Mechanical Engineering Research Unit.

The cyclotron hall has been completed and a start has been made with the installation of the heavier parts of the cyclotron itself. The nuclear physics building is making good progress and should be ready for occupation towards the middle of 1954.

The first of the major buildings, that for the National Building Research Institute is now well on the way and should be completed in April, 1954.

The building to house the Acoustics Section of the N.P.L. was commenced at the end of the period under review and tenders for the biophysics building and the main National Physical Laboratory building will be invited early in 1954.

Plans for the Headquarters Administration, Library and Central Workshops buildings are at present under discussion and it is hoped that it will be possible to commence building during 1954.

Skakelafdeling

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

Oorsese Kantore

Die werksaamhede van die Skakelafdeling in Pretoria, is geïntegreer met dié van die Wetenskaplike Skakelkantore in Londen en Washington deur die uitruiling van beamptes tussen hierdie afdelings. Daar is op die oomblik beamptes in Londen en Washington met verskeie jare van skakelondervinding in Pretoria terwyl daar drie beamptes in Pretoria is met ondervinding van die oorsese kantore. Baie nut word getrek uit hierdie uitruilings en die kantoor in Pretoria ondersoek tans wyse waardeur die dienste van oorsese beamptes makliker toeganklik gemaak kan word vir Suid-Afrikaanse wetenskaplikes en tegnoloë.

Internasionale Wetenskaplike Unies

Suid-Afrikaanse nasionale korrespondente is aangestel vir verskeie van die internasionale wetenskaplike unies en hulle samestellende verenigings. Die eerste vergadering van die Nasionale Komitee van die Internasionale Sterrekundige Unie is op 17 Junie 1953 in die Raadsaal van die W.N.N.R. gehou.

NYWERHEIDSKAKEL

Die vertrek van dr. R. G. Shuttleworth om die Washingtonse kantoor oor te neem en dié van mnr. A. M. Schady om by die personeel van die Londense kantoor aan te sluit en hulle vervanging deur mnr. T. F. W. Harris (teruggekeer van die Londense kantoor in November 1952) en mnr. G. C. Hide (aangestel by die Skakelafdeling in Oktober 1952), het gelei tot 'n tydelike periode van heraanpassing in die afdeling wat aan die Nasionale Chemiese Navorsingslaboratorium verbonde is. Mnr. Hide het die probleem van swawelproduksie in hersiening geneem terwyl mnr. Harris besig is om inligting in te samel aangaande nywerheidsmikrobiologie.

Hierdie afdeling word voortdurend besiggehou met navrae wat wissel van onbenullighede tot sake wat besoeke aan fabriëke vereis en kontrakte meebring. Navrae wat ondergeskikte *ad hoc* ondersoeke vereis, neem steeds toe.

Mnr. G. B. M. Ballot, 'n werktuigkundige ingenieur, is in April by die Nasionale Fisiese Laboratorium aangestel.

Industriële Navorsingsinstitute

Die jaarlikse, gekombineerde vergadering van die direkteure van die industriële navorsingsinstitute en die W.N.N.R.-laboratoria, is op 31 Julie 1953 gehou.

Liaison Division

Head of Division: MR. D. G. KINGWILL

Overseas Offices

The activities of the Liaison Division, Pretoria, have been integrated with those of the Scientific Liaison Offices in London and Washington. Through the exchange of officers between these sections, there are now officers in London and Washington with several years' liaison experience in Pretoria and three officers in Pretoria with experience in the offices overseas. Much has been gained by these exchanges and the Pretoria office is exploring means of making the services of the offices overseas more readily available to South African scientists and technologists.

International Scientific Unions

South African national correspondents have been appointed for several of the international scientific unions and their constituent associations. The first meeting of the National Committee of the International Astronomical Union was held in the C.S.I.R. Board Room on June 17th, 1953.

INDUSTRIAL LIAISON

The departure of Dr. R. G. Shuttleworth to take over the Washington Office and of Mr. A. M. Schady to join the staff of the London Office and their replacement by Mr. T. F. W. Harris (returned from the London Office in November, 1952) and Mr. G. C. Hide (appointed to the Liaison Division in October, 1952) resulted in a temporary period of re-adjustment in the section attached to the National Chemical Research Laboratory. Mr. Hide has been reviewing the question of sulphur production and Mr. Harris is collecting information on industrial microbiology.

This section is fully occupied in dealing with inquiries ranging from minor matters to those which necessitate visits to factories and lead to contracts. Inquiries which require minor *ad hoc* investigations are increasing.

Mr. G. B. M. Ballot, a mechanical engineer, was appointed in April on attachment to the National Physical Laboratory.

Industrial Research Institutes

The annual combined meeting of directors of industrial research institutes and directors of C.S.I.R. laboratories was held on July 31st, 1953.



Mnr. S. Stephenson, Voorsitter van die Natalse Streeksnavorsingskomitee van die W.N.N.R.

Mr. S. Stephenson, Chairman of the C.S.I.R. Natal Regional Research Committee.

Voorstelle vir koöperatiewe navorsing is met die verteenwoordigers van verskeie nywerhede bespreek. Die W.N.N.R. het sy bereidwilligheid te kenne gegee om operasionele navorsing onder 'n navorsingsvereniging te ondersteun en het die saak met die Navorsingskomitee van die Gefedereerde Kamer van Nywerhede bespreek.

Die Hoof van die Afdeling het die Raad verteenwoordig op vergaderings van die beheerrade en navorsingsadvieskomitees van verskillende navorsingsinstitute.

Streeksnavorsingskomitee

Die Middellandse Streeksnavorsingskomitee het begin met 'n skema om die aandag van die individu te vestig op publikasies wat in *W.N.N.R. Inligting* verskyn en het steeds gesorg dat die Skadelafdeling in noue aanraking met nywerheidsontwikkelings in die Kaapse Middellande bly.

Drie vergaderings van die Natalse Streeksnavorsingskomitee is onder voorsitterskap van mnr. S. Stephenson gehou en die komitee het aanbeveel dat die W.N.N.R. 'n streekskakeelbeampte vir Natal aanstel. Die mening van die komitee is dat baie voordele wat moontlik kon voortgespruit het uit toesprake deur senior W.N.N.R.-

Proposals for co-operative research have been discussed with representatives of several industries.

The C.S.I.R. has announced its willingness to support operational research under the research association scheme and this has been discussed with the Research Committee of the Federated Chamber of Industries.

The Head of the Division has represented the Council at meetings of the boards of control and research advisory committees of the various research institutes.

Regional Committees

The Midland Regional Research Committee has initiated a scheme of drawing the attention of individuals to publications listed in *C.S.I.R. Information* and has at all times kept the Liaison Division in close touch with industrial developments in the Cape Midlands.

Three meetings of the Natal Regional Research Committee have been held under the chairmanship of Mr. S. Stephenson, and the committee recommended that the C.S.I.R. should appoint a regional liaison officer to Natal. Its view is that many of the benefits which may have resulted from addresses by senior



Mr. H. Schauder, Chairman of the C.S.I.R. Midland Regional Research Committee.

Mnr. H. Schauder, Voorsitter van die Middellandse Streeksnavorsingskomitee van die W.N.N.R.

personcellede, verlore gegaan het weens gebrek aan genoegsame benutting. Die Raad het toegestem om 'n Skakelbeampte vir 'n proeftydperk van een maand na Durban te stuur.

Vrystelling van Inkomstebelasting

Daar was minder aansoeke om besoeke aan fabrieke en geen besonder moeilike gevalle het voorgekom nie.

PATENTE

Gedurende hierdie tydperk is twee volledige patent-spesifikasies in die Unie ingevul en in elke geval is ooreenstemmende aansoeke in 'n aantal oorsese lande gedoen. Hierby is tien uitvindings wat deur beamptes van die Raad gedoen is sowel as 'n uitvinding deur die houer van 'n W.N.N.R.-navorsingsbeurs deur voorlopige patent aansoeke gedek. Die meeste van die Raad se voorlopige spesifikasies is deur die Nasionale Korporasie vir Navorsingsontwikkeling in Groot-Brittanje en die Kanadese Patente en Ontwikkeling Beperk getakseer. Die Raad is baie dank verskuldig aan hierdie organisasies vir hulle raad en bystand.

Verskeie van die gepatenteerde uitvindings of prosesse is nou gereed vir eksplorasie en pogings word aangewend om hulle aan nywerheidsondernemings te lisensieër.

OPENBARE INLIGTING

Navorsingsoorsig

Afgesien van 'n gekleurde buiteblad en illustrasies, bly die publikasiebeleid onveranderd.

Keur van Wetenskaplike Nuus

Gedurende Junie het die Skakelafdeling begin met 'n weeklikse publikasie van opsommings van die meer interessante wetenskaplike en tegniese persverklarings van oorsee, wetenskaplike nuusverslae ens., wat van die skakelkantore in Londen en Washington ontvang word. Hierdie stof gee 'n aanduiding van die navorsing en ontwikkeling wat tans oorsee onderneem word en van moontlike bronne van wetenskaplike inligting. Die hoofdoel is om hierdie stof onder die aandag van soveel mense as moontlik te bring en daarom word dit hoofsaaklik aan inrigtings versprei sowel as aan koerante sn tydskrifte vir herpublikasie. Dit is nie beskikbaar vir gereelde verspreiding aan die individuele wetenskaplike nie.

Persskakel

Verhouding met die Pers is steeds op besonder goeie voet. Gemiddeld twee nuusverhale word elke maand deur bemiddeling van John T. Baird and Associates vrygestel en hierdie reëling lewer steeds bevredigende resultate. Talryke navrae van die Pers word direk deur die Skakelafdeling hanteer.

C.S.I.R. staff have been lost through the lack of adequate follow-up. The Council agreed to send a liaison officer to Durban for an experimental period of one month.

Remission of Income Tax

There have been fewer applications requiring visits to factories and no cases of special difficulty have arisen.

PATENTS

During this period two complete patent specifications were filed in the Union and in each case corresponding applications made in a number of overseas countries. In addition ten inventions made by officers of the Council and an invention made by the holder of a C.S.I.R. research bursary have been covered with provisional patent applications. Most of the Council's provisional specifications have been appraised by the National Research Development Corporation in Great Britain and Canadian Patents and Development Limited. The Council is most indebted to these organisations for the advice and assistance which they have given.

Several of the patented inventions or processes are now ready to be exploited and efforts are being made to negotiate licences with industrial undertakings.

PUBLIC INFORMATION

Research Review

Apart from adopting a coloured cover and including illustrations, publication policy remains unaltered.

Science News Selections

During June the Liaison Division commenced the weekly publication of summaries of the more interesting overseas scientific and technical press releases, science news reports, etc., received from the liaison offices in London and Washington. This material provides an indication of the research and development currently being undertaken overseas, and of possible sources of scientific information. The primary aim is to bring this material to the attention of as wide a public as possible and it is therefore distributed mainly to institutions and to newspapers and journals for republication. It is not available for regular distribution to the individual scientist.

Press Liaison

Relations with the Press continue to be most cordial. On the average, about two news articles are released each month through the agency of John T. Baird and Associates and this arrangement continues to give satisfactory results. Numerous inquiries from the Press are dealt with directly by the Liaison Division.

Tentoonstellings

Die W.N.N.R. het verantwoordelikheid aanvaar vir die Wetenskapslokaal in die Suid-Afrikaanse Pawiljoen tydens die Rhodes Eeufoes-tentoonstelling in Bulawayo. Die tema is uitgewerk in samewerking met dr. H. B. S. Cooke wat die organisasie van die uitstalling in die fynste besonderhede onderneem het. Met genoeë spreek die Raad sy dank uit aan dr. Cooke en mnr. Hughes van die Departement Anatomie aan die Universiteit van Witwatersrand vir 'n besonder indrukwekkende uitstalling en aan die ander wat stof en artikels op ander maniere bygedra het.

Algemeen

Omvattende artikels oor die W.N.N.R. is voorberei vir die *South African/American Survey* wat jaarliks deur die Suid-Afrikaanse Persattaché in Washington uitgegee word, asook vir die Stad van Pretoria Eeufoes-brosjyre wat aanstaande Oktober sal verskyn. Inligting oor die W.N.N.R. en sy samestellende organisasies is aan C.S.A. verskaf wat besig is met die opstel van 'n *Directory of Research Institutions in Africa*.

WETENSKAPLIKE SKAKELKANTOOR, WASHINGTON

Personeel

Na 'n tydperk van vier jaar as Hoof van die Kantoor het mnr. D. R. Masson gedurende November 1952 uit Washington na Suid-Afrika teruggekeer. Hy is opgevolg deur dr. R. G. Shuttleworth wat in Januarie 1953 in Washington aangekom het. Intussen was mej. J. Kennard in bevel van die kantoor bygestaan wanneer nodig deur beamptes en personeel van die ander eenhede wat deel uitmaak van die Wetenskaplike Kantoor van die Britse Gemenebes maar veral deur die Kanadese Wetenskaplike Skakelkantoor. Met genoeë betuig die Raad sy dank aan die Kanadese Nasionale Navorsingsraad.

Voor sy vertrek na Amerika, het dr. Shuttleworth die geleentheid gehad om 'n besoek te bring aan al die Navorsingsinrigtings en Eenhede met inbegrip van dié wat buite die kring van die W.N.N.R. lê, verskeie Regerings- en semi-Regeringsorganisasies en die Universiteite.

Betrekking met B.C.S.O. en Ambassade

Die Suid-Afrikaanse Skakelkantoor vorm 'n eenheid van die Wetenskaplike Kantoor van die Britse Gemenebes in samewerking met die Wetenskaplike Skakelkantore van Kanada, Australië, Nieu-Seeland en die Verenigde Koninkryk wat almal saam gehuisves is in die Bradfordgebou, K Straat 1800, N.W., Washington, D.C. Hierdie

Exhibitions

C.S.I.R. accepted responsibility for the Hall of Science in the South African Pavilion at the Rhodes Centenary Exhibition, Bulawayo. The theme was worked out in consultation with Dr. H. B. S. Cooke, who undertook detailed organization of the exhibit. The Council has pleasure in recording its thanks to Dr. Cooke and to Mr. A. R. Hughes of the Department of Anatomy, University of the Witwatersrand, for staging a most effective display and to those who contributed materials or assisted in other ways.

General

Comprehensive articles on the C.S.I.R. were prepared for the *South African/American Survey*, published annually by the S.A. Press Attaché in Washington, and for the *City of Pretoria Centenary Brochure*, to be published next October. Information on the C.S.I.R. and its constituent organizations was provided for C.S.A. which is preparing a *Directory of Research Institutions in Africa*.

SCIENTIFIC LIAISON OFFICE, WASHINGTON

Staff

After a period of four years as Head of the Office, Mr. D. R. Masson, left Washington on his return to South Africa during November, 1952, and was replaced by Dr. R. G. Shuttleworth, who arrived in Washington in January, 1953. In the interim the office was in the charge of Miss J. Kennard with assistance, when required, from officers and staff of the other constituent units of the British Commonwealth Scientific Office, but particularly from the Canadian Scientific Liaison Office. It is a pleasure to record the Council's thanks to the Canadian National Research Council.

Before his departure to America, Dr. Shuttleworth was given the opportunity of visiting all Research Institutes and Units, including those outside the C.S.I.R. orbit, various Government and semi-Government organisations, and the Universities.

Relationship with B.C.S.O. and Embassy

The South African Scientific Liaison Office forms one unit of the British Commonwealth Scientific Office in concert with the Canadian, Australian, New Zealand and United Kingdom Scientific Liaison Offices, all of which are housed together in the Bradford Building, 1800 K Street, N.W., Washington, D.C. This associa-



Die Bradfordgebou in Washington D.C. waar die S.A. Wetenskaplike Skakelkantoor gehuisves is.

The Bradford Building in Washington D.C. where the S.A. Scientific Liaison Office is housed.

vereniging is besonder nuttig in die sin dat die Suid-Afrikaanse kantoor 'n beroep kan doen op die ondersteuning van die ander gesantskappe vir die aanknoop van kontakte of om inligting in te win in antwoord op spesifieke of algemene navrae uit Suid-Afrika. Verslae deur beamptes van enige van die Gesantskappe wat van algemene belang mag wees, word as verslae van die Wetenskaplike Kantoor van die Britse Gemenebes gepubliseer en as sulks na alle lande wat lede is, gestuur.

Die betrekking tussen die Suid-Afrikaanse Wetenskaplike Kantoor en die Suid-Afrikaanse Ambassade verskil nie wesenlik van dié wat tussen ander gesantskappe van die Wetenskaplike Kantoor van die Britse Gemenebes en hulle onderskeie Ambassades bestaan nie: hoofde van Gesantskappe is amptelik verbind aan hulle Ambassades as wetenskaplike attachés, 'n reëling wat van wedersydse voordeel is vir die diplomatieke en wetenskaplike verteenwoordigers van die betrokke Gemenebesregerings. Die Suid-Afrikaanse Wetenskaplike Skakelkantoor is daagliks in verbinding met die Ambassade wat navrae sowel as tegniese personeel, veral dié van Regeringsdepartemente, na die kantoor aanstuur waar volle verantwoordelikheid vir hulle en hulle reëlings aanvaar word.

Deur bemiddeling van die Ambassade, ontvang die Wetenskaplike Attaché magtiging van die Atoomkragkommissie van die Verenigde State vir die aankoop van radio-isotope en die versending daarvan na Suid-Afrika.

tion is extremely useful in that the South African office can call on the assistance of the other missions in making contacts, or in obtaining information relative to specific or general enquiries from South Africa. Reports by officers of any one mission which may have general value are produced as B.C.S.O. reports, and as such are forwarded to all constituent countries.

The relationship existing between the South African Scientific Liaison Office and the South African Embassy does not differ in any essential respect from that existing between other constituent missions of B.C.S.O. and their respective Embassies: heads of Missions are officially attached to their Embassies as scientific attachés an arrangement which is mutually beneficial to the diplomatic and scientific representatives of the Commonwealth governments concerned. The South African Scientific Liaison Office is in daily contact with the Embassy, which passes enquiries as well as technical personnel, particularly those from Government Departments, on to the office, which then takes over major responsibility for them and their arrangements.

Through the Embassy the Scientific Attaché is accredited to the United States Atomic Energy Commission for the obtaining and transmitting of radio-isotopes to South Africa.

Dokumente

Afgesien van die feit dat voldoen word aan versoeke om mikrofilms, fotostasiese kopieë en dokumente, word die Biblioteek en Inligtingsdiens van 'n aantal gereelde en ongereelde publikasies voorsien namate hulle verskyn.

'n Aantal nuttige reëlings is getref vir die uitruil van dokumente. Melding kan veral gemaak word van die ooreenkoms tussen die Biblioteek van die Mynburo van die Verenigde State en die Biblioteek van die W.N.N.R. Ander roetine-uitruilings is gereël tussen die Verfnwywerheidsnavorsingsinstituut en die National Paint, Varnish and Lacquer Association van die Verenigde State, die Telekommunikasie-navorsingslaboratorium met die Central Radio Propagation Laboratory van die Nasionale Buro vir Standaarde en die Kantoor vir Vlootnavorsing in verband met ionosferiese werk wat onder kontrak by Stanford Universiteit gedoen word. Die Nasionale Instituut vir Personeelnavorsing gaan insgelyks publikasies uitruil met die Human Resources Centres van die Lugmag van die Verenigde State.

Konferensies, Besoeke en Algemene Skakel

Sowat drie-honderd of meer belangrike wetenskaplike konferensies vind elke jaar in die Verenigde State en Kanada plaas. Die funksies van die kantoor sluit in die verkryging en aanstuur van konferensieprogramme, proewe, uittreksels van verrigtinge en ander nuttige inligting. Bywoning van sommige van die konferensies mag lei tot die verkry van inligting 'n jaar of meer voordat dit gepubliseer word, indien dit wel gepubliseer word.

Twee konferensies oor die opruiming van nywerheidsafval is bygewoon en aansoek is gedoen om programme in die geval van ongeveer honderd of meer konferensies van maontlike belang. Spesiale reëlings is in sommige gevalle getref vir die ontvangs van uittreksels, proewe of verrigtinge, terwyl afskrifte van gelewerde verhandelings van die betrokke verenigings of skrywers verkry is in antwoord op versoeke uit Suid-Afrika.

Behalwe 'n reeks besoeke aan navorsings- en verwante organisasies in en om Washington in verband met navrae of vir die aanknoop van waardevolle kontakte, is besoeke gebring aan 'n aantal organisasies in New York. 'n Besoek van sowat 10 dae is aan Kanada gebring om 'n idee te kry van die Kanadese Navorsingsfront oor die algemeen en om in die besonder te let op dinge soos navorsing i.s. melkuitvloei, kalibrering van maatlyne, voedselnavorsing, rotsstortings in mynnavorsing ens.

Besondere aandag is gewy aan watersuiwering en verwante navorsing asook aan voedselnavorsing. In verband met laasgenoemde word reëlings getref om inligting aan Suid-Afrika te verskaf wat afkomstig is

Documents

Apart from fulfilling requests for microfilms, photo-stats and documents, the Office provides the Library and Information Division with a number of regular and irregular publications as they become available.

A number of useful exchange arrangements for documents has been made; worthy of mention is that concluded between the United States Bureau of Mines Library and the C.S.I.R. Library. Other routine exchanges have been arranged between the Paint Industries Research Institute and the U.S. National Paint, Varnish and Lacquer Association, the Telecommunications Research Laboratory with the Central Radio Propagation Laboratory of the National Bureau of Standards and the Office of Naval Research in respect of ionospheric contract work being done at Stanford University. The National Institute for Personnel Research is likewise to exchange publications with the Human Resources Centres of the United States Air Force.

Conferences, Visits and General Liaison

Some three hundred or more major scientific conferences take place in the United States and Canada every year. Among the useful functions which the Office can perform is to obtain and forward conference programmes, preprints, abstracts or proceedings, and other useful information. Attendance at some of these conferences may result in important information going forward up to a year or more before it is published, if at all.

Two conferences on industrial waste disposal were attended, and programmes have been called for in the case of some hundred or more conferences of possible interest. Special arrangements were made in some cases for the receipt of abstracts, preprints or proceedings, while in others copies of papers delivered have been obtained from the societies or from the authors in response to requests from South Africa.

Apart from a series of visits to research and related organisations in and around Washington in connection with enquiries or for the establishment of valuable contacts, visits have been paid to a number of organisations in New York. A visit covering about ten days was paid to Canada for the purpose of surveying the Canadian research scene in general, and in connection with specific matters such as milk effluent research, calibration of measuring tapes, food research, rock-bursts in mines research, and so on.

Special attention has been given to water treatment and related research and to food research. In connection with the latter, arrangements are in train which should make available to South Africa much information

van 'n beampte van die Verenigde Koninkryk wat in Amerika gestasioneer is, om verslag te doen slegs oor die ontwikkelings op hierdie gebied.

Stappe is gedoen om skakel of direkte kontak tussen verskeie laboratoriums en individue en hulle ooreenstemmende beamptes in Amerika te bewerkstellig. Hiervolgens is die Eenheid vir Toegepaste Fisiologie van die Transvaalse Kamer van Mynwese op die adreslyste van etlike Amerikaanse organisasies geplaas en die Afdeling Nywerheidsdiamante van die Verenigde State se Mynburo is ingelig aangaande die Diamantnavorsingslaboratorium, tussen wie 'n hegte skakeling aan die ontwikkel is. Laasgenoemde organisasies is twee van etlike nie-W.N.N.R. organisasies wat hulp ontvang het van die kantoor.

Navrae

Die groter gebruik wat die W.N.N.R. en ander organisasies van die Kantoor maak, kan miskien afgelei word uit die feit dat die aantal spesifieke navrae wat gedurende die afgelope ses maande gehanteer is, sowat 150 beloop het. Deur die beantwoording van navrae sowel as deur die verskaffing van ongevraagde inligting, is so te sê elke afdeling van die W.N.N.R., sy Laboratoriums en Eenhede (met inbegrip van die Mediese Navorsings-eenhede), Navorsingsinstitute ens. bedien; sommige in meer as een opsig. Organisasies buite die sfeer van die W.N.N.R. wat ook bedien is, sluit in die Navorsingslaboratoriums van die Kamer van Mynwese, die Diamantnavorsingslaboratorium, verskeie universiteite, die Bernard Price-instituut, Departement van Handel en Nywerheid, Departement van Gesondheid, Korporasie vir Nywerheidsontwikkeling, Klipfontein Organic Products, Suikerproefstasie, Suid-Afrikaanse Spoorweë, Wattelnavorsingsinstituut en die Korporasie vir Fosfaatontwikkeling.

Besoekende Wetenskaplikes

Aan agt besoekers uit Suid-Afrika is in 'n groter of kleiner mate hulp verleen in verband met hulle besoeke aan die V.S.A. en Kanada.

WETENSKAPLIKE SKAKELKANTOOR, LONDEN

Die werksaamhede van die Wetenskaplike Skakelkantoor kan in twee groot afdelings verdeel word: roetinedienste, administratiewe en verteenwoordigende pligte aan die een kant en wetenskaplike inligting en ondersoek aan die ander. Hoewel die eerste nie onbelangrik is nie, is dit tog eintlik die tweede groep wat die hoofdoel van die kantoor uitmaak, ten spyte van 'n tekort aan personeel weens verskuiwing.

Ten einde die beste gebruik te maak van die tyd wat beskikbaar is vir inligtingsdoeleindes moet twee

collected by a United Kingdom officer stationed in America to report on developments in this field only.

Steps have been taken to establish liaison or direct contact between several laboratories and individuals and their opposite numbers in America. Thus the Applied Physiology Unit of the Transvaal Chamber of Mines has been placed on the mailing lists of a number of organisations in America, and the Industrial Diamonds Section of the U.S. Bureau of Mines has been advised concerning the Diamond Research Laboratory and close liaison is developing. The latter organisations are two of several non-C.S.I.R. organisations which have been assisted by the office.

Enquiries

The greater use which the C.S.I.R. and other organisations are making of the Office can perhaps be gauged from the fact that the number of specific enquiries handled during the past six months has been about 150. In answering enquiries as well as in forwarding unsolicited information, almost every section of the C.S.I.R., its Laboratories and Units (including Medical Research Units), Research Institutes, etc., have been served, some in many instances. Organisations falling outside the C.S.I.R. orbit which have been served include the Chamber of Mines Research Laboratories, the Diamond Research Laboratory, various universities, Bernard Price Institute, Department of Commerce and Industries, Department of Health, Industrial Development Corporation, Messrs. Klipfontein Organic Products, Sugar Experiment Station, South African Railways, Wattle Research Institute and the Phosphate Development Corporation.

Visiting Scientists

Eight visitors from South Africa have been helped to a greater or lesser extent in connection with their visits to the U.S.A. and Canada.

SCIENTIFIC LIAISON OFFICE, LONDON

The activities of the Scientific Liaison Office can be divided into two main groups: routine services, administrative and representational duties on one side, and in the second group scientific intelligence and investigation. Whilst the first is not unimportant, it is the second group which constitutes the essential purpose of the office. In spite of a shortage of staff due to transfers, the office can look back on a year of fruitful activity.

To utilise the time available for intelligence activities to the best advantage, two essential factors are the

belangrike faktore in aanmerking geneem word nl. die doeltreffende verspreiding van inligting afkomstig van die kantoor en 'n hegte skakel tussen die kantoor en navorsingswerksaamhede in Suid-Afrika. Daar is nou grotendeels voldoen aan die twee vereistes hoofsaaklik as gevolg van twee nuwe faktore. Eerstens het die Skakelafdeling nou die stadium bereik waar 'n groot gedeelte van sy personeel ondervinding het van oorsese sowel as van nywerheidskakeltoestande in Suid-Afrika.

Dit het gelei tot 'n beter begrip van en die oplossing van baie probleme van die oorsese skakelkantore. In die tweede instansie is die kantoor tans veel hegte aan die struktuur en werksaamhede van die Skakelafdeling as geheel verbind. Sonder die voortdurende bewustheid van die ontwikkelings en huidige behoeftes in Suid-Afrika, is dit moeilik om die werksaamhede van die kantoor in die kanale te stuur waar skakel die nodige is en waar dit van die grootste nut kan wees. Van belang in hierdie verband is ook die groeiende aantal wetenskaplike organisasies in Suid-Afrika afgesien van die W.N.N.R., wat gebruik maak van die fasiliteite wat deur die kantoor aangebied word vir die verkryging van inligting of vir hulp aan beamptes op besoeke oorsese. As gevolg van hierdie ontwikkelings word gehoop dat dit in die toekoms moontlik sal wees om nog groter klem te laat val op wetenskaplike inligtingen ondersoek.

Navrae wat gedurende die jaar ontvang is, het gewissel van versoeke om spesifieke items van inligting tot wye opnames wat die hele Wes-Europa ingesluit het. Ongeveer vyftig sulke versoeke is gehanteer. Die kantoor het ook op eie houtjie 'n aantal ondersoeke onderneem en 16 skakelverslae is uitgebring.

Ander dienste wat deur die kantoor gelewer is sluit in die onderhoud van 'n klein biblioteek van wetenskaplike rolprente vir verspreiding in die Verenigde Koninkryk; die verteenwoordiging van Suid-Afrika op 'n aantal Komitees en Konferensies en fotokopieringsdienste vir die Afdeling Biblioteek en Inligting; ongeveer 140 sulke versoeke om artikels uit skaars of minder bekende blaaië is op hierdie manier opgespoor en weg-

effective dissemination of information emanating from the office, and closer liaison between the office and research activities in South Africa. These two requirements have now largely been achieved mainly due to two new factors. Firstly, the Liaison Division has now reached the stage where a large proportion of its staff has experience both overseas and in industrial liaison in South Africa. This had led to a greater understanding and the solution of many of the problems of overseas

liaison. Secondly, the office has now been drawn much closer into the structure and activities of the Liaison Division as a whole. Without the constant awareness of the developments and current needs in South Africa it is difficult to direct the activities of the office into those fields where Liaison is most needed and where it would be most effective. Important in this connection also is the growing number of scientific organizations in South Africa, other than the C.S.I.R., which are using the facilities of this office either for the location of information, or for assistance to officers on overseas visits. With these developments it is hoped that in future it will be possible to place even greater emphasis on scientific intelligence and investigation.

Enquiries received during the year ranged from requests for specific items of information to wide surveys embracing the whole of Western

Europe. Approximately fifty such requests were dealt with. The office also independently undertook a number of investigations and 16 liaison reports were issued.

Other services rendered by the office included the maintenance of a small library of scientific films for distribution in the United Kingdom; the representation of South Africa on a number of Committees and Conferences; and photocopying services for the Library and Information Division—approximately 140 such requests for articles from rare, or lesser known journals, being located and despatched in this way. On numerous occasions it was found necessary for the office to assist



Africa House in Londen waar die W.N.N.R. Wetenskaplike Skakelkantoor (Londen) gehuisves is.

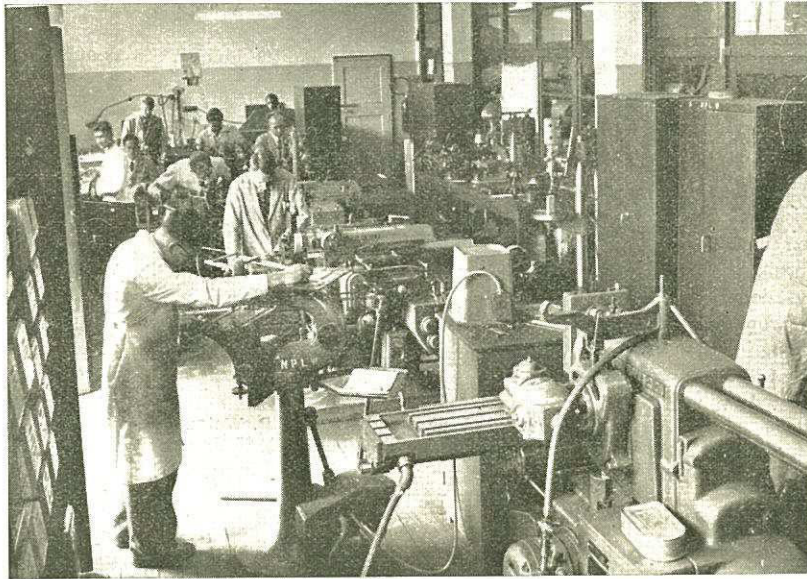
Africa House in Londen where the C.S.I.R. Scientific Liaison Office is housed.

gestuur. By talle geleenthede het die kantoor dit nodig gevind om die verskillende laboratoriums by te staan in die lokalisering en verkryging van gespesialiseerde toerusting.

Dank word betuig aan die kantoor van die Hoë Kommissaris in Londen en aan die Wetenskaplike Skaak-kantore van die ander lande van die Gemeenebes vir hulle hulp gedurende die jaar.

the various laboratories in the location and procurement of specialised equipment.

Thanks are due to the Office of the High Commissioner in London and to the scientific liaison offices of the other Commonwealth countries for their assistance during the year.



'n Hoek van die Sentrale Werkplaas van die W.N.N.R. waar gespesialiseerde navorsingstoerusting vervaardig word deur geskoolde tegnisi wat in noue samewerking met die wetenskaplikes in die nasionale laboratoriums verkeer.

A corner of the C.S.I.R. Central Workshops where specialized research equipment is made by skilled technicians working in close association with the scientists in the national laboratories.

Afdeling Biblioteek en Inligting

Hoof van die Afdeling: MEJ. H. MEWS.

Die Afdeling Biblioteek en Inligting van die W.N.N.R. bestaan nou vir sewe jaar en gedurende hierdie belangrike tydperk is daar 'n na-graadse wetenskaplike biblioteek vir die gebruik van die Raad se personeel en 'n nasionale sentrum vir wetenskaplike en tegniese inligting gevorm. Die hoogtepunt van die eerste stadium van die Afdeling se werk sal aanbreek wanneer die nuwe biblioteekgebou op die nuwe bouterrein opgerig word en die boeke en personeel daarheen oorgeplaas word.

Hier volg nou enkele werksaamhede van die Afdeling; behalwe die gewone besonderhede omtrent boekevoorraad, die aantal geklassifiseerde publikasies ens., word inligting ook verstrek betreffende die aktiewe sy van die Afdeling se werk in die beantwoording van navrae, raad aan nywerheidsbiblioteke, die opstelling van boeklyste ens.

Boekevoorraad

Aan die einde van Augustus 1953 het die aantal gebonde boekdele in die biblioteek op 16,771 te staan



'n Deel van die omvangryke kaartkatalogus in die W.N.N.R.-Biblioteek.

Library and Information Division

Head of Division: MISS H. MEWS

The C.S.I.R. Library and Information Division has now been in existence seven years, and during these important first seven years it has built up a post-graduate scientific library for the use of the Council's own staff and has also established the nucleus of a central scientific library and national centre for scientific and technical information. The culmination of this first stage of the Division's work will come when the new library building is erected on the Lynnwood site and the books and staff are transferred to it.

Some details of the Division's activities follow; in addition to the usual details about bookstock, number of publications classified, etc., some information is also given about the active side of the work of the Division in answering enquiries, giving advice to industrial libraries, compiling book-lists, etc.

Bookstock

At the end of August, 1953, the number of bound volumes in the library was 16,771; this figure includes

A section of the extensive card catalogue in the C.S.I.R. Library.

gekomp; hierdie syfer sluit sowel boeke as gebonde tydskrifte in en toon 'n aanwas van 2,205 boekdele sedert dieselfde tyd verlede jaar.

Geleende Publikasies

Gedurende die jaar is 24,380 publikasies uitgeleen. Hiervan is 21,443 deur die personeel van die W.N.N.R. geleen, 266 deur regeringsdepartemente, 721 deur nywerheidsfirmas en 810 deur inrigtings en individue; 1,140 publikasies is van ander biblioteke geleen. Die laaste syfer kan dien as 'n aanduiding van die onderlinge afhanklikheid van biblioteke in ons land aangesien die W.N.N.R.-Biblioteek hoewel 'n gespesialiseerde biblioteek in diens van spesialiteite, dit nogtans in 1952-53 nodig gevind het om meer as 'n duisend feitlik uitsluitlik wetenskaplike publikasies van ander biblioteke te leen.

Afdeling Klassifikasie en Katalogisering

Die aantal publikasies wat geklassifiseer en gekatalogiseer is (elke publikasie maak albei prosesse deur) was as volg:—

Geklassifiseer	Gekatalogiseer
3,217	3,122

Fotografiese Afskrifte

Die volgende getal fotografiese afskrifte is gedurende hierdie tydperk verkry; die eenheid is een artikel in 'n tydskrif afgesien van die aantal bladsye daarby betrokke.

Van Suid-Afrikaanse bronne	282
Van bronne in die Verenigde Koninkryk (deur die Londense kantoor)	119
Van bronne in die Verenigde State (deur die Washingtonse kantoor)	138
Totaal	<u>539</u>

Sedert 18 Augustus 1952 het die fotografiese eenheid van die Nasionale Fisiese Laboratorium onderneem om fotografiese kopieë van artikels in wetenskaplike blaaië vir die Biblioteek te maak. Dit is 'n groot hulp aangesien dit die noodsaaklikheid uitskakel om die werk vir fotografie na Johannesburg te stuur.

Publikasies wat aan ander inrigtings gestuur is

Die Afdeling het voortgegaan om sekere gespesialiseerde publikasies en duplikate wat van die skakelkantore en ander biblioteke, laboratoriums ens. ontvang is, aan ander inrigtings te skenk. Gedurende die jaar het hierdie publikasies 3,900 beloop.

Deur die welwillendheid van die Nu-Seelandse Departement van Wetenskaplike en Industriële-Navorsing is veertien stelle van die Verslag oor die „Canterbury Project” aan die W.N.N.R. gestuur vir verspreiding in Suid-Afrika en in November 1952 is die stelle aan belangstellende inrigtings gestuur.

both books and bound volumes of periodicals, it shows an increase of 2,205 volumes since the same time last year.

Publications Borrowed

During the year, 24,380 publications were issued on loan. Of these, 21,443 were borrowed by C.S.I.R. staff, 266 by government departments, 721 by industrial firms, and 810 by institutions and individuals. 1,140 publications were borrowed from other libraries; this last figure may serve as an indication of the interdependence of libraries in this country since, although the C.S.I.R. Library is a specialised library serving specialists, it still found it necessary in 1952-53 to borrow over a thousand almost exclusively scientific publications from other libraries.

Classification and Cataloguing Section

The number of publications classified and catalogued, each publication going through both processes, were:

Classified	Catalogued
3,217	3,122

Photographic Copies

The following number of photographic copies were obtained during the period, the unit being one article in a periodical, irrespective of the number of pages involved:

From South African sources	282
From U.K. sources (through the London Office)	119
From U.S. (through the Washington Office)	138
Total	<u>539</u>

Since 18th August, 1952, the photographic unit of the National Physical Laboratory has undertaken the work of copying articles from scientific journals for the Library, and this has been a great help, doing away with the necessity for sending the work to Johannesburg to be photographed there.

Publications Passed on to Other Institutions

The Division has continued to pass on as gifts to other institutions certain specialised publications and duplicates received from the liaison offices and other libraries, laboratories, etc. During the year the number of such publications passed on was 3,900.

Through the courtesy of the New Zealand Department of Scientific and Industrial Research, fourteen sets of the Report on the „Canterbury Project” were sent to the C.S.I.R. for distribution in South Africa, and in November, 1952, these were passed on to interested South African institutions.

Duplikaatydskrifte

Soos in enige biblioteek, versamel die Afdeling ook n. et verloop van tyd 'n hele aantal duplikaatdele van wetenskaplike blaaie. Die duplikate kan van onskatbare waarde wees vir ander biblioteke wat sekere dele kort kom in hulle stelle volledig te maak, en aangesien dit baie moeilik is om hulle van die gewone bronne te verkry het die Biblioteek die welbekende praktyk om lyste te maak van die dele, nagevolg. Gedurende die jaar is vier sulke duplikaatlyste opgestel en eerste aan biblioteke in die Unie gestuur sodat hulle die eerste keuse kon hê, daarna aan die Wetenskaplike Raad vir Afrika Suid van die Sahara sodat Suidelike Afrika in die breër sin van die woord, die tweede keuse sou hê en ten slotte aan Unesco en die Verenigde State se Boekuitruilskema (lyste van nie-Amerikaanse materiaal). As gevolg hiervan is versoeke vir 2,829 van die duplikaatdele van tydskrifte ontvang. Van soortgelyke duplikaatlyste wat deur ander biblioteke aan die W.N.N.R. gestuur is, en as gevolg van 'n „Gevra”-lys wat deur die Afdeling opgestel is, is 274 uitgawes van tydskrifte ontvang. Hoewel dit nie 'n besonder indrukwekkende syfer is nie, verteenwoordig dit nogtans die vulling van 'n groot aantal klein gapings wat nie op enige ander manier gevul kon word nie en aangesien hierdie stelle die mees waardevolle afdeling van die Biblioteek vorm, is die Afdeling besonder dankbaar vir die samewerking wat ontvang is.

Belangrike Skenkings

Escom het 'n stel van die United States Patent Office Gazette van Januarie 1934 tot Desember 1950 aangebied wat 'n groot aanwys vir die Biblioteekvoorraad behoort te wees weens die W.N.N.R. se onlangse verhoogde belangstelling in patente.

Ander nuttige skenkings is van mej. T. Prinsloo en mnr. E. W. Dohse ontvang.

Die publikasies wat gratis ontvang is van die verskillende afdelings van die Britse D.S.I.R. vorm nog altyd nuttige toevoegings tot die Biblioteek se boekvoorraad.

Navrae om inligting, Biblioteekpublikasies ens.

Gedurende die jaar het die Afdeling 439 navrae om inligting hanteer. Al die navrae het 'n sekere mate van bibliografiese ondersoek meegebring aangesien roetinevrae nie as „navrae” beskou word nie.

Dieselfde personeel wat navrae hanteer, stel ook die Biblioteek se eie publikasies op. Hierdie werk maak deel uit van die aktiewe sy van die Afdeling se taak, n.l. om die hulpbronne van die Biblioteek onder die aandag van wetenskaplikes te bring. Die Biblioteek se maandelikse lys van byvoegings, *W.N.N.R. Inligting*, word nog deur hierdie afdeling geredigeer en verdere vordering i.v.m. die res van die publikasieprogram was hierdie

Duplicate Periodicals

As is the case in every library, as time passes the Division acquires quite a number of duplicate parts of scientific periodicals. These duplicates can be invaluable to other libraries needing certain missing parts to complete their sets, and as they are difficult to obtain from ordinary sources, the Library has been following the widespread practice of making lists of these parts. During this year four such lists of duplicates have been produced and circulated first of all to libraries in the Union to give them the first choice, then to the Scientific Council for Africa South of the Sahara so that Southern Africa in the larger sense should have the next choice, and finally to Unesco and the United States Book Exchange (lists of non-American material). As a result, requests for 2,829 of these duplicate parts of periodicals have been received. From similar lists of duplicates sent to C.S.I.R. by other libraries, and as a result of a "Wanted" list compiled in the Division, 274 periodical issues have been received. Although this is not a very impressive figure it represents the filling of many little gaps in sets of periodicals that could not be filled in any other way, and as these sets represent the most valuable section of the Library, the Division is most grateful for the co-operation received.

Notable Gifts

Escom presented a set of the *United States Patent Office Gazette* from January, 1934, to December, 1950, which should be a useful addition to the Library stock since C.S.I.R.'S recent increased interest in patents.

Other useful gifts were received from Miss T. Prinsloo and Mr. E. W. Dohse.

The publications received free from the various sections of the British D.S.I.R. continue to be invaluable additions to the stock of the Library.

Enquiries for Information, Library Publications, etc.

During this year the Division has handled 439 enquiries for information. All these enquiries have involved some kind of bibliographical search, since routine questions are not counted as "enquiries."

The same staff that handles enquiries also prepares the Library's own publications. This work forms part of the active side of the Division's task, that of bringing the Library's resources to the notice of scientists. The Library's monthly list of accessions (*C.S.I.R. Information*) continues to be edited by this section and further progress has been possible this year with the rest of the publishing programme. In November, 1952, the

jaar moontlik. In November 1952 is die *Register van die Huidige Wetenskaplike Navorsing aan Suid-Afrikaanse Universiteite*, 1951, gepubliseer. Die vraelyste is terug ontvang van die Universiteite vir die huidige jaar en word gesorteer en persklaar gemaak. Daar word gehoop om die huidige deel van die *Register* voor die einde van 1953 te publiseer.

Nog drie Biblioteek-klaslyste is uitgegee. No. 3 i.s. *Grondmeganika* is op versoek van die N.B.N.I. opgestel en 100 afskrifte is aan hulle verskaf vir eie gebruik; No. 4 het *Leer en Verwante Bedrywe* behandel, en No. 5 *Voeding*. Afskrifte van die lyste is aan veldwerkers in verskillende dele van Suid-Afrika gestuur.

Daar was ook kans vir die opstelling van omvattende lyste van die Biblioteek se boekevoorraad wat handel oor spesifieke onderwerpe in antwoord op spesifieke navrae oor gepubliseerde inligting—bv. keramiek en aanverwante onderwerpe; gehaltebeheer, patent-literatuur; grondstabilisering en grondsement; oonddroging en droging van timmerhout en die ontwerp van timmerhoutoonde; uittrekselskrifte (hersiene lys); en muko-proteiene. Dit was moontlik om sommige van die lyste weer te gebruik by die beantwoording van verdere navrae.

As 'n bykomende definitiewe werksaamheid, het die Afdeling voortgegaan om ander gespesialiseerde biblioteke van raad te bedien i.s. hulle organisasie, toerusting ens. en verskeie personeellede van sulke biblioteke het vir tydperke van wisselende lengte by die W.N.N.R. gewerk om die metodes wat toegepas word, te bestudeer. Die inrigtings wat die Afdeling op hierdie manier geraadpleeg het, sluit in die Raad vir die Ontwikkeling van Natuurlike Hulpbronne; die South African Pulp and Paper Industry, die Bounavorsingsinstituut, Accra; National Chemical Products, Ltd., Germiston; die Weerburo, Pretoria; Lugpublikasies, Suid-Afrikaanse Lugmag; Suikerproefstasie, Mount Edgecombe; African Explosives and Chemical Industries; Modderfontein en die Koring-beheerraad, Pretoria.

Rhodes-Eeufestentoonstelling, Bulawayo

Die Biblioteek het gehelp met die insameling van materiaal vir die Rhodes-Eeufestentoonstelling in Bulawayo. Die Afdeling het ook 'n opname gemaak van die menings van biblioteke in ons land oor 'n gekose lys van standaard wetenskaplike werke oor Suid-Afrikaanse wetenskap.

Ruimte-Probleme

Die oorvol toestand van die Biblioteek het nou sulke afmetings aangeneem dat meer en meer leestafels verwyder moes word om plek te maak vir boekrakke. Sommige van die werk moet selfs op die vloer gedoen word. Al ons hoop word dus nou gevestig op die bespoediging van die bouprogram op die nuwe terrein.

Register of Current Scientific Research at South African Universities, 1951, was published. The questionnaires have been returned by the universities for this current year and are being sorted and edited. It is hoped to publish the current volume of the *Register* before the end of 1953.

Three more Library class lists have also been issued. No. 3 on *Soil Mechanics* was compiled at the request of the N.B.R.I., to which 100 copies were supplied for their own use; No. 4 dealt with *Leather and Related Industries*, and No. 5 with *Nutrition*. Copies of these lists were circulated to workers in the field in various parts of South Africa.

It has also been possible to devote some time to preparing comprehensive lists of the Library's holdings on certain subjects in reply to specific enquiries for published information, for example: ceramics and related subjects; quality control; patent literature; soil stabilization and soil cement; kiln-drying and seasoning of timber and the design of timber kilns; abstracting journals (revised list) and mucoproteins. It has been possible to use some of these lists again in replying to further enquiries.

As an additional positive activity, the Division has continued to give advice to other specialised libraries on their organisation, equipment, etc., and several members of staff from such libraries have spent varying times working at C.S.I.R. to see the methods used. The institutions who have consulted the Division in this way have included the Natural Resources Development Council; South African Pulp and Paper Industry; Building Research Institute, Accra; National Chemical Products Ltd., Germiston; Weather Bureau, Pretoria; Air Publications, South African Air Force; Sugar Experiment Station, Mount Edgecombe; African Explosives and Chemical Industries, Modderfontein; Wheat Control Board, Pretoria.

Rhodes Centenary Exhibition, Bulawayo

The Library helped with the collection of material for the Rhodes Centenary Exhibition in Bulawayo. The Division also collected the views of libraries in this country on a selected list of standard scientific works on South African science.

Space Problems

The overcrowding in the Library has now reached very uncomfortable proportions and still more readers' tables have had to be removed to make way for bookcases. Some of the work has to be done on the floor. But hopes are now centred on the acceleration of the building programme at the new site.

Nasionale Chemiese Navorsingslaboratorium

Direkteur: DR. W. S. RAPSON.

Die afgelope jaar is meer gekenmerk deur die konsolidasie of uitbreiding van reeds bestaande werksaamhede as deur ontwikkelings op nuwe gebiede. In laasgenoemde klas egter, is twee belangrike opdragte onderneem wat spesiale melding verdien, naamlik, navorsing na die ontsouting van water en voedingsnavorsing. Albei hierdie skemas het baie aspekte en vereis aansienlike beplanning. Baie tyd is dan ook bestee aan die bou van die nodige raamwerk en fasiliteite.

Terselfdertyd het opdragte van nywerhede en ander organisasies toegeneem en die wetenskaplike personeel wat spesiaal aangestel is of aan hierdie laboratorium beskikbaar gestel is om opdragte of onder kontrak of deur beurstoekennings uit te voer, tel nou 19 in vergelyking met 'n permanente wetenskaplike personeel van 67. Die aantal kort-termyn ondersoeke wat deur die lede van die permanente personeel onderneem is, het ook vermeerder.

'n Saak van uiterste belang is die toenemende moeilikheid wat ondervind word in die werwing van personeel om vakante betrekkings te vul namate hulle ontstaan. Hieruit moet afgelei word dat ons Universiteite nie langer in staat is om genoeg skeikundiges op te lei nie. Indien die huidige toestand voortduur, kan dit ernstige gevolge hê vir inrigtings- en nywerheidsnavorsing deur die hele land.

Die Nasionale Advieskomitee vir Skeikundige Navorsing en sy Onderkomitees het weereens onskatbare hulp verleen met die beplanning van werksaamhede. Graag spreek die Raad sy waardering uit teenoor die-gere wat op hierdie Komitees gedien het.

MINERALE PRODUKTE

Kleisoorte en Verwante Stowwe

Die grondige opmeting van attapulgitneerslae in die Springbokvlaktegebied wat, soos in die vorige verslag vermeld, reeds aan die gang was, is nou voltooi. Bewys is gelewer dat die gebied waarin dit voorkom etlike aangrensende plase beslaan en 'n totaal van ongeveer 1,000 monsters is ondersoek. 'n Finale verslag wat 'n opsomming gee van die bevindings, is opgestel en word as 'n gesamentlike verhandeling van die W.N.N.R. en die Geologiese Opname uitgegee.

Die voorkoms van saponiet, vermeld in verlede jaar se verslag, is verder ondersoek en het geblyk van wetenskaplike belang te wees in soverre dat dit 'n hoër magnesiumgehalte het as dié waaroor tevore verslag gedoen is. Aangesien dit in 'n hoë mate van suiwerheid verkry

National Chemical Research Laboratory

Director : DR. W. S. RAPSON

The past year has been marked by consolidation or extension of existing activities rather than by developments in new fields. In the latter category, however, two major commitments which have been undertaken deserve special mention—namely, water demineralisation research and nutrition research. Both these projects have many aspects and require much planning, and considerable time has been spent on the building up of the necessary framework and facilities.

At the same time commitments to industry and other organisations have grown and the scientific staff specially appointed or seconded to the laboratory in order to meet contract or fellowship commitments now numbers 19, as compared with a permanent scientific establishment of 67. The number of short-term investigations carried out by permanent staff has also increased.

A matter of the greatest importance has been the increasing difficulty of recruiting staff to fill vacancies as they arise, and the deduction must be drawn that the output of chemists from our universities is now insufficient to meet demands. Should the present position continue, the effects on institutional and industrial research throughout the country could be most serious.

In the planning of activities the National Advisory Committee on Chemical Research and its Sub-Committees have again provided invaluable assistance and the Council takes pleasure in recording its appreciation of the services rendered by those who serve on these Committees.

MINERAL PRODUCTS

Clays and Related Materials

As mentioned in the previous report, a thorough survey of the attapulgit deposits in the Springbok Flats area has been in progress and is now complete. The area of occurrence proved to cover several adjacent farms and a total of about 1,000 samples was examined. A final report summarising the findings has been prepared and is being published as a joint paper from the C.S.I.R. and the Geological Survey.

The saponite occurrence reported last year has been examined, and has proved of scientific interest in that it appears to be more extreme with regard to magnesium content than previously reported saponites. As it could be obtained in high purity, the X-ray and differential thermal analysis data obtained should be of considerable value. A full report is in course of publication.

kon word, behoort die gegewens van die X-straal-onderzoek en differensiële termiese ontleding van groot waarde te wees. Die publikasie van 'n volledige verslag is in voorbereiding.

Roetine-onderzoek van grondkolloïedes vir die Nasionale Bounavorsingsinstituut en vir die Departement van Landbou is voortgesit soos in vorige jare. Monsters wat sporadies voorgekom het en wat van moontlike belang sou kon wees, is ondersoek maar oor die algemeen is geen nuwe neerslae van besondere kleisoorte ontdek nie. Die enigste uitsondering hierop was monsters hoë-kwaliteit serisiet afkomstig van 'n aantal plekke in die Unie en Suidwes-Afrika. Die moontlikhede van hierdie reerslae as keramiese grondstowwe sal ondersoek word.

Enkele korttermynondersoeke is onder kontrak uitgevoer.

Steenkool

In verdere uitbreiding op vroeëre werk wat gedoen is i.v.m. die fyn struktuur van steenkool en die moontlike verband met die neiging tot spontane ontbranding van steenkool, is verdere proewe op die adsorpsie van argon aan Suid-Afrikaanse steenkoolsoorte uitgevoer. In ooreenstemming met aansprake van oorsese werkers, is gevind dat adsorpsie aansienlik groter was by -80°C . as by -184°C . Hierdie buitengewone resultaat kan moeilik verklaar word, en dui daarop dat baie meer werk vereis word voordat sorpsie deur steenkool ten volle verklaar kan word. Verdere proewe wat oor 'n reeks van temperature uitgevoer is, het getoon dat sorpsie toeneem namate die temperatuur tot by ca. -120°C . daal maar dat 'n opvallende verandering intree tussen -120°C . en -180°C . wat veroorsaak dat die hoeveelheid gas wat deur ontgaste steenkool geadsorbeer word, merkbaar daal. Weens dringender vereistes moes die werk op hierdie program egter gestaak word.

Chroom

Onderzoek is voortgesit na die moontlikhede van selektiewe elektro-deposisie in kwik van yster en chroom wat aanwesig is in oplossings wat verkry word deur die vertering van chromiet met swawelsuur. Streng gesproke is die gegewens wat verkry is vergelykbaar met toestande wat ontstaan by 'n druppelende kwik-elektrode. Aanvullende ondersoek is uitgevoer na die invloed van temperatuur, suurkonsentrasie en ander faktore op die potensiale van yster en chroom onder die komplekse toestande wat sou heers in 'n diafragma-sel met 'n kwikkatode onder praktiese toestande.

Praktiese toetse is op kleinskaalse elektrolieseselle van besondere ontwerp uitgevoer en moeikhede wat ondervind is, word ondersoek. Planne is opgestel vir 'n grootskaalse toets-aanleg waarin die proses wat

Regular work on examination of soil colloids for the National Building Research Institute, and for the Department of Agriculture has continued as in past years. Sporadic samples which appeared of possible interest have been examined, but on the whole no new deposits of special clay types have been revealed. The only exception is that high quality sericite samples have been obtained from a number of places in the Union and in South West Africa. The possibilities of these deposits as ceramic raw materials will be investigated.

Some short-term investigations have been carried out under contract.

Coal

In amplification of earlier work on the fine structure of coal as possibly related to its tendency to spontaneous combustion, further experiments have been carried out on adsorption of argon on South African coals. In agreement with claims made by overseas workers, it was found that adsorption was considerably greater at -80°C . than at -184°C . This rather extraordinary effect is not easily explained, and indicates that a great deal more work is required before sorption by coals is fully understood. Some further experiments over a range of temperatures showed that sorption increased as temperature decreased down to about -120°C ., but that, between -120°C . and -180°C ., a marked change takes place causing the amount adsorbed by a degassed coal to decrease very markedly. Owing to more urgent requirements, however, work on this programme has had to be brought to an end.

Chromium

Investigation has continued into the possibilities of selective electrodeposition into mercury of iron and chromium present in liquors obtained by the dissolution of chromite in sulphuric acid. The data obtained relate strictly speaking to conditions at a dropping mercury electrode, and have been supplemented by studies of the effects of temperature, acid concentration and other factors on the potentials of iron and chromium under the complex conditions which would prevail in a mercury diaphragm cell under practical conditions.

Practical trials have been carried out on small scale electrolysis cells of special design and difficulties encountered are being investigated. Plans for a larger scale plant in which the process can be studied using a cascade system of cells have been prepared.

van 'n serie-selstelsel gebruik maak, bestudeer kan word.

Die samestelling, struktuur en elektro-chemiese eienskappe van chroomamalgame sowel as amalgame van ander transisie-elemente is bestudeer en praktiese metodes vir die herwinning van metale van sulke amalgame is ondersoek.

Ondersoek is ingestel na die moontlikhede om verbruikte elektroliet-oplossings deur kristallisasiëprosesse te verwerk.

WATER

Hergebruik van Afvalwater

Gegewens wat deur verskillende munisipaliteite dwarsdeur die Unie verstrek is, dui daarop dat ongeveer 70 persent van die water wat aan munisipale gebiede verskaf word in rioler beland en 'n potensiele hergebruikswaarde besit. In sommige gevalle, bv. in Pretoria waar afvalwater aan die kragstasie vir verkoelingswater verskaf word, is hergebruik alreeds beplan en prakties deurgevoer. 'n Struikelblok in die weg van 'n meer

The composition, structure and electrochemical properties of chromium amalgams, as well as amalgams from other transition elements have been studied, and practical methods for the recovery of the metals from such amalgams explored.

The possibilities of working up spent liquors from the electrolysis by crystallisation processes have been investigated.

WATER

Re-use of Sewage Effluents

Data supplied by different municipalities throughout the Union indicate that of the water supplied in municipal areas, approximately 70 per cent. reaches sewage outfalls, and must be regarded as having a potential re-use value. In some cases, as for example in Pretoria, where sewage effluent is being supplied to the power station for use as cooling water, such re-use is already planned or being practised. An obstacle to more extended

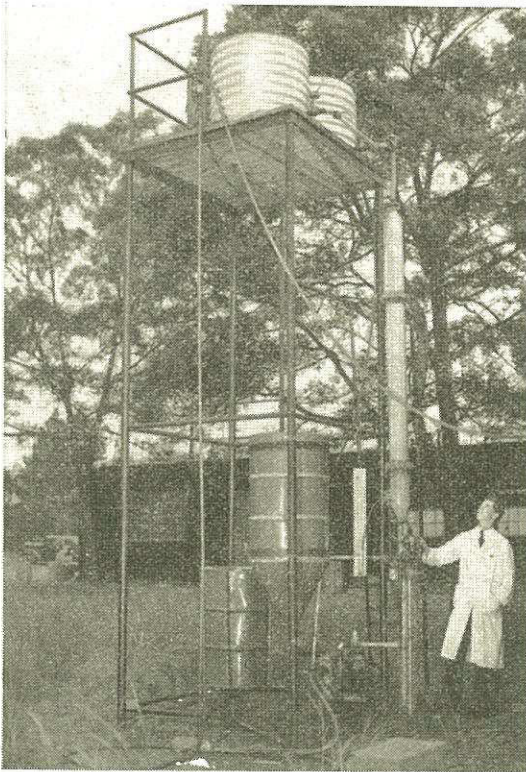


Die neem van 'n monster riooluitvloeisel waar dit in 'n kunsmatige vlei vloei waar dit verdere suiwering ondergaan voordat dit weer gebruik word.

Taking a sample of sewage works effluent as it flows into an artificial vlei, where it undergoes further purification prior to re-use.

uitgebreide stelsel van hergebruik is die koste verbonde aan ontsmetting wat hoog is as gevolg van die hoë chloor-dosering. Daar is gevind dat betreklike klein dosisse chloor (2-4 dele per miljoen) fekale coli in deeglik-gesuiwerde afvalwaters vernietig indien 'n lang kontak (tot 24 uur) toegelaat word.

Ander aspekte van die probleem is deur 'n spesiale Komitee ondersoek wat besluit het dat veldproewe onderneem moes word. Vir hierdie doel is fasiliteite deur die Cydna Rioolwerke in Johannesburg en by die Pretoriase Rioolwerke geskep. Van die Cydna-werke is hulp verkry by die bou van kleinskaalse uitvlokkings-, uitsakkings- en biologiese filtrasie-toetsaanleggings en visdamme is beskikbaar gestel vir toksisiteitsstudies in verband met vistelery. In Pretoria is 'n studie beplan vir suiwering deur grasland- en vleifiltrasie, deur die aanleg van opgaardamme en modelriviere. Die Departement van Besproeiing onderneem die nodige bouwerk en die stadsraad stel fasiliteite beskikbaar vir die laboratoriumkontrole van proewe. Voorlopige resultate dui daarop dat afvalwater maklik beskikbaar gestel kan word as 'n bron van water.



'n Kleinskaalse filtrasie-eenheid vir die verwydering van fluoriëde uit watervoorrade.

A Pilot-plant filtration unit for the removal of fluorides from water supplies.

re-use is the cost of sterilisation, which is high because of the level of chlorine dosage required. It has been found that comparatively small doses of chlorine (2-4 parts per million) destroy faecal coli in well purified effluents if an extended contact time (up to 24 hours) is allowed.

Other aspects of the problem have been reviewed by a special Committee, and as a result it was decided to undertake field experiments, facilities for which have been made available at the Cydna Sewage Works in Johannesburg and at the Pretoria Sewage Works. At the Cydna Works assistance has been obtained in the construction of pilot flocculation, sedimentation and biological filtration plant, and fish ponds have been made available for toxicity studies as related to fish culture. In Pretoria, a study of the purification afforded by grassland filtration, vlei filtration, impounding reservoirs and model rivers has been planned. The Department of Irrigation is undertaking the constructional work necessary, and the municipality is making available facilities for the laboratory control of experiments. Preliminary results indicate that sewage effluents can be made readily available as a source of raw water.

Defluoridation of Water Supplies

Work has been completed on the development of a method for removing fluorides from water. Using the technique developed on a laboratory scale, fluorides have been removed from water successfully on a pilot plant scale. Over an extensive testing period, the best method of operation was worked out and deterioration of the defluoridant (commercial superphosphate of lime activated by treatment with caustic soda) was evaluated over 80 defluoridation and regeneration cycles. Patents covering the manufacture of the defluoridant have been granted in South Africa and Southern Rhodesia, while others are pending in Australia, the United Kingdom and the U.S.A. Negotiations covering the production of defluoridation units on a commercial scale are in progress.

Desalting of Water Supplies

A high content of dissolved mineral salts is a grave disadvantage of many underground water supplies in the Union, and in many instances such water supplies remain unused because of their salt content. The first steps have therefore been taken towards the building up of a team for work on this problem. Attention is being devoted in particular to electro-dialysis through ion exchange membranes as a means of desalting—a technique which appears most economically applicable to waters containing up to 10,000 parts per million of dissolved salts.

Recovery of fresh water from saline waters by solar distillation is also feasible when small quantities, for

Verwydering van Fluor uit Watervoorrade

Die werk i.v.m. die ontwikkeling van 'n metode vir die verwydering van fluorides uit water, is nou voltooi. Deur gebruik te maak van die tegniek wat in die laboratorium ontwikkel is, kan fluorides tegnies op 'n klein skaal met sukses uit water verwyder word. Na 'n uitgebreide proeftydperk is die beste werksmetode ontwikkel. Die ontbinding van die defluorineringsagens (kommersiële kalsiumsuperfosfaat geaktiveer deur behandeling met bytsoda) is gedurende 80 defluorinerings- en hernuwingsiklusse, bepaal. Oktrooie wat die vervaardiging van die defluorineringsagens dek, is in Suid Afrika en Suid-Rhodesië toegestaan terwyl die toekening van ander in Australië, die Verenigde Koninkryk en die Verenigde State hangende is. Onderhandelinge wat die produksie van defluorineringsseenhede op 'n kommersiële skaal dek, is aan die gang.

Ontsoouting van Watervoorrade

Die hoë opgeloste mineralesout-gehalte is 'n ernstige nadeel van baie ondergrondse watervoorrade in die Unie; in baie gevalle is sulke watervoorrade weens hulle hoë soutgehalte onbruikbaar. Die eerste stappe is dus gedoen om 'n span werkers saam te stel om op hierdie probleem in te gaan. Aandag word veral geskenk aan elektrodialise deur ionuitwisselende membrane as 'n middel tot ontsoouting—'n tegniek wat besonder ekonomies blyk te wees vir aanwending op water wat soveel as 10,000 dele opgeloste soute per miljoen bevat.

Herwinning van vars water uit brakwater deur distillasie met sonhitte is ook moontlik wanneer slegs klein hoeveelhede vir huishoudelike gebruik vereis word. Vir hierdie doel is 'n eksperimentele distilleerketel wat energie van die son benut, aangelê vir voorlopige ondersoek.

Stroomopnames

Die maksimum gebruik van watervoorrade vereis 'n noukeurige skatting van die potensialiteite van riviere en strome tesame met die vermindering tot 'n minimum van verontreiniging. In samewerking met die Departement van Besproeiing en plaaslike owerhede, is die monitoring en ontleding van sommige belangrike riviere voortgesit.

Die biologiese en chemiese opname van die Berg-rivier in die Kaap is voltooi. 'n Voorlopige studie van die resultate dui op 'n verband tussen die verspreiding van die dierlike bevolking en spesies in die verskillende boppe of gebiede, seisoensvariasies, die verwantskap van die tipes fauna tot die substraat en die gevolge van verontreiniging op die dierlike bevolking. Die gevolge van verontreiniging is ook bestudeer in die klein Krom-rivier wat 'n aansienlike hoeveelheid distilleerafval en



Kleinskaalse biologiese filtreerders vir die verwydering van melkeryuitvloeiels.

Pilot scale biological filters for dairy effluent disposal.

domestic use only, are required. An experimental solar still for this purpose has been operated on an exploratory basis.

Stream Surveys

Maximum use of water supplies requires exact evaluation of the potentialities of rivers and streams together with reduction of pollution to a minimum. With the co-operation of the Department of Irrigation and local authorities, sampling and analysis of some important rivers have been continued.

The biological and chemical survey of the Berg River in the Cape has been completed. A preliminary review of the results indicates that their analysis will establish the distribution of animal population and species in relation to different reaches or zones, seasonal variations, the relationship of the types of fauna to the substratum and the effects of pollution on the animal population. The effects of pollution were also studied in the small Krom River which takes a considerable quantity of distillery waste as well as storm water

stormwater van Stellenbosch wegvoer. 'n Rykdom van biologiese materiaal is versamel wat tans geklassifiseer word en waar wenslik, aan deskundiges, plaaslik en oorsee, vir verdere studie versend word.

Die Witwatersrandgebied is ingedeel in nege eksperimentele kringlope wat al die takriviere sowel as die hoofstrome van die Klip-, Blesbok- en Suikerbosrandriviere dek. Plaaslike stadsrade het verantwoordelikheid aanvaar vir die ondersoek van vyf van hierdie kringlope terwyl die Afdeling gereelde monsterring van die orige vier onderneem. Gereelde vloeiometings is ook by sleutelposisies geneem en die korrelasie van die vloei-gewens met die chemiese samestelling van die water verskaf tans 'n kwantitatiewe beraming van verontreiniging en selfsuiwering d.m.v. natuurlike vleie en die waterlewe van hierdie riviere.

In Natal is die voorlopige opname van die Tugelarierviervallei voltooi en die monsters- en meetpunte nodig vir 'n kwantitatiewe opname is op 'n kaart aangebring. Die Kommissie vir Stads- en Streeksbeplanning het nou 'n beurs by die W.N.N.R. ingestel ten einde voortsetting van die werk te verseker. Die Universiteit van Natal het aangebied om die Beurshouer in sy Departement van Plantkunde te huisves.

Wynafvloeiwater

Studies op semi-tegniese skaal het daarop geëindig dat koper en sulfiete wat soms in taamlike hoë konsentrasies in distilleerafval voorkom, moeilikhede veroorsaak met die anaerobiese vertering daarvan. Sulfiete veral, was besonder giftig in die teenwoordigheid van hoë konsentrasies van vlugtige sure soos dié wat aange-tref word in gestookte wyne wat bederf het. Die giftige uitwerking van hierdie stowwe is daarna in laboratoriumverteeders bepaal. Daar is gevind dat permanente akklimatisering in teenwoordigheid van koper ontwikkel kon word. Akklimatisering in teenwoordigheid van sulfiete was minder blywend maar bakterieë kon ontwikkel word om 'n voeding van 500, 2,000 en 5,000 d.p.m. van koper, sulfiet en vlugtige sure onderskeidelik, teen 'n tempo wat ooreenstem met 'n terug-houtydperk van ses dae, te weerstaan. Personeelmoeilikhede het verhoed dat toetse op semi-tegniese skaal gedurende die stookseisoen voortgesit kan word.

Suifelfabriekafvloeiels

Die ondersoek na geskikte metodes vir die kwytraak van suifelfvloeiels met behulp van 'n beurs van die Raad van Beheer oor die Suifelnwyerheid, is voortgesit. Laboratoriumstudies het aangetoon dat die suiwering van melkafvalstowwe deur enkel-stadium biologiese filtrasie met hersirkulasie of met afwisselende dubbele biologiese filtrasie suksesvol uitgevoer kan word. Op grond van die resultate van hierdie eksperimente, is 'n volskaalse toetsaanleg ontwerp om 10,000 gelling af-

from Stellenbosch. A wealth of biological material has emerged from the survey which is being classified and, where desirable, distributed to specialists both here and overseas for further study.

The Witwatersrand area has been divided into nine sampling circuits which cover all the tributaries as well as the main streams of the Klip, Blesbok and Suikerbosrand Rivers. Local municipalities have accepted responsibility for study of five of these circuits while the C.S.I.R. has undertaken regular sampling of the remaining four. Regular flow measurements were also taken at key positions and correlation of the flow data with chemical composition of the water is now providing a quantitative assessment of pollution and the self-purification afforded by natural vleis and aquatic life in these rivers.

In Natal the preliminary survey of the Tugela River Basin has been completed, and the sampling and gauging points necessary for a quantitative survey have been mapped. The Town and Regional Planning Commission has now established a Fellowship with the C.S.I.R. to ensure the continuation of the work. The University of Natal is making accommodation available for the Fellow in its Department of Botany.

Wine Effluents

Pilot plant studies indicated that copper and sulphites which sometimes occur in fairly high concentrations in wine distillery wastes cause difficulties in their anaerobic digestion. Sulphites were particularly toxic in the presence of high volatile acid concentrations such as are encountered in deteriorated distilling wines. The toxic effects of these substances were subsequently evaluated in laboratory digesters. It was found that permanent acclimatisation to copper could be developed. Acclimatisation to sulphites was less permanent but could be developed to withstand a feed containing 500, 2,000 and 5,000 p.p.m. of copper, sulphite and volatile acids respectively at a rate corresponding to six days retention period.

Staffing difficulties prevented the continuation of the pilot plant trials during the distilling season.

Dairy Factory Effluents

The Fellowship investigation of suitable means for the disposal of dairy effluents, sponsored by the Dairy Industry Control Board, has continued. Laboratory studies demonstrated the successful purification of milk wastes by single stage biological filtration with recirculation or with alternating double biological filtration. Based on the results of these experiments, a full-scale plant was designed to treat 10,000 gallons of effluent daily. This plant which has been constructed by a private company at their creamery will serve as a

vloeiisel per dag te suiwer. Hierdie installasie wat deur 'n privaatsmaatskappy by hulle romery opgerig is, sal as model dien vir die res van die suiwelbedryf en sal beskikbaar wees vir verdere proewe.

'n Studie van die suiwing van afvloeiwatervat deur geaktiveerde slijk is by 'n poeiermelkfabriek, waar 'n Kessener-aanleg (borselbelugting) aangebring is, gemaak. Advies is gegee aangaande die werking van en veranderinge aan die aanleg. Die werking van hierdie aanleg het nuttige inligting verskaf wat vergelyk kan word met die metode van afwisselende dubbelfiltrasie. Flokkulasie van melkafvloeisel as hulpmiddel by verwydering, deur middel van besproeiing, is ook ondersoek. Hierdie metode mag meer prakties wees vir klein fabriekke.

Afvloeiwaters van „Olie van Steenkool”-Nywerheid

Die behandeling van verskeie afvloeisels wat ontstaan by die vervaardiging van olie uit steenkool, lewer 'n hele aantal probleme op. Hulle is ondersoek deur 'n beampete wat deur die betrokke Korporasie gesekondeer is om in die Afdeling vir Watersuiwing te werk. Proewe is onderneem om die nodige gegewens vir die ontwerp van grootskaalse suiweringsinstallasies te verskaf. Voorlopige resultate van biologiese filtrasiestudies dui daarop dat organiese sure en alkoholiese bestanddele in die afvloeisels vernietig kan word. Ander probleme soos die verwydering van afvloeisels met 'n hoë mineraalgehalte en die verwydering van boron uit hierdie afvloeiwatervat word nog bestudeer.

Die werk is nou oorgeplaas na die fabriekslaboratorium maar die afdeling tree nog altyd in 'n adviserende hoedanigheid op. Advies is ook gegee in verband met die suiwing van watervoorrade vir verskillende prosesse. Die beginsel van hergebruik is sover as moontlik toegepas.

Afvloeisels van die Goudmynbedryf

Volgens 'n reëling met die Komitee vir Goudprodusente van die Kamer van Mynwese, word personeellede aangestel om in die navorsingslaboratoriums van die Kamer van Mynwese te werk in verband met afvloeisel- en waterprobleme waarmee die Goudmynbedryf te kampe het. Die algemene leiding van die werk vind plaas onder beskerming van 'n Komitee waarop die W.N.N.R. verteenwoordig is en die beampete in bevel van die Afdeling Watersuiwing is reeds op aktiewe wyse hierby betrokke.

Afvloeisels van Houtverwerking

In 1949 het die Afdeling Watersuiwing ondersoek gedoen na afvloeisels van 'n houtfabriek en aanbevelings gedoen in verband met die installering van 'n volskaalse toets-aanleg. Die aanleg is gedurende Februarie van hierdie jaar amptelik deur die Administrateur van Natal geïnspekteer en die beampete in bevel van die Afdeling

model to the rest of the dairy industry, and will be available for further experiments.

Activated sludge purification of effluent has been studied at a powdered milk factory where a Kessener (brush aeration) plant had been installed. Advice was given on operation of, and alterations to the plant. The performance of this plant provided useful information for comparison with alternating double filtration treatment.

Flocculation of milk effluent as an aid to disposal by irrigation was also investigated. For small factories this method may prove more practicable.

Effluents from “ Oil From Coal ” Industry

Treatment of the many effluents arising from the manufacture of oil from coal, presents a variety of problems. These have been investigated by an officer who was seconded from the corporation concerned to work in the Water Treatment Division. Experiments were undertaken to provide data necessary for the design of large-scale treatment plants. Preliminary results of biological filtration studies indicate that organic acids and alcohols in the effluents can be destroyed. Other problems such as the disposal of highly mineralised effluents, and the removal of boron from gas liquors are still under study.

The work has now been transferred to the factory laboratory, but the Division has continued to act in an advisory capacity. Advice has also been given on treatment of the water supplies for various processes. The principle of re-use was applied wherever possible.

Effluents From Gold Mining Industries

In terms of an arrangement with the Gold Producers' Committee of the Chamber of Mines, staff is being appointed to work in the Chamber of Mines Research Laboratories on effluent and water problems of the gold mining industry. The general direction of this falls under the auspices of a Committee which the C.S.I.R. is represented, and the officer in charge of the Water Treatment Division is actively involved.

Effluents From Wood Processing

In 1949 the Water Treatment Division carried out an investigation of effluents from a wood processing factory and made recommendations regarding the installation of full-scale plant. This full-scale plant was officially inspected in February of this year by the

het 'n uitnodiging ontvang om die plegtigheid by te woon.

Ander Prosesse vir die verwydering van Afvloeiels

Namate die inligting aangaande die werksaamhede van die Afdeling Watersuiwering meer algemeen bekend geword het, is 'n steeds toenemende aantal aansoeke om raad en hulp ontvang. Onder andere is gedurende die jaar aandag geskenk aan die volgende navrae:

Van 'n fabriek vir elektrolitiese beslag waar 'n afvloeisel geproduseer word wat sianiede bevat.

Van die Administrasie van Suidwes-Afrika in verband met watervoorraad en verwyderingsprobleme by Walvisbaai.

Van die Visrywerheidsnavorsingsinstituut t.o.v. die voorsiening en verwydering van water vir vismaakinstallasies.

Van 'n fabriek wat geïnteresseerd is in die langtermyn-gevolge van sy afvloeiels op die watervoorraad van die omgewing. (Verdere opname studies benodig.)

Van 'n leerlooierij wat 'n oplossing verlang vir sy afvloeiselprobleme.

Van 'n vervaardiger van diervoer wat 'n afvloeiselprobleem het as gevolg van die uitloging van bene.

Van 'n installasie wat sakke was en dit moeilik gevind het om aan die vereistes van die plaaslike owerheid te voldoen weens die hoë koolhidraatgehalte van sy uitvloeisel.

Van 'n lekkergoedfabriek met 'n hinderlike afvloeisel.

Van 'n fabriek wat eetbare olies, kunsbotter en seep vervaardig.

Van 'n styselabriek wat moeilikheid met die plaaslike owerheid ondervind het.

Van 'n firma wat insekdoende middels vervaardig en met moeilike verwyderingsprobleme te kampe gehad het.

Van twee suurdeegfabrieke wat albei moeilikheid ondervind het in verband met die verwydering van hulle afvloeiels.

PLANTPRODUKTE

Suikerrietwas

'n Fabriek vir die produksie van suikerrietwas word tans in Natal opgerig. Met die oog daarop is die werk in verband met die verwerking van modder, gevorm in 'n voorlopige suiweringsproses deur middel van suur, gedurende die jaar onderbreek. 'n Begin is egter gemaak met die fraksionering van die suiwer kutikula-was teneinde sy chemiese samestelling te bepaal. Dit is reeds duidelik dat die was nie uitsluitlik uit esters bestaan nie. Die plan is om hier van die navorsingstegnieke wat vir wolwas ontwikkel is, gebruik te maak.

Administrator for Natal, and the officer in charge of the Division was invited to attend.

Other Effluent Disposal Processing

As information concerning the activities of the Water Treatment Division has become more widespread, a steadily increasing number of enquiries for advice and assistance has been received. Amongst those that have received attention during the year the following may be mentioned:—

From an electroplating factory producing an effluent containing cyanides.

From the Administration of South West Africa in regard to water supply and disposal problems at Walvis Bay.

From the Fishing Industry Research Institute in regard to supply and disposal of water for fish canning plants.

From a factory interested in the long-term effects of its effluents on water supplied in the neighbourhood. (Continuing survey studies required.)

From a tannery desiring a solution to its effluent problems.

From a manufacturer of animal feeds having an effluent problem arising from the extraction of bones.

From a bag-washing plant which found difficulty in meeting the requirements of a local authority, because of the high carbohydrate content of its effluent.

From a sweet factory having an effluent causing nuisance.

From a factory manufacturing edible oils, margarine and soaps.

From a starch processing factory which was in difficulties with local authorities.

From an insecticide manufacturing firm faced with a difficult disposal problem.

From two yeast factories, both in difficulty in regard to the disposal of their effluents.

PLANT PRODUCTS

Cane Wax

A factory for production of cane wax is now under construction in Natal, and, in view of this, work on the processing of muds from an acid preclarification process has been interrupted during the year. A start has, however, been made with the fractionation of the pure cuticle wax to determine its chemical composition. It is already clear that the wax is not wholly composed of esters; it is intended to use here the techniques of study established for wool wax.

Bitterstowwe van die *Cucurbitaceae* (Komkommerfamilie)

Twee struktureel-verwante, giftige verbindings is geïsoleer en voorlopig cucurbitacin A en cucurbitacin B genoem. Die struktuur van cucurbitacin A word ondersoek. Samewerking met 'n personeelid van die Universiteit van Witwatersrand wat cucurbitacin B bestudeer, is gehandhaaf. 'n Navorsingsprogram is in medewerking met die Afdeling Tuinbou opgestel sodat die plantgenetiese en plantfisiologiese aspekte van die probleem in verband gebring kan word met sy chemiese en farmakologiese aspekte.

Kutikulare materiaal van die Sisalplant (*Agave* spp.).

'n Aantal xerofitiese (teen droogte bestand) plante besit 'n dun, onafgebroke skede van waterafwerende kutikula wat uit was en kutien saamgestel is. Kutien van *Agave americana* is ondersoek; dit bevat 'n poliester waaruit 'n mengsel van hidroksiesure na hidroliese verkry word. Die individuele hidroksiesure word deur 'n metode van teenstroomverdeling afgesonder waarna hulle strukture ondersoek word. Die moontlikheid om die kutien by die verwerking van sisal te herwin, word in gedagte gehou.

Seegrasse

Die seisoenstudies van die bestanddele van bruin (wat algiensuur bevat) en rooi (wat agar bevat) seegrass is byna voltooi. Die Departement Plantkunde van die Universiteit Kaapstad het aan die plantkundige sy van die probleem meegewerk. Aandag word nou gewy aan die agars van *Gracilaria confervoides* en *Gelidium pristoides* wat van kommersiële belang is. Die ondersoek val in twee kategorieë: (a) probleme wat direk uit die kommersiële aanwending voortspuit en (b) fundamentele strukturele en fisies-chemiese studies. 'n Aantal waarnemings is gedoen van die veranderings in viskositeit wat gedurende die verwerking van *Gracilaria* agar waargeneem is. Die fundamentele ondersoek is nog maar in die beginstadium hoewel metodes vir die bepaling van molekuleêre gewig ontwikkel is.

Hout

Oplosbare natuurlike lignien is van die totale houtekstrak van swartbasboomhout (*Acacia mollissima*) geïsoleer, chromatografies gereinig en met behulp van die gebruikelike metodes gekarakteriseer. Deur die goedgevestigtheid van die C.S.I.R.O. van Australië, is 'n eksperimentele suurhidrolise-eenheid vir proewe met bas- en ander houtsoorte verkry. Daar is egter nog geen aanvang met hierdie werk gemaak nie.

Plantaardige Olies

Verdere werk is gedoen op die saadolie van *Ximenia* spp. (suurpruim) en 'n reeks nuwe vetsuurbestanddele

Bitter Principles From the *Cucurbitaceae* (Cucumber Family)

Two structurally related compounds responsible for the toxicity and provisionally named cucurbitacin A and B have been isolated. The structure of cucurbitacin A is under study and collaboration is being maintained with a member of staff of the University of the Witwatersrand who is now studying cucurbitacin B. A collaborate programme of research with the Division of Horticulture has been drawn up so that the plant genetical and plant physiological aspects of the problem will be correlated with the chemical and pharmacological aspects.

Cuticular Material From Sisal Plants (*Agave* spp)

A number of xerophytic (drought resistant) plants have a thin continuous sheath of water-repellent cuticle, composed of wax and cutin. Cutin from *Agave americana* has been investigated; it contains a polyester from which a mixture of hydroxy acids is obtained on hydrolysis. The individual hydroxy acids are being separated out by a counter-current distribution method and their structures are under study. The possibility of recovering the cutin from sisal processing is being kept in mind.

Seaweeds

Seasonal studies of the constituents of brown (alginic acid containing) and red (agar containing) seaweeds are nearly complete. The Department of Botany, Cape Town University, has collaborated on the botanical side of this problem. Attention is now being directed to the agars from *Gracilaria confervoides* and *Gelidium pristoides* which are of commercial interest. The investigations fall into two categories: (a) those arising directly from problems of commercial exploitation, (b) fundamental structural and physico-chemical studies. A number of observations have been made in relation to the changes of viscosity observed during processing of *Gracilaria* agar. The fundamental studies are, as yet, in their initial stages although methods for molecular weight determinations have been developed.

Wood

Pure native lignin obtained chromatographically from the total wood extractives of black wattle wood (*Acacia mollissima*) has been characterised by methods in common use for this purpose. By the courtesy of the Australian C.S.I.R.O. an experimental acid wood hydrolysis unit has been obtained for trials with wattle and other woods, but work on this aspect has not yet been started.

Vegetable Oils

Further work has been carried out on the seed oils of *Ximonia* spp. (suurpruim) and by the application

is geïsoleer deur die aanwending van noukeurige distilleertegnieke. Daar was 'n mate van belangstelling in *Ximenia* spp. as 'n moontlike bron van oliesaad onder droë-land toestande in die Laeveld.

Narrassaad

Gedurende opleiding in die fisies-chemiese tegnieke van proteïen-skeikunde, het 'n beurshouer van die Leernywerheidsnavorsings-instituut 'n studie gemaak van saadproteïene afkomstig van die narras (*Acanthosicyos horrida*, Hook)—'n komkommeragtige plant wat veral naby Walvisbaai in Suidwes-Afrika aangetref word. Die vrug is 'n klein spanspek bestaande uit 'n buitenste skil en ses segmente wat talryke sade bevat. Die vrugte en saad van hierdie plant is vroeër op groot skaal as voedsel deur die woestynbewoners van hierdie gebied gebruik en word nog tot 'n sekere mate gebruik. In die jongste tyd is die saad na Suid-Afrika uitgevoer waar hulle in die lekkergoedbedryf gebruik word.

Plantgomme

Om 'n navorsingswerker van 'n Universiteit te help, is plantgomsoorte deur fisies-chemiese tegnieke ondersoek. Die gom van die Port Jacksonstruik is elektroforeties ondersoek, maar dit het geen teken van heterogeniteit getoon nie. Metings van molekulêre gewig deur osmotiese druk en ligverstrooiing het ooreenstemming getoon maar aangesien laasgenoemde waarde ietwat hoër was, is daar 'n moontlikheid dat molekule met 'n reeks molekulêre gewigte in die gom aanwesig is.

Essensiële Olies

Uit navrae blyk dit dat daar 'n groeiende belangstelling in Suid-Afrika is in verband met die moontlikheid van die plaaslike produksie van 'n verskeidenheid van essentiële olies soos bloekomolie, laventelolie, pepermentolie en malva-olie. 'n Paar monsters is reeds ontvang en 'n mate van hulp met die skeikundige ondersoek daarvan is aangebied.

Plantstowwe (algemeen)

Voortvloeiend uit 'n vergadering van belangstellendes in 1952 en in samewerking met die Afdeling Plantkunde van die Landboudepartement, het die laboratorium begin met die opbou van 'n kaartindeks-sisteem wat verwysings bevat na werk op Suid-Afrikaanse plante wat reeds gepubliseer is en wat nog aan die gang is. Kopieë van hierdie kaartindeks sal op datum ghou word en aan belangstellendes uitgeleen word. Op hierdie manier sal Suid-Afrikaanse werkers voorsien word van 'n maklik bekombare bron van inligting aangaande werk wat op Suid-Afrikaanse plante oedoen is, beide plaaslik en oorsee.

of precision distillation techniques, a series of new fatty acid constituents has been isolated. There has been some interest in *Ximenia* spp. as possibly providing an oil seed crop under dry land conditions in the low veld.

Narras Seed

During a course of training in the physico-chemical techniques of protein chemistry, a research bursar of the Leather Industries Research Institute studied seed proteins derived from the narras (*Acanthosicyos horrida*, Hook)—a cucurbitaceous plant which occurs particularly near Walvis Bay in South West Africa. The fruit is a small melon consisting of an outer rind and six segments which contain numerous seeds. The fruits and the seeds from them were extensively used as foods by the desert dwellers of the area in earlier days, and are still used to some extent. More recently, the seeds have been exported to South Africa where they have found use in the confectionery industry.

Plant Gums

As an aid to a University research worker, plant gums have been examined by physico-chemical techniques. Thus the gum from the Port Jackson willow was examined electrophoretically and gave no sign of heterogeneity. Measurements of molecular weight by osmotic pressure and by light scattering were similar, but, as the latter value was somewhat higher, there is the possibility that molecules with a range of molecular weights are present in the gum.

Essential Oils

From enquiries received, there would appear to be a growing interest in South Africa in the possibility of producing a variety of essential oils locally, e.g., eucalyptus, lavender, peppermint, geranium. A few samples have been received and some help with the chemical examination of these has been given.

Plant Extractives (General)

Following on a meeting of interested parties in 1952, and in collaboration with the Division of Botany of the Department of Agriculture, the laboratory has started to build up card index systems covering references to current and past work on South African plants. These card indexes will be issued on loan to interested persons and kept up to date. In this way South African workers will be provided with a ready source of information on past and current work on South African plants, both here and overseas.

Afgesien van die werk in verband met die *Cucurbitaceae* (sien hierbo) is die plantstowwe van *Euryops floribundis* (harpuisbos) en giftige stowwe uit die wortels van *Neorautanenia ficifolius*, ook bestudeer, maar hierdie ondersoek is eger nog in die beginstadium.

DIEREPRODUKTE

Die Kreef (*Jasus lalandii*)

Ondersoek na die nie-proteïen stikstofhoudende bestanddele van die spiere en hepatopankreas-ekstrakte van die kreef is voortgesit. 'n Breedvoerige kwalitatiewe ontleding van die ekstrakte is gemaak deur verplasing-kromatografie op 'n katioonuitruilings-hars gevolg deur 'n papier-kromatografiese ontleding van die verkreë fraksies. Ondersoek na die kwantitatiewe bepaling van die aanwesige aminosure deur middel van die Moore en Stein-metode is aan die gang.

Haemosianien uit kreefbloed is afgesonder en gesuiwer en sy molekulêre gewig, grootte en vorm deur middel van ligverstrooiing, viskositeit, osmotiese druk en diffusiemetings bepaal.

Wolvesel

As gevolg van reëlings wat met die Grootfonteinse Landboukollege getref is, is monsters van merinowol verkry wat, hoewel hulle tot dieselfde klas behoort, grootliks in substansie verskil tussen die twee uiterstes, „styf” en „slap.” Vir 'n ervare wolklassifiseerder is die verskille duidelik maar dit is wenslik om 'n studie te maak van hulle wettenskaplike grondslag. Die monsters is geneem van 'n kudde wat bekend is vir sy slapwol. Monsters van normale wol is ook van dieselfde kudde verkry. Enige bewyse van verskille is gevind. Dit blyk dat slapwol 'n laer sistengehalte het en ook effens vinniger rek wanneer dit in water gedompel en eweredig per eenheid dwarsnitieseloppervlak gelaai word. Die slapwolwesels was merkbaar dunner as die ander en

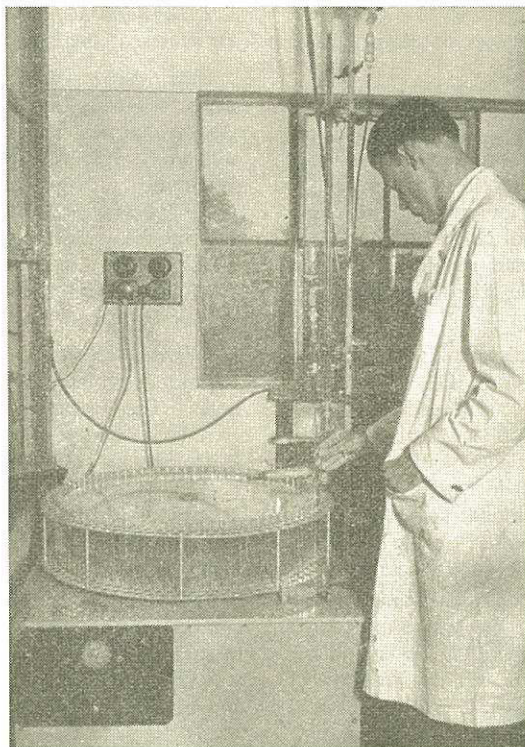
Apart from the work on the *Cucurbitaceae* (see above), extractives from *Euryops floribundis* (resin bush) and toxic substances from the roots of *Neorautanenia ficifolius* have been studied, but these investigations are in their initial stages.

ANIMAL PRODUCTS

The Rock Lobster (*Jasus lalandii*)

Work on the non-protein nitrogenous constituents of rock lobster muscle and hepatopancreas extracts has been continued. A detailed qualitative analysis of the extracts has been made by displacement chromatography on a cation exchange resin, followed by paper chromatographic examination of the fractions obtained. Work is in progress on the quantitative determination of the amino acids present, using the Moore and Stein method.

Haemocyanin from rock lobster blood has been separated and purified, and its molecular weight, size and shape have been determined from light scattering, viscosity, osmotic pressure and diffusion measurements.



'n Ioon-wisselende kolom en outomatiese fraksioneringstoestel wat gebruik word vir die kwantitatiewe ontleding van aminosure uit wol.

An ion exchange column and automatic fraction cutter being used for the quantitative analysis of amino acids from wool.

Wool Fibre

By arrangement with the Grootfontein College of Agriculture, samples of merino wools have been obtained which, although belonging to the same class, differ greatly in “substance,” from the extremes of “firm” and “flabby.” The differences are apparent to an experienced wool-classer, but it is desirable to study their scientific foundations. The samples were collected from a stud with a history for growing “flabby” wool, and samples of normal wool were obtained from the same stud. Some evidence of differences has been found. The flabby wools appeared to have a lower cystine content, and also stretched at a slightly faster rate when immersed in water and loaded equally per unit cross-sectional area of fibre. The flabby wool fibres

dit is moontlik dat die verskil in tasbare hoedanigheid tussen die twee stelle monsters eerder hierdeur verklaar moet word as deur verskille in skeikundige struktuur.

„Staalagtige” Wol

Hierdie soort wol kom voor by skape wat geteel is op weivelde waar daar 'n tekort aan koper is. 'n Paar ou monsters „staalagtige” en normale merinowolwesels afkomstig van die Stellenbosche Landboukollege is vergelyk en daar is gevind dat staalagtige vesels vinniger rek onder konstante belading.

'n Poging word tans aangewend om gekontroleerde monsters te verkry deur skape van sekere plase in die Bredasdorpdistrik uit te soek waar, deur 'n tekort aan koper, die voorkoms van staalagtige vesels aangedui word. Die skape sal na 'n tydperk van etlike maande bymekaar gebring word en 'n koperbevattende diëet ontvang wat die groei van normale wol sal bevorder. Met monsters wat op hierdie manier verkry word, sal 'n volledige skeikundige en fisiese ondersoek gedoen kan word.

Wolwas

Onverseepte fraksie.—Die ondersoek na die strukture van die 1 : 2 glikole is voltooi.

Suurfraksie.—Ondersoek na die a-hidroksiesure wat in wol voorkom, is afgehandel. As 'n aanvullende studie is 'n aantal opties-aktiewe-a-hidroksiesure van bekende konfigurasie gesintetiseer. Moontlike winsgewende gebruike van die totale hidroksiesuurfraksie word in gedagte gehou en monsters word aan belangstellendes verskaf. Aandag word gegee aan gerieflike metodes vir die skeiding van die totale hidroksiesuurfraksie van die ru sure van wolwas.

Tegnologiese Studies.—Die tegniese kalkverseping vir wolwas word op kleinskaal bestudeer. Die reaksiesnelheidstudies waarvan voorheen verslag gedoen is, is verder uitgebrei om die gebruik van suiwer magnesiumhidroksied en van dolomiethoudende kalk (kalsium- en magnesiumhidroksiedmengsels) in te sluit aangesien baie plaaslike kalksoorte dolomiethoudend is. Inligting in verband met die moontlike gebruike van die kalsium- en magnesiumsepe van wolwassure word ingesamel.

Die medewerking van 'n handelonderneming wat ingaan op die moontlikheid van die verwerking van wolwas deur afskeiding met behulp van 'n oplosmiddel, is voortgesit. 'n Aantal monsters van die proewe is ontleed en verslag is daarvoor gedoen.

Menslike haarwas

Hierdie studie is aanvullend by die studies op wolwas en 'n omvattende gebruik word van die tegnieke wat vir wolwas ontwikkel is, gemaak. By verseping lewer die was 'n komplekse mengsel van alkohole waarvan die

were noticeably thinner than the others, and it is possible that the difference in tactile properties between the two sets of samples may be accounted for more by this than by differences in chemical structure.

“Steely” Wools

This type of wool appears when sheep are grown on copper-deficient pastures. Some old samples of “steely” and of normal merino wool fibres, obtained from the Stellenbosch College of Agriculture, were compared and it was found that steely fibres showed a greater rate of stretching under constant load.

An attempt is currently being made to obtain controlled samples by selecting sheep from certain farms in the Bredasdorp area where copper deficiency is evidenced by appearance of steely fibres. The sheep will, after a period of several months, be collected and given a copper-containing diet to cause growth of normal wool. With samples so obtained, it is intended to carry out a full chemical and physical examination.

Wool Wax

Unsaponifiable fraction.—The investigations into the structures of the 1 : 2 glycols have been completed.

Acid fraction.—The investigations into the a-hydroxy acids occurring in wool wax have been completed. As a complementary study a number of optically active a-hydroxy acids of known configuration have been synthesised. Possibilities of profitable uses for the total hydroxy acid fraction are being kept in mind and samples supplied to interested parties. Attention is being given to convenient methods for the separation of the total hydroxy acid fraction from the crude acids of wool wax.

Technological studies.—The lime saponification process for wool wax is being studied on a pilot plant scale. The previously reported reaction rate studies have been extended to cover the use of pure magnesium hydroxide and of dolomitic limes (calcium and magnesium hydroxide mixtures), since many local limes are dolomitic. Information as to possible uses for the calcium and magnesium soaps of wool wax acids is being collected.

Collaboration has been maintained with a commercial concern which is investigating the possibility of processing wool wax by a solvent segregation method; a number of samples from these trials has been examined and reported upon.

Human Hair Wax

This study is subsidiary to the wool wax studies and extensive use is being made of the techniques developed for wool wax. The wax yields, on saponification, a complex mixture of alcohols from which the

normale reeks geïsoleer en vier lede tot dusver geïdentifiseer is. Die ander fraksies van die onverseepbares word ondersoek.

Visolies

Die beurshouer vir visiolie-navorsing het 'n metode vir die studie van gehidrogeneerde fraksies van sardynoliesure en soortgelyke stowwe ontwikkel. Die toepassing van die kromatografiese tegniek op die hoogs-onversadigde sure van hierdie olies word bestudeer. Terselfertyd is 'n molekulêre distilleerapparaat waarin 'n vloeistoffilm deur drie stadia daal, ontwikkel as 'n hulpfraksioneringsimplement vir hierdie hooglabiele stowwe.

Visskubbe

'n Studie word gemaak van die geaardheid van die proteïene in vars sardynskubbe. Na die verwydering van anorganiese materiaal deur swak sure, word gelatien beskou as die fraksie wat oplosbaar is in warm water. Daar is gevind dat die verhouding van gelatien tot igtilepidien (onoplosbare proteïen) ongeveer 3:1 is in teenstelling met die verhouding 1:1 waarvan melding gemaak word in die literatuur. 'n Kwantitatiewe aminosuurontleding van albei fraksies is onderweg.

MIKROBIOLOGIESE SKEIKUNDE

Mikrobiologiese Onderzoek van die bereiding van Kafferbier

Kafferbier word op groot skaal in Suidelike Afrika gebrou deur verskeie stadsrade en instansies wat groot getalle naturelle in hulle diens het. In die meeste gevalle word die brouery met die eenvoudigste toerusting uitgevoer en geen poging word aangewend om die vergisting biologies te beheer nie. Gevolglik is dit geen seldsame verskynsel nie dat die produksie van 'n hele dag, wat etlike duisende gellings beloop, dikwels in 'n brouery verlore gaan as gevolg van versuring deur infeksie met asynsuurbakterieë. Met die oog hierop was dit van algemene belang om 'n mikrobiologiese ondersoek na die brou van kafferbier in te stel. Die gisflora van bier, „beslag” en kafferkoringmout van drie munisipale brouerye is bestudeer en 'n aanvang is reeds gemaak met die ondersoek van die melksuurbakterieë. Dit is die vooropgestelde doel om die moontlikheid te ondersoek of die bier te brou met behulp van geïsoleerde reinkulture van giste en melksuurbakterieë wat die gewenste smaak kan gee.

Verwering van Betonriole

Hierdie ondersoek word met behulp van 'n Beurs van die Instituut van Munisipale Ingenieurs uitgevoer.

normal series has been isolated and four members identified so far; the other fractions of the non-saponifiables are being investigated.

Marine Oils

The Marine Oil Research Fellow has developed a method for the study of hydrogenated fractions of pilchard oil acids and similar materials. The application of the chromatographic technique to the highly unsaturated acids of these oils is under study. At the same time a three-stage falling film molecular still has been developed as an auxiliary fractionating tool for these highly labile materials.

Fish Scales

A study is being carried out of the nature of the proteins in fresh pilchard scales. After removal of inorganic matter by weak acids, gelatine is estimated as the fraction soluble in hot water. The ratio of gelatine to ichthylepidin (insoluble protein) has been found to be about 3:1, which is in contrast to the 1:1 ratio mentioned in the literature. A quantitative amino acid analysis of both fractions is in progress.

MICROBIOLOGICAL CHEMISTRY

A Microbiological Study of the Brewing of Kaffir Beer

Kaffir beer is brewed on a large scale by many municipalities and big employers of native labour in Southern Africa. In most cases the brewing is carried out with the simplest equipment and no attempt is made to control the yeasts or bacteria present in the porridge and malt. Consequently it is not surprising that it frequently happens that a day's brew, amounting to several thousand gallons, goes sour due to infection by acetic acid-producing bacteria and has to be discarded. In view of this, it was considered that it would be of interest to make a microbiological study of the brewing of kaffir beer. The yeast flora of beer, "porridge" and sorghum malt from three municipal breweries have been studied in detail and work on the lactic acid bacteria is in progress. It is the aim to brew beer eventually with the aid of pure cultures of yeasts and lactobacilli isolated from this source.

Corrosion of Concrete Sewers

This work is being carried out under a Fellowship established through the Institute of Municipal Engineers.

'n Bakteriologiese opname is gemaak van 'n aantal monsters van verweerde beton, watervlakslyk en rioolafvalwater van die Witwatersrand en Pretoria. Een of beide van die swawelbakterieë *Thiobacillus thiooxidans* en *The thioparus* is oral aangetref waar daar ververing plaasgevind het. Daar bestaan geen twyfel dat die ververing van betonriole, 'n ernstige probleem in baie dele van Suid-Afrika, te wyte is aan swawelsuur wat deur hierdie mikro-organismes gevorm word.

Daar is aangetoon dat *Thiobacillus thiooxidans* in staat is om die swawelwaterstof wat aanwesig is in riool-atmosfere as die enigste bron van swawel vir die groei en produksie van swawelsuur te gebruik. Om die minimum-konsentrasie van swawelwaterstof nodig vir die ontwikkeling van hierdie organisme, te bepaal, is 'n gaskamer gebou waardeur 'n aanhoudende stroom vogtige lug gestuur kan word wat hoeveelhede swawelwaterstof, ammonia en koolstofdioksied bevat, en na gelang verander kan word. Proewe het getoon dat betonstawe wat met 'n gemengde kultuur van *Th. thiooxidans* en *Th. thioparus* ge-ent en blootgestel is aan 'n lugstroom wat 15 dele per millimeter (d.p.m.) swawelwaterstof bevat, binne vyf weke definitiewe tekens van ververing toon. Kontroles onder dieselfde toestande wat nie ge-ent was nie, is nie aangetas nie. Daar was maar min verskil tussen die groeitempo van die bakterieë in lug wat 10 d.p.m. en 1 d.p.m. swawel-

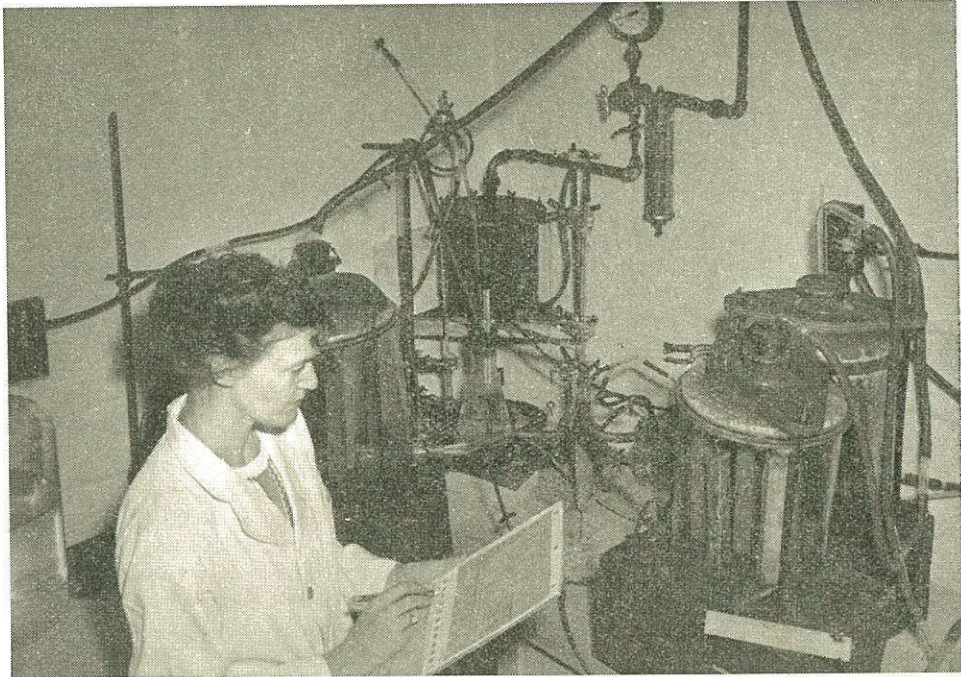
A bacteriological survey has been made of a number of specimens of corroded concrete, water level slimes, and effluents from Witwatersrand and Pretoria sewers. Either one or both of the sulphur-oxidising bacteria *Thiobacillus thiooxidans* and *Th. thioparus* have been found whenever there was corrosion and there is no doubt that the corrosion of concrete sewers, which is a serious problem in many parts of South Africa, is due to the production of sulphuric acid by these micro-organisms.

Thiobacillus thiooxidans was shown to be capable of using the hydrogen sulphide which is present in sewer atmospheres as a sole source of sulphur for growth and sulphuric acid production. To determine the minimum concentration of hydrogen sulphide needed by this organism a gas chamber was constructed through which could be passed a constant stream of humidified air containing controlled amounts of hydrogen sulphide, ammonia and carbon dioxide. Experiments showed that concrete bars inoculated with a mixed culture of *Th. thiooxidans* and *Th. thioparus* and exposed to an air stream containing 15 p.p.m. hydrogen sulphide showed definite signs of corrosion in five weeks. Uninoculated controls exposed under the same conditions were not affected. There was little difference between the rate of growth of the bacteria in air containing 10 p.p.m. and 1 p.p.m. hydrogen



Die tap van 'n model-gistingsketel vir die brou van Kafferbier in die Nasionale Chemiese Laboratorium.

Tapping a model fermenter for the brewing of Kaffir beer in the National Chemical Research Laboratory.



Hierdie betonmonsters is getoets om vas te stel wat hulle weerstand is teen verwerking deur sure wat as gevolg van bakteriese werking in rioolatmosfera gevorm is.

Specimens of concrete are here seen being tested to determine their resistance to corrosion by acids formed as a result of bacterial action in sewer atmospheres.

waterstof bevat het. Die groei was egter merkbaar stadiger in 'n atmosfeer met 0.5 d.p.m. swawelwaterstof.

'n Aantal stowwe is getoets vir hulle vermoë om die groei van *Th. thiooxidans* in 'n vloeibare medium te rem. Selenium, pentachloorfenol en 'n kwarternêre ammoniumverbinding het uitstekende resultate gelever. Hierdie en ander moontlike remstowwe is in betonstawe ingesluit en hulle beskerming teen bakteriële verwerking word in die gaskamer op die proef gestel.

sulphide, but growth was noticeably slower with 0.5 p.p.m. hydrogen sulphide.

A number of substances has been tested for their ability to inhibit the growth of *Th. thiooxidans* in liquid medium. Selenium, pentachlorophenol and a quaternary ammonium compound gave excellent results. These and other possible inhibitors have been incorporated into concrete bars and their resistance to corrosion is being tested in the gas chamber.

VOEDING

Agtergrond vir Nuwe Ontwikkelings

Voorheen is voedingnavorsing deur 'n klein eenheid gedoen wat in die Suid-Afrikaanse Instituut vir Mediese Navorsing gehuisves was. Die status van die eenheid is, volgens die verslag van 1952, hersien en vorm nou 'n nuwe mediese navorsingseenheid wat bekendstaan as die Navorsingseenheid vir Menslike Biochemie. Die werksaamhede van Ig. inrigting word elders bespreek.

Dit het egter nie 'n staking van die werksaamhede op die gebied van voeding beteken nie, aangesien 'n nuwe voedingnavorsingsgroep volgens ooreenkoms met die Departement Voeding tans saamgestel word. Die groep word aanvanklik binne die Nasionale Chemiese

NUTRITION

The Background to New Developments

Previously work on nutrition was carried out by a small Unit which was accommodated in the South African Institute for Medical Research. The status of this Unit, as was reported in 1952, has been revised and now constitutes a new medical research unit—known as the Human Biochemistry Research Unit. Its activities are reported elsewhere.

This has not meant a cessation of activity in the field of nutrition, however, since by agreement with the Department of Nutrition, a new nutrition research group is being formed. This is being set up initially within the National Chemical Research Laboratory,

Navorsingslaboratorium gevorm en die vorming word beskou as die eerste stap in die opbou van 'n aparte organisasie vir voedingnavorsing.

Gedurende die eerste jaar van sy werksaamhede sal hierdie nuwe afdeling gefinansier word met behulp van fondse wat die Departement tot die beskikking van die W.N.N.R. gestel het. Die Departement het ook ingestem om vier lede van sy wetenskaplike personeel tydelik aan die W.N.N.R. af te staan. Volgens hierdie ooreenkoms is twee beamptes van die Departement reeds by die W.N.N.R. in diens. Die werwing van verdere personeellede asook reëlings in verband met huisvesting en ander fasiliteite is onderweg.

'n Loodskomitee is deur die W.N.N.R. in die lewe geroep om die werksaamhede van die afdeling te lei en 'n navorsingsprogram is goedgekeur.

Voedselverryking en die Bepaling van die Voedingsenskappe van Voedselsoorte

Sommige van die belangrikste en verreikendste werksaamhede van die Departement Voeding is gebaseer op die verryking van koring- en mielieprodukte wat die belangrikste voedsel van 'n groot deel van ons bevolking uitmaak. Hierdie verryking bring in die eerste plek mee die toevoeging van proteiene uit ander bronne by die graanprodukte om die tekort aan noodsaaklike aminosure in lg. produkte aan te vul.

Op die navorsingsprogram moet voorkeur dus gegee word aan die oprigting van masjinerie waardeur die voedingshoedanighede van graansoorte en potensiele verrykingsmiddels bepaal kan word en verliese in voedingsgehalte gedurende verwerking tot 'n minimum beperk kan word. Met die hulp van prof. Kellerman van die Universiteit van Pretoria en die Direkteur van die Veeartsenykundige Navorsingsinstituut te Onderstepoort, wat albei sekere fasiliteite beskikbaar gestel het, was dit moontlik om 'n begin te maak met die biologiese bepaling van verskeie proteiene deur verskillende tegnieke. Reëlings word ook getref vir die opstelling van chemiese en mikrobiologiese bepalingsmetodes; by laasgenoemde bepalings word hulp ontvang deur die S.A. Buro vir Standaarde.

Mielie- en Koringprodukte

In die meliemeulebedryf bestaan tans 'n neiging om maalmasjinerie in te voer wat voorsiening maak vir die verwydering van die kiem en gevolglik 'n meel te produseer met 'n lae kiemgehalte. Hierdie maalmethode kan tot ernstige voedingstekorte lei. In samewerking met 'n beampte van die Mieliebeheerraad, is 'n verslag opgestel vir die Departement van Voeding wat die moontlike nadelige gevolge van hierdie metode in die meulpraktiek behandel.

Die Koringbeheerraad wat beskik oor laboratoriums toegerus met eksperimentele bakapparaat, het onder-

and its formation is regarded as the first step in the building up of a separate organisation for nutrition research.

During the first year of its operation, this new section is being financed with funds made available to the C.S.I.R. by the Department, which has also agreed to second four of its scientific staff to the C.S.I.R. Two officers of the Department are already working with the C.S.I.R. in terms of this arrangement. The recruitment of other members of staff is now in hand, as are also arrangements for accommodation and facilities.

A Steering Committee has been established by the C.S.I.R. to guide the affairs of the section, and a research programme has been approved.

Food Enrichment and the Assessment of the Nutritional Characteristics of Foods

Some of the most important and far reaching activities of the Department of Nutrition are based upon its aim to enrich the wheat and maize products which form the staple articles of diet for such a large proportion of our population. Such enrichment involves primarily the addition to cereal products of proteins from other sources, which by virtue of their contents of "essential" amino acids deficient in wheat and maize meals, are able to remedy or reduce the nutritional deficiencies of the cereal proteins themselves.

A first priority on the research programme is therefore the setting up of machinery whereby the nutritional characteristics of cereals and of potential enriching agents can be assessed, and losses in nutritional quality during processing brought to a minimum. Through assistance from Professor Kellerman at the University of Pretoria, and from the Director of the Onderstepoort Veterinary Research Institute, both of whom have made facilities available, it has been possible to make a beginning on the biological evaluation of different proteins by various techniques. Arrangements are also in train for the setting up of chemical and microbiological assay techniques, and in respect of the latter, assistance is being given by the S.A. Bureau of Standards.

Maize and Wheat Products

A present trend in the maize milling industry is towards the introduction of milling machinery which permits of the extraction of the germ, and therefore of the production of maize meals with a lower content of germ. The removal of the germ from maize meals used as staple articles of diet could result in severe nutritional deficiencies, and, in collaboration with an officer of the Maize Control Board, a report on the nutritional implications of these trends in milling practice has been prepared for the Department of Nutrition.

The Wheat Control Board, which has laboratories

neem om sy steun aan die studie van koringprodukte te verleen.

Verrykende Produkte

'n Groot verskeidenheid verrykende produkte is gekeur vir ondersoek. O.a. kan van suiwelprodukte, grondboontjemeel, sojaboontjemeel, vismeel, suurdeeg, vleismeel, peulplante, aartappelmeel ens. melding gemaak word.

Met die uitbreiding van ondersoek van hierdie produkte, word elke moontlike poging aangewend om die lewendige belangstelling en ondersteuning van die betrokke nywerhede op te wek vir die vervaardiging van produkte van die hoogste gehalte vir verrykingsdoelindes. In hierdie verband is die geval van vismeel vir die verryking van graanprodukte 'n tipiese voorbeeld. Die Visnywerheidsnavorsings-instituut bygestaan deur die vervaardigers van vismeel het reeds die ondersoek van metodes vir die vervaardiging van smaaklike vismeel begin. Laasgenoemde sal deur 'n besigheidsonderneming op 'n proefbasis vervaardig word. Die toegepaste prosesse sal biologies gekontroleer word volgens hulle proteïengehalte wat sal verseker dat die gelewerde produk die hoogste moontlike voedingswaarde besit.

ALGEMEEN

Gepolimeriseerde Olies

'n Studie is gemaak van die struktuur van die dimeer wat ontstaan wanneer metiel β -eleostearaat verhit word. Daar is gevind dat die verwagte sesring wat in vier aangrensende posisies gesubstitueer is, ontstaan. 'n Nagraadse student van die Universiteit van Pretoria aan wie die nodige laboratoriumfasiliteite verleen is, is besig met 'n studie van die fisies-chemiese aspekte van die polimerisering van droënde olies. In die eerste instansie word die molekuleêre gewigsverdeling van tipiese verhardende olies ondersoek. Die outo-oksidasie van metiel-linoleaat is verder ondersoek, deels omdat linoleïensuur een van die belangrikste vetsure is wat in vet sowel as in droënde olies voorkom en deels omdat die fynstruktuur van die isohidroperoksied wat gevorm word, nog op verklaring wag.

Koolteer

'n Studie word tans gemaak van basisse wat herwin word uit hoë temperatuurteer by Yskor. Die identifikasie en kwantitatiewe bepaling van die piridien, pikolien en lutidien en sommige van die hoogkokende komponente word in vooruitsig gestel.

Was van die Fischer Tropsch Proses

Fasiliteite is beskikbaar gestel vir drie personeellede van die S.A. Steenkool-Olie- en Gaskorporasie om

equipped with test baking equipment, has agreed to co-operate in the study of wheat products.

Enriching Materials

A wide range of enriching materials has been selected for study. Amongst them may be mentioned dairy products, groundnut flour, soya bean flour, fish flour, yeast, meat meals, legumes, potato flour, etc.

In developing work on these various products, every effort is being made to enlist the active interest and support of the industries concerned in producing materials of the highest quality for enrichment purposes. The case of fish flour for cereal enrichment is typical in this respect. The Fishing Industry Research Institute, with assistance from fish meal manufacturers, is embarking on a search for methods of producing palatable fish flours. These will be produced on a pilot plant scale by a commercial concern, and the processes used are being controlled by biological tests of protein quality which will ensure that products of the maximum possible nutritional value result.

GENERAL

Polymerised Oils

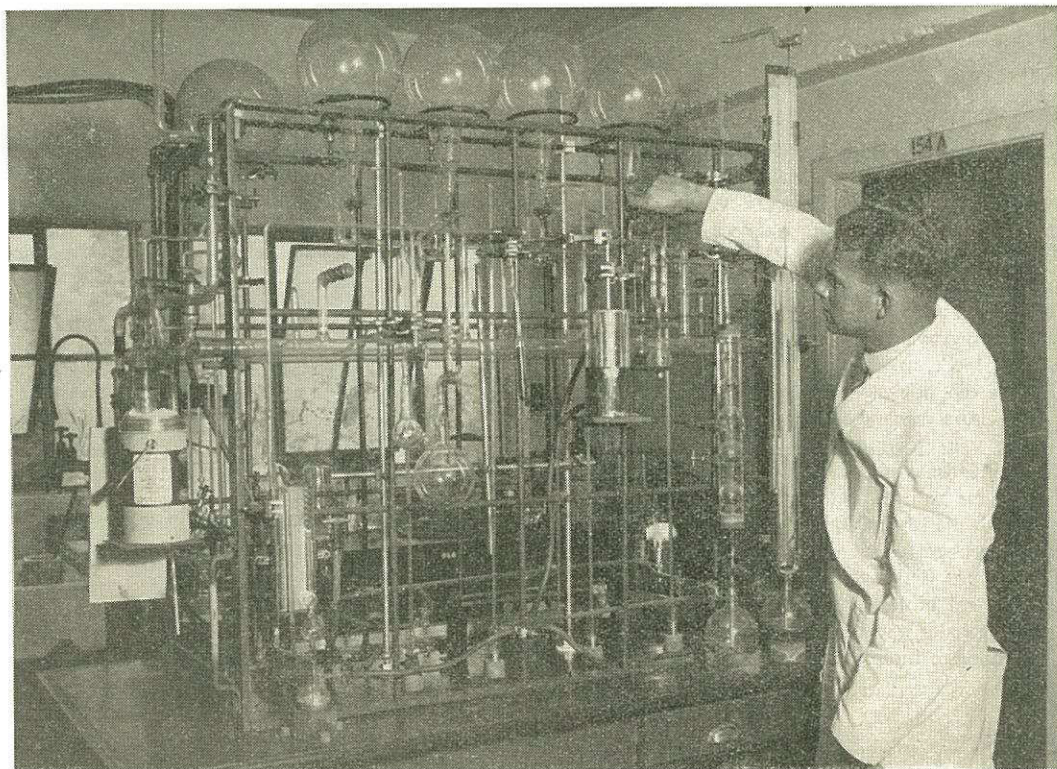
The structure of the dimer produced by heating methyl β -elacostearate has been studied: it has been found to contain the expected six-membered ring substituted in four neighbouring positions. Physico-chemical aspects of drying oil polymerisation are under study by a post-graduate student of the University of Pretoria who has been afforded facilities in the laboratory. The molecular weight distribution of typical stand oils is being investigated as a first step. The autoxidation of methyl linoleate has been investigated further, partly because linoleic acid is one of the most important fatty acids occurring in both fats and in drying oils and partly because the fine structure of the isohydroperoxides produced remained to be elucidated.

Coal Tar

Bases recovered from Iscor high temperature tars are under study. The identification and estimation of the pyridine, picolines, lutidines and some of the higher boiling components is envisaged.

Waxes From Fischer Tropsch Process

Facilities have been made available for three members of the staff of the S.A. Coal, Oil and Gas Corporation



'n Hoëvakuum toestel wat gebruik word om die adsorpsie van gasse en dampe of fyn-verdeelde vaste stowwe te meet.

A high-vacuum assembly in use for measuring the adsorption of gases and vapours on finely divided solids.

navorsing te doen op die probleme wat gepaard gaan met die gebruik en verkoop van die was wat vervaardig sal word deur hulle installasie wat tans nog in aanbou is. Besondere aandag word aan die harde-was fraksies gewy.

to work in the laboratory on problems associated with the use and sale of waxes from their plant at present under construction. Particular attention is being paid to the hard wax fractions.

Studies van die Adsorpsie van Gasse

Studies of Gaseous Adsorption

In die kinetika van adsorpsie en katalise is die oordrag van gasse en dampe in poreuse media van die aller-grootste belang. Onder sekere toestande is die „oppervlakdiffusie” van geadsorbeerde molekule oorheersend. Metodes waarby gebruik gemaak word van stasionêre en veranderlike toestande is aangewend vir die bepaling van diffusiekoëffisiënte en die verkreeë resultate vergelyk goed. Daar is gevind dat die orde van oppervlakdiffusiekoëffisiënte diselfde is as by vloeistowwe. Die proses is geaktiveerd d.w.s. geadsorbeerde molekule kan slegs beweeg nadat hulle genoeg energie verkry het. Hierdie beginsels word tans toegepas om die moontlike skeiding van gasse te ondersoek.

In kinetics of adsorption and catalysis the transport of gases and vapours in porous media is of prime importance. Under certain conditions the dominant part is played by the “surface diffusion” of adsorbed molecules. Steady and transient state methods have been used for the determination of diffusion coefficients and the results were found to compare well. It was found that the order of “surface diffusion coefficients” is the same as that in liquids. The process is an activated one, *i.e.*, adsorbed molecules can move only after having acquired a sufficient energy. These principles are at present being applied to investigate the possible separation of gases.

'n Vergelyking is getref tussen enkellaagkapasiteite met lae adsorpsiehitte en dié vir stelsels met hoë adsorpsiehitte. 'n Goeie ooreenkoms is gevind by die gebruik van die B.E.T. vergelyking soos deur Anderson gewysig.

Radioskeikunde

Studies in verband met die toediening van kunsmis vir tabakplante in samewerking met die Tabaknavorsingstasie is voortgesit. Kunsmistoediening het geen uitwerking gehad op die persentasie fosfor wat deur die plant opgeneem word nie maar op een of twee van die grondsoorte wat ondersoek is, het belangrike verskille voorgekom ten opsigte van die grootte van plante in soverre dat bemeste plante groter was en gevolglik 'n groter totale fosforgehalte gehad het. Resultate op die ander grond was minder seker. Die gebruik van hol brikette van gedroogde plantmateriaal vir die meting van radio-aktiewe fosfor tydens die later stadia van die proef is ondersoek en van praktiese belang bevind.

A comparison has been made of monolayer capacities when heats of adsorption are very small, with those for systems with high heats of adsorption. Good agreement was found if the Anderson modification of the B.E.T. equation was used.

Radiochemistry

Studies in application of fertiliser to tobacco plants, in collaboration with the Tobacco Research Station, have been continued. Addition of fertiliser did not affect the percentage of phosphorus taken up by the plant, but on one of the two soils studied, significant differences occurred in sizes of plants, in that fertilised plants were larger and so had a larger total phosphate content. Results on the other soil were less certain. The use of hollow briquets of dried plant material for measuring radioactive phosphorus in the latter stages of experiment was investigated and found practical.



Tabakblare wat gekweek is met behulp van kunsmis wat radioaktiewe fosfor bevat word ondersoek ten einde die fosforopname te bepaal. Die werk word in medewerking met die Sentrale Tabaknavorsingstasie uitgevoer.

Tobacco leaves grown with the aid of a fertilizer containing radio-active phosphorus are being examined to determine the uptake of phosphate. This work is being undertaken in co-operation with the Central Tobacco Research Station.

In samewerking met die Afdeling Biofisika is die Mn⁵⁴-isotoop van mangaan afgeskei van suiwer ysterstawe wat in die Harwell-suil aan bestraling onderwerp is. In 'n verslag opgestel vir publikasie word bewys gelewer dat hierdie element uit 'n Fe⁵⁴ (n, p) Mn⁵⁴ reaksie ontstaan het.

Metaalverwering

Voorlopige werk is gedoen in verband met verwering deur water wat kook onder toestande wat in stoomlokomotiewe heers.

Studies is gemaak van faktore wat staalverwering in gewapende beton veroorsaak met die oog op die aanwending van katodiese beskerming as 'n maatreël teen verwering in bestaande geboue.

Die verf van staalheiwark in Suid-Afrikaanse hawens wat altyd 'n probleem oplewer, asook die installering van katodiese beskerming, het ook veel aandag geniet. Die wyse waarop plaatheiwark verweer het voorbeelde gelewer van die werking van sulfaat-reduserende bakterieë in die ingeslote water van 'n hawe. 'n Algemene verslag oor die werking van sulfaat-reduserende bakterieë in hierdie verband, is opgestel vir publikasie.

Die snelle verwering van die koperbekleding onderaan bote, is teruggevoer tot die gebruik van nie-dekkende skeepsverf wat kwikverbindinge bevat het.

Aandag is geskenk aan 'n groot aantal praktiese probleme van verskillende aard op 'n kontrakbasis.

Analitiese Laboratorium

Gedurende die afgelope jaar het die eise wat deur die verskillende afdelings van die W.N.N.R. aan die analitiese laboratorium gestel word, steeds toegeneem. Die chroomskema was veral verantwoordelik vir 'n groot hoeveelheid analitiese werk. Die opname van Suid-Afrikaanse klei het die voltydse dienste van een analise vereis. 'n Vlam-fotometer is opgestel en met sukses gebruik vir roetinebepalings van alkaliese in kleisoorte en ander stowwe. Verder is 'n toenemende verskeidenheid van analyses vir die organiese en biochemiese afdelings uitgevoer met inbegrip van infra-rooi spektrometrie. Verskeie analyses is ook vir die N.F.L. uitgevoer, bv. die verryking van spoorelemente in plantasies en die analise van uraanerster vir geochemiese ouderdomsbepalings.

In collaboration with the Biophysics Division, the Mn⁵⁴ isotope of manganese was separated from bars of pure iron irradiated in the Harwell pile. In an account prepared for publication, evidence is cited that this originates from a Fe⁵⁴ (n,p) Mn⁵⁴ reaction.

Metallic Corrosion

Some preliminary work has been carried out on corrosion by waters boiling under the conditions experienced in steam locomotives.

Studies have been made of factors causing corrosion of steel in reinforced concrete, with a view to adoption of cathodic protection as a means of preventing corrosion in existing structures.

The problem of painting steel piling in South African harbours, followed by installation of cathodic protection has also received much attention. The mode of corrosion of sheet piling has provided instances of the activity of sulphate-reducing bacteria in the enclosed waters of a harbour, and a general account of sulphate-reducing bacteria in this connection has been prepared for publication.

An example of rapid corrosion of underwater copper sheathing on launches has been traced to the use of antifouling paints containing mercury compounds.

A large number of practical problems of diverse nature has been dealt with on a contract basis.

Analytical Laboratory

The demand of the various sections of the C.S.I.R. on the services of the analytical laboratory has steadily increased in the past year. The chromium project in particular was responsible for a very large volume of analytical work. The survey on South African clays required the full-time service of one analyst. A flame photometer has been set up and is being used successfully for routine determinations of alkalis in clays and other material. Furthermore, an increasing variety of analytical work including infra-red spectrometry was performed for the organic and biochemical sections. Various analytical services have been rendered to the N.P.L., e.g., enrichment of trace elements in plant ash and analyses of uranium ores for geochemical age determinations.

Nasionale Fisiese Laboratorium

Direkteur: DR. A. J. A. ROUX

Die ontwikkeling van die Nasionale Fisiese Laboratorium gedurende die afgelope jaar is veral gekenmerk deur die toenemende mate waarin die nywerheid en ander instansies van die dienste van die laboratorium gebruik maak. Hierdie belangrike neiging moet daaraan toegeskryf word dat die laboratorium besig is om te ontwikkel uit die periode waarin die aandag hoofsaaklik bepaal moes word by die opleiding van gespesialiseerde personeel en die opbou van geskikte fasiliteite.

Dat hierdie fase van sy ontwikkeling bereik kon word in die kort periode sedert die stigting van die Nasionale Fisiese Laboratorium, is in geen geringe mate te danke nie aan die Advieskomitee wat weereens 'n jaar van uitmuntende diens gelewer het.

Alhoewel die laboratorium op 'n groot deel van die gebied van fisika reeds so toegerus is dat dit sy funksies kan vervul en in die dringendste behoeftes voorsien, is daar nog enkele rigtings waarin die bestaande fasiliteite heeltemal ontoereikend is. So byvoorbeeld sal die personeel en geriewe vir kernfisiese navorsing uitgebrei moet word as dit enigsins in verhouding wil wees met die belang wat Suid-Afrika het by die vinnige ontwikkelinge wat op hierdie gebied plaasvind.

KERNFISIKA

Sentrum vir Kernfisiese Navorsing

Gedurende die afgelope jaar was die aandag hoofsaaklik toegespits op verdere voorbereiding in verband met die daarstelling van 'n nasionale sentrum vir kernfisiese navorsing.

Die ontwerp van die siklotron, met die uitsondering van enkele werk tekeninge, is voltooi, terwyl 'n groot aantal van die onderdele reeds vervaardig en aan die nodige toetse onderwerp is. Sodra die siklotronsaal beskikbaar gestel is, sal 'n aanvang gemaak word met die oprigting van die siklotron self.

Intussen is bevredigende vordering ook gemaak met die ontwikkeling van bykomstige toerusting. Die permanente magneetspektrometer is gereed en sal in die gebou vir kernfisika wat ook tans in aanbou is, opgerig word. Ook die sintillasiemeter is voltooi en 'n deeglike studie is van sy eienskappe gemaak.

Drie-kwantumvernietiging van Positrone

Na aanleiding van die onlangse ontdekking in die buiteland van 'n relatiewe seldsame proses waarin 'n positron, wat in materie tot rus kom, saamsmelt met 'n

National Physical Laboratory

Director: DR. A. J. A. ROUX

The development of the National Physical Laboratory during the past year is characterised particularly by the increasing degree to which Industry and other bodies have made use of the services of the laboratory. This important tendency may be ascribed to the fact that the laboratory has now passed out of the stage where attention had of necessity to be restricted to the training of specialised personnel and the provision of suitable facilities.

That this stage of development has been reached in the short period since the establishment of the National Physical Laboratory is in no small measure due to the Advisory Committee which has once again rendered a year of valuable service.

Although the Laboratory is now equipped to cope with the most essential demands in the field of physics, there are still a few gaps where the existing facilities are totally inadequate. Thus, for example, the personnel and facilities for research in nuclear physics will have to be augmented if South Africa is to keep pace with the rapid developments which are taking place in this field.

NUCLEAR PHYSICS

Centre of Nuclear Research

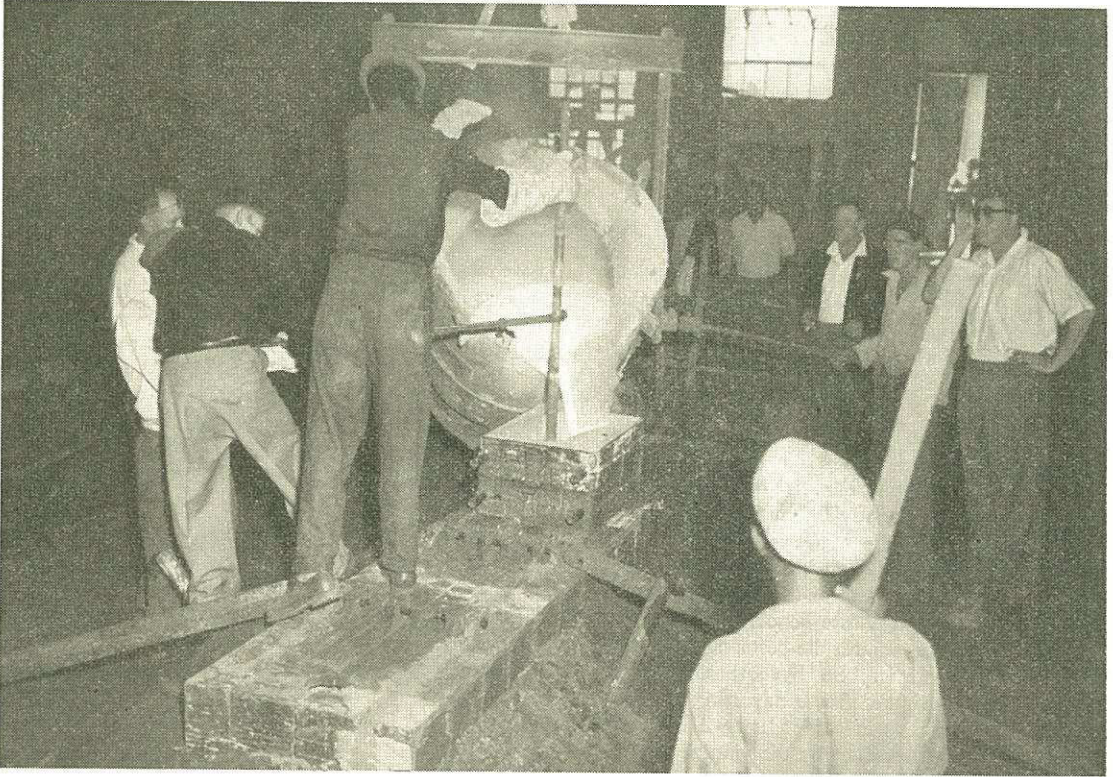
During the past year attention has been devoted mainly to further preparations for the establishment of a national centre for nuclear research.

The design of the cyclotron, with the exception of a few working drawings, is complete, while a number of the component parts have now been constructed and subjected to the necessary tests. As soon as the cyclotron hall is available a start will be made with the installation of the cyclotron itself.

In the meantime satisfactory progress has been made with the auxiliary equipment. The permanent magnet spectrometer is ready and will be installed in the nuclear physics building which is now under construction. The scintillation spectrometer is also complete and a thorough study of its characteristics has been made.

Three Quantum Annihilation of Positrons

Following upon the recent discovery overseas of a relatively rare phenomenon in which a positron, coming to rest in matter, unites with a negatron, resulting in



Die giet van die vakuumkamer vir die Siklotron van die W.N.N.R. Al die vernaamste komponente en onderdele van die siklotron word in Suid-Afrika vervaardig.

Casting of the vacuum chamber for the C.S.I.R. Cyclotron. All the major components and assemblies for the cyclotron are being made in South Africa.

negatron en waarin die saamsmeltingsproses lei tot die algehele vernietiging van die twee deeltjies, met die uitstraling van hul rusmassa-energie in die vorm van drie gammakwantums, is 'n omvattende eksperimentele studie van die proses onderneem. Die feit dat 'n 4π -telbuis ook vir hierdie studie beskikbaar was het meegebring dat die waarskynlikheid van die proses absoluut bepaal kon word.

Standaardisering van Radio-aktiwiteit

'n Hele aantal roetine-standaardiserings is uitgevoer, hoofsaaklik vir navorsingsinrigtings. Alle moeilikhede wat met die 4π -telbuis ondervind is, is uit die weg geruim en dit is tans moontlik om 'n absolute standaardisering van enige radio-isotoop se disintegrasië met 'n noukeurigheid van ongeveer 2 persent uit te voer.

'n Opstelling waarin 'n telbuis en sintillasiesteller gekombineer word, is vir die Geologiese Opname opgebou. Met behulp hiervan is dit moontlik om ertsmonsters waarin uraan en thorium saam voorkom te ontleed, asook monsters waarin die ewewig tussen die moederstof en die volprodukte verstoer is.

the total destruction of the two particles with the emission of their mass energy in the form of *three* gamma quanta, an exhaustive investigation of the process has been undertaken. The availability of a 4π counter for this study made it possible to make an absolute determination of the probability of the occurrence.

Standardization of Radio Activity

A large number of routine standardizations, mainly for research institutions, have been undertaken. All the difficulties experienced with the 4π counter have been overcome and it is now possible to carry out an absolute standardization of any radio-isotope disintegration with an error of about 2 per cent.

Apparatus in which a counter and a scintillation counter are combined, has been built for the Geological Survey. With the aid of this equipment it is possible to analyse mineral samples containing both uranium and thorium, and also samples in which the equilibrium between the original material and its daughter substances has been disturbed.

Toepassing van Kenfisiiese Metodes

'n Groot aantal bauksietblokke is vir 'n firma van glasfabrikante getoets ten einde die posisies van swak plekke en lugholtes vas te stel. Hierdie metode maak gebruik van deurdringende gammastrale wat met behulp van 'n telbuis geregistreer word, en is vinnig en goedkoop. Die toetse stel die betrokke firma in staat om deur korrekte oriëntering van die blokke in die oondwande die lewensduur van die oonde met maande te verleng en bring 'n besparing van duisende ponde mee.

Om die Geologiese Eenheid van die Raad op Atoomkrag behulpsaam te wees met die ontwikkeling en toepassing van kernfisiiese meetmetodes is 'n navorsings-betrekking deur genoemde Raad in die Afdeling Kernfisiika geskep. Die betrokke amptenaar doen navorsing in, en onder leiding van, die Afdeling.

BIOFISIKA

Beskadiging deur Straling

Vir 'n studie van die invloed van straling op lewende selle word die inaktivering van bakteriofagus deur elektrone onder eksperimentele omstandighede ondersoek wat duideliker omskryf is as die van die meeste ondersoekte wat voorheen deur ander navorsers gedoen is.

Die biologiese stof wat gebruik word is die T-reeks van coliphagus. Vordering is gemaak met die handhawing van die lewensvatbaarheid van die virusse in 'n droë toestand, sodat hulle bestraal kan word sonder die steurende invloede van die vrye radikale wat gevorm sou word indien water teenwoordig was. Kwantitatiewe metodes vir die noukeurige bepaling van die fraksionele inaktivering van die bakteriofagus is verder ontwikkel.

Vervaardiging van Draervry Isotope

In 1949 is in die laboratorium bevind dat Mn^{54} in 'n atoomsuil gevorm word. In voortsetting van hierdie ondersoek is bestralings te Harwell gedoen en kon die vorige bevindinge bevestig word dat deur neutronbestraling van yster, draervry Mn^{54} gevorm word.

Aanwending van Isotope in Mediese Navorsing

Radio-aktiewe isotope word in toenemende mate gebruik vir doeleindes van mediese navorsing in die laboratorium en in samewerking met ander navorsingsinstitute. Die volgende dien as voorbeelde :

Myxoedema.—Sekere afwykings in die opname en verspreiding van jodium in pasiënte met myxoedema is opgemerk en die probleem word tans ondersoek met toediening van I^{131} .

Application of Nuclear Physical Methods

A large number of bauxite blocks have been tested for a glass manufacturer in order to determine the positions of weak spots and voids. This method, which makes use of penetrating gamma rays recorded on a counter, is both quick and inexpensive. The tests enabled the firm concerned to prolong the life of ovens by many months by correct orientation of the blocks in the oven walls, and led to a saving of thousands of pounds.

In order to assist the Geological unit of the Atomic Energy Board with the development and application of nuclear physical methods, a research post has been established in the Nuclear Physics Division. The officer concerned is employed on research under the direction of the Division.

BIOPHYSICS

The Harmful Effects of Radiation

In order to study the influence of radiation on living cells, the inactivation of a bacteriophage by electrons is being investigated under experimental conditions which have been more closely defined than in most of the investigations undertaken by other workers.

The biological material being used is the T-series of coliphage. Progress has been made with the maintenance of the viability of the viruses in a dry condition, so that they can be irradiated without the disturbing influence of free radicals which would be formed in the presence of water. Quantitative methods for the accurate determination of the fractional inactivation of bacteriophage has also been developed further.

Preparation of Carrier-free Isotopes

During 1949 the laboratory reported that Mn^{54} is formed in an atomic pile. In continuation of this investigation, an irradiation carried out at Harwell confirmed the finding that the neutron irradiation of iron gives rise to carrier-free Mn^{54} .

Application of Isotopes in Medical Research

Radio-active isotopes are being used to an increasing degree for medical research purposes in the laboratory and in co-operation with other research institutes. The following serve as examples :—

Myxoedema.—Certain abnormalities in the assimilation and distribution of iodine in patients suffering from myxoedema have been noted, and the problem is now being investigated by the administration of I^{131} .

Haakwurm.—In medewerking met die Voedings-eenheid van die W.N.N.R. by die S.A. Instituut vir Mediese Navorsing in Johannesburg word eksperimente uitgevoer op pasiënte wat besmet is met haakwurm ten einde te probeer vasstel wat die korrelasie tussen bloedverlies en haakwurmbesmetting is. Fe^{59} word as spoorelement gebruik.

Haemochromatosis.—In samewerking met die Departement van Geneeskunde van die Universiteit van die Witwatersrand word die yster-metabolisme in pasiënte wat aan haemochromatosis ly, ondersoek. Na die toediening van spoordosis Fe^{59} , is die ysterinhoud van etlike honderde bloedmonsters bepaal, asook van die faeces.

Vloestofsintilleerders

Vanweë die kleinheid van die monsters wat beskikbaar is wanneer sekere liggaamsvloeistowwe ondersoek moet word, word die meting van die radio-aktiwiteit in die monsters baie moeilik. Met behulp van 'n vloestofsintilleerder kan die monster direk in die sintilleerder opgelos en metings met 'n hoë mate van doeltreffendheid uitgevoer word. Die ondersoek van impuls hoogte, fluoresensie-eienskappe, energiedistribusie en relatiewe doeltreffendheid en geskiktheid van 'n aantal vloestofsintilleerders word voorgesit.

Verskaffing en Aanwending van Radio-aktiewe Isotope

Die vervoer van radio-aktiewe isotope in die vlerk-punte van vliegtuie het 'n groot verlaging in die invoer-koste meegebring. As gevolg hiervan en met 'n beter begrip van die toepassingsmoontlikhede het die gebruik van kunsmatige radio-aktiewe isotope baie toegeneem. 'n Binnelandse vlerkpuntkema wat tans gereël word, sal die aflewering en verspreiding van isotope in Suid-Afrika bevorder.

Vir doeleindes van mediese ondersoeke is I^{131} gereeld ingevoer. Gedurende die afgelope jaar is 236 spoordosisse toegedien, 242 pasiënte se jodiumopnames is gemeet en 95 terapeutiese dosisse is uitgedeel. Co^{60} , Au^{198} en roetinebesendings P^{32} is ook vir mediese gebruik ingevoer. Ander ingevoerde isotope sluit in groot Co^{60} - en Ir^{192} bronne vir nywerheidsradiografie asook standaard gammastralbronne vir die yking van ionisasiekamers.

Vir die Nasionale Bounavorsingsinstituut is 'n metode ontwikkel vir die bepaling van die verwerking van sement-rioolpype met behulp waarvan 'n verandering van 1 mm. in die dikte van die pyp aangetoon kon word. Sn^{113} word hiervoor gebruik.

In samewerking met die Landboukollege, Potchefstroom, is 'n begin gemaak met die bestraling van grondboontjies met behulp van Co^{60} gammastrale in 'n poging om genetiese veranderinge te bewerkstellig.

Hookworm.—In co-operation with the C.S.I.R. Nutrition Unit at the S.A. Institute for Medical Research in Johannesburg, experiments are being carried out on patients infected with hookworm in an attempt to establish the correlation between blood losses and hookworm infection. Fe^{59} is being used as the trace element.

Haemochromatosis.—In co-operation with the Department of Medicine at the Witwatersrand University, the iron metabolism of patients suffering from haemochromatosis is being investigated. After the administration of trace doses of Fe^{59} , the iron content of some hundreds of samples of blood and faeces have been measured.

Fluid Scintillators

On account of the small samples available the measurement of radio-activity in certain body fluids is extremely difficult. With the help of a fluid scintillator the sample can be dissolved directly in the scintillator and measurements can be made with a high degree of accuracy. The investigation of impulse height, fluorescence characteristics, energy distribution and relative efficiency and suitability of a number of fluid scintillators has been continued.

Supply and Application of Radio Isotopes

The transport of radio-isotopes in the wingtips of aircraft has resulted in a considerable reduction in importation costs. As a result of this, and a better understanding of the possibilities of their application, the use of artificial radio-isotopes has increased considerably. An inland wingtip scheme which is now being planned will facilitate the local distribution and delivery of isotopes.

For the purposes of medical research I^{131} is imported regularly. During the past year 236 trace doses were administered, the iodine uptake of 242 patients measured, and 95 therapeutic doses distributed. Co^{60} , Au^{198} and routine consignments of P^{32} have also been imported for medicinal use. Other isotope imports include large Co^{60} and Ir^{192} sources for industrial radiography and standard gamma ray sources for the calibration of ionisation chambers.

On behalf of the National Building Research Institute, a method has been developed for the measurement of corrosion of concrete sewer pipes in which a change of as little as 1 mm. in the thickness can be demonstrated. Sn^{113} is used for this purpose.

In co-operation with the Potchefstroom Agricultural College a start has been made with the irradiation of ground nuts with the help of Co^{60} gamma rays in an attempt to bring about genetic changes.

Beskerming Teen Strale

Ten einde gebruikers van X-straalapparaat en radio-aktiewe stowwe in mediese dienste en die nywerheid teen oordosisse van straling te beskerm, word 'n filmwapendiens in stand gehou. Gedurende die periode in oënskou is 2,226 filmwapens uitgestuur, gemeet en verslae daarop gelewer. Verder is 'n hele aantal stralings-ondersoeke ten behoeve van die X-straaldepartemente van hospitale uitgevoer.

X-straalstandaardisasie en Dosismetings

In terapeutiese behandeling is dit van groot belang dat die terapeut weet watter X-straaldosis aan die pasiënt gegee word. Met die doel om dosimeters te yk, word in die laboratorium 'n absolute standaard van X-straaldosis opgestel deur gebruik te maak van 'n lug-ionisasiekamer. Die toerusting wat vir hierdie werk beskikbaar is, is onlangs aangevul met 'n X-straalapparaat van 200 kv.

In verband met hierdie diens is 'n metode ontwerp vir die gebruik van 'n Th^{204} -bron as 'n verwysings-standaard vir dosimeters van die Marconi tipe.

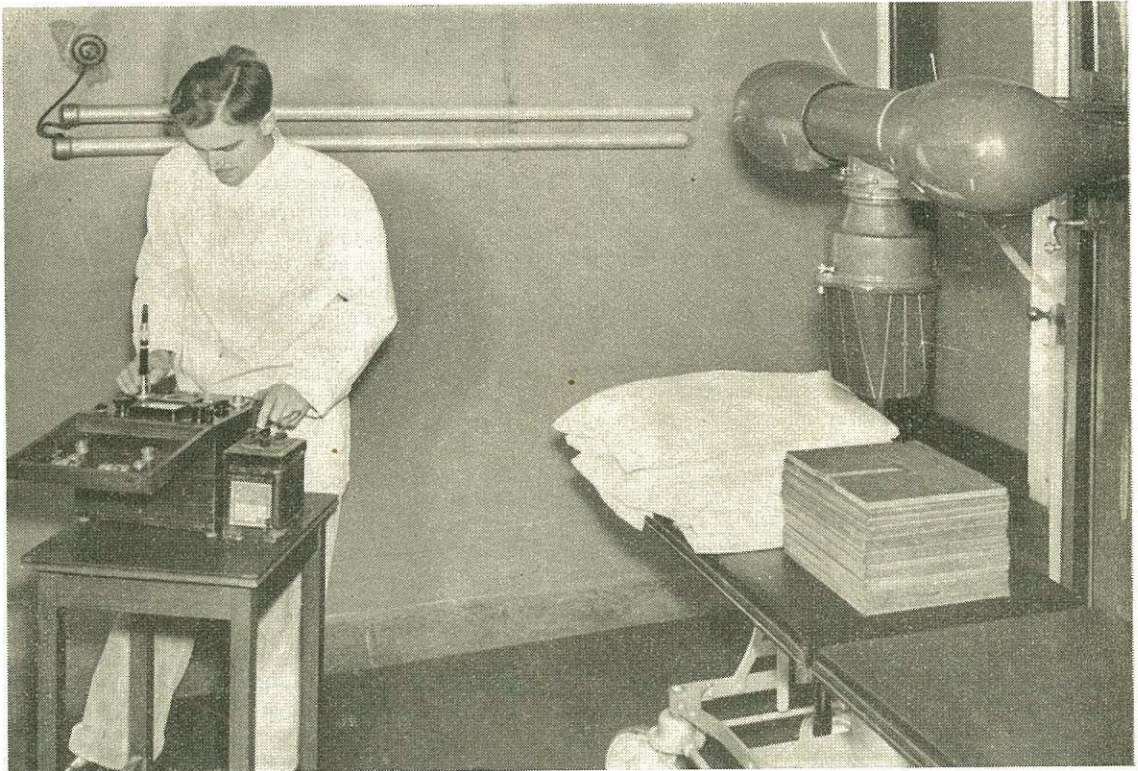
Protection From Radiation

The film badge service for the protection of users of X-rays and radio-active materials in the medical services and industry against overdoses of radiation has been maintained. During the period under review, 2,226 film badges were distributed, examined and reported on. In addition, a number of radiation investigations have been carried out on behalf of X-ray departments of hospitals.

X-ray Standardization and Dose Measurements

In therapeutic treatment it is of great importance for the practitioner to know what X-ray dose is being administered to the patient. In order to calibrate dose meters, an absolute standard of X-ray dose has been set up in the laboratory using an air ionization chamber. The equipment available for this purpose has been augmented by a 200 KV X-ray apparatus.

In connection with this service a method has been developed for the use of a Th^{204} source as a reference standard for dose meters for the Marconi type.



'n Kondensator-ionisasiekamer wat gebruik word om die dosering van die X-straalapparaat aan die regterkant te meet. X-straal dosismetings is 'n belangrike diens wat deur die N.F.L. aan hospitale en mediese praktisyns gelewer word.

A condenser ionization chamber used for measuring the dosage produced by the X-ray set shown on the right. X-ray dose measurement is an important service rendered by the N.P.L. to hospitals and medical practitioners.

MASSASPEKTROMETRIE

Geologiese Ouderdomsbepaling

Die studie van die metodes en tegnieke vir die bepaling van isotoopverhoudings van lood in radioaktiewe ertse ten einde die geologiese ouderdom van sulke ertse vas te stel, is voortgesit en uitgebrei. Navorsing is hoofsaaklik toegespits op ionbron-konstruksie en het aanleiding gegee tot suksesvolle isotoopontledings op strontium en barium in 'n termiese emissiebron en tot die bevinding dat lood en yster nie in die bestaande instrument met behulp van so 'n bron ontleed kan word nie. Daar is verder in geslaag om 'n elektronbombardementbron volgens die Dempster-Nier-beginsel met uitstekende goeie eienskappe te ontwikkel. Die sukses van hierdie bron word toegeskryf aan 'n afwyking van die konvensionele metode van opbou. Aanvanklike proewe dui daarop dat die bron geskik is vir ontledings op monsters wat heelwat kleiner is as wat voorheen nodig was.

'n Massaspektrometer, wat in die laboratorium ontwerp en opgebou is, is voltooi en 'n reeks isotoopontledings op 'n loodmonster wat vir ykingsdoeleindes met twee ander instrumente in die V.S.A. ontleed word, is uitgevoer. 'n Begin is gemaak met die isotoopontledings op twee ertsmonsters wat uit Namakwaland en Suid-Rhodesië verkry is. Verskeie monsters vir die uitvoering van dergelike ontleding is van Suidwes-Afrika ontvang asook Uganda, Tanganyika en Malaya.

Onlangs is 'n aanvang gemaak met die studie van die geologiese ouderdom van die Witwatersrandstelsel. Daar word gehoop dat verdere lig gewerp sal kan word op die probleem aangaande die ontstaan van die Randse goud- en uraanerslae.

Met die oog op die groot behoefte aan 'n instrument waarmee die geologiese ouderdom van minerale met 'n lae uraan- of thoriumgehalte (soos graniet) bepaal kan word, is 'n begin gemaak met die ontwerp van 'n massaspektrometer waarin mikrogram-hoeveelhede ontleed kan word.

Massaspektrometer-ontledings

In samewerking met die Nasionale Chemiese Navorsingslaboratorium is 'n reeks eksperimente uitgevoer waarin C^{13} as opsporelement gebruik is, om die diffusie van koolsuurgas in kalsietkristalle te bepaal.

Isotoopontledings is gedoen op twee monsters ferrichloried waardeur gegewens ingewin is in verband met 'n kernfisiese eksperiment wat in samewerking met die Britse Atoomenergie-navorsingsinrigting te Harwell uitgevoer is.

Om die belangrike meganisme van stikstofbinding deur natuurlike grasgewasse te bestudeer, is voorbereidingswerk gedoen in verband met 'n reeks spoorderksperimente, wat in samewerking met die Departement van Landbou beplan word.

MASS SPECTROMETRY

Geological Age Determinations

The study of methods and techniques for the estimation of the isotope ratios of lead and radio-active minerals to establish their geological age has been continued and extended. Research has mainly been directed towards the construction of ion sources, and has resulted in successful isotope analyses of strontium and barium in a thermal emission source. It was further established that lead and iron cannot be analysed in the existing instrument with this type of source. An electron bombardment source with exceptionally good characteristics has been developed on the Dempster-Nier principle. The success of this source may be ascribed to a departure from the conventional methods of construction. Preliminary tests indicate that it is suitable for the analysis of samples considerably smaller than those previously used.

A mass spectrometer, which was designed and constructed in the laboratory, has been used to carry out a series of isotope analyses on a lead sample which is also being analysed for calibration purposes on two other instruments in the U.S.A. A start has been made with the isotope analysis of two ore samples obtained from Namaqualand and Southern Rhodesia. Various samples for similar analysis have been received from South West Africa, Uganda, Tanganyika and Malaya.

Recently a start was made with a study of the geological age of the Witwatersrand System. It is hoped that it will be possible to throw further light on the origin of the gold and uranium deposits.

In view of the great need for an instrument with which the age of minerals with low uranium and thorium contents, e.g., granite, can be determined, a start was made with the design of an instrument capable of analysing microgramme quantities.

Mass Spectrometer Analyses

In co-operation with the National Chemical Research Laboratory, a series of experiments has been undertaken using C^{13} as the tracer element to determine the rate of diffusion of carbon dioxide in calcite crystals.

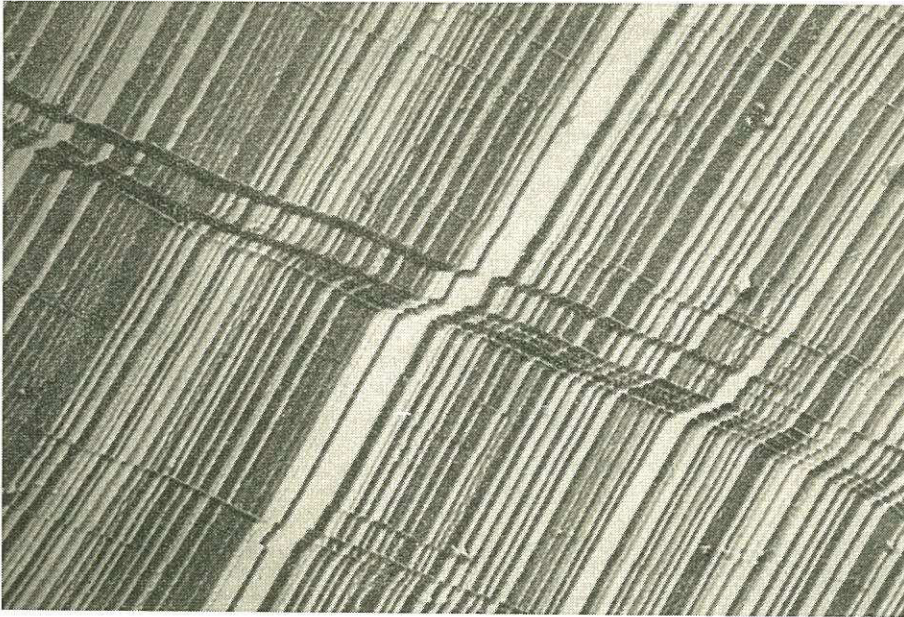
Isotope analyses have been carried out on two samples of ferric chloride in order to obtain data in connection with a nuclear physics experiment which is being undertaken in co-operation with the British Atomic Energy Research Establishment at Harwell.

In order to study the important mechanism of nitrogen fixation by natural grasses, preparatory work has been done for a series of tracer experiments planned in co-operation with the Department of Agriculture.

ELEKTRONMIKROSKOPIE

Plastiese Vervorming van Metale

Ten einde die meganismes wat by die plastiese vervorming van metale in werking tree te probeer verklaar is elektronmikroskopiese ondersoek op vervormde metaalkristalle voortgesit. Uitbreide ondersoeke op aluminium het baie daartoe bygedra om plastiese vervorming in die geval van hierdie metaal te verklaar. Ander metale, t.w. silwer, koper en alfa-geelkoper, is ook ondersoek om vas te stel of dieselfde vervormingsmeganismes wat in die geval van aluminium gevind is, ook hier geld. Die resultate van hierdie eksperimente het bewys dat, hoewel die vervormingsmeganismes vir die suiwer metale aluminium, koper en silwer identies is, hulle fundamenteel verskil van dié van die legering alfa-geelkoper.



'n Elektronmikrograaf van die oppervlak van alfa-geelkoper wat 25,000 keer vergroot is en glylyne en glylamellae vertoon wat ontwikkel het namate die metaal vervorm is. Die fundamentele navorsing werp lig op die basiese struktuur van metale en die redes vir hulle swigting tydens gebruik.

ELECTRON MICROSCOPY

Plastic Deformation of Metals

In an attempt to throw light on the mechanisms involved during the plastic deformation of metals, electron microscopic investigations on deformed metal crystals are under way. Detailed investigations of aluminium have contributed much towards the understanding of plastic deformation in the case of this metal. Other metals such as silver, copper and alpha-brass have also been studied in order to determine whether the same deformation mechanism applies. The results have proved that although the mechanisms are identical for the pure metals aluminium, copper and silver, they differ fundamentally in the case of the alloy, alpha-brass.

An electron micrograph of the surface of alpha brass at 25,000 x magnification showing slip lines and slip lamellae which have developed as the metal has been deformed. This fundamental research helps to throw light on the basic structure of metals and the reasons why they sometimes fail in use.

Mediese en Biologiese Ondersoeke

In samewerking met 'n aantal institute is 'n groot aantal virusse en bakterieë ondersoek. Hierdie ondersoeke het gelei tot waardevolle inligting aangaande die vorm, grootte ens. van hierdie submikroskopiese deeltjies.

Medical and Biological Investigations

In co-operation with various institutes, a number of viruses and bacteria have been studied. These investigations have provided valuable information concerning the shape, size and other characteristics of these submicroscopic particles.

Deeltjiegrootte-bepaling

In samewerking met die Nasionale Chemiese Navorsingslaboratorium is 'n groot aantal kleisoorte elektronmikroskopies ondersoek, om hulle deeltjiegrootte, vorm en samestelling vas te stel. In verband met 'n projek om kunsmatig 'n neerslag van reën te veroorsaak deur wolke met silwerjodietdeeltjies te bestrooi, is die grootte van hierdie klein deeltjies elektronmikroskopies bepaal.

X-STRAALDIFRAKSIE

Kristalstruktuur-ontledings van Asetate

Die buitengewone gedrag en magnetiese onreëmatighede wat waargeneem is in die geval van die asetate van sekere transisie-elemente het 'n verduideliking uitgelok. Ten einde hierdie seldsame verskynsels te verduidelik, is sistematiese kristal-struktuurontledings van genoemde samestellings onderneem. Die interne struktuur van koper-, chroom- en nikkel-asetaat is met welslae bepaal en in die geval van die eerste twee soute het die bepaling gelei tot nuwe en totaal onverwagte kristalstrukture, wat, o.a. sulke onbekende verskynsels soos metaal-tot-metaal bindings behels. Dit is seker dat verdere ondersoek langs hierdie weg veel daartoe sal bydra om die onverklaarbare eienskappe van hierdie samestellings te verduidelik.

Fisiese Eienskappe van Metale en Legerings

'n Begin is gemaak om deur middel van X-straal-diffraksie metodes vas te stel tot watter mate kristalgrootte, koudbewerking, temperatuur, kristalroostersteuringe ens., die fisiese eienskappe van metale en legerings beïnvloed. Voorlopige eksperimente het bewys dat intense monokromatiese straling vir hierdie ondersoek onontbeerlik sal wees. 'n Monokromator met 'n geboë kristal is reeds vir hierdie doel ontwerp en verwag word dat hierdie apparaat die X-straalintensiteit met 'n faktor van 20 sal verhoog.

X-straalontledings

Hoewel X-straaldiffraksiemetodes hulle grootste toepassing vind in die bepaling van die atoomrangskikking in kristalle, is daar egter 'n aantal toepassings van 'n meer praktiese aard waarvoor 'n juiste kennis van die atoomrangskikking in kristallyne-monsters nie nodig is nie. Ten behoeve van die nywerheid en regeringsliggame is sodanige metodes gedurende die afgelope jaar met 'n groot mate van sukses aangewend op 'n aantal uiteenlopende ondersoek, waarvan die volgende enkele voorbeelde is :

1. Kwantitatiewe identifikasie van die bestanddele van sementsoorte wat sinteties voorberei is.

Particle Size Determinations

In co-operation with the National Chemical Research Laboratory a large number of clay types have been subjected to electron microscopic examination in order to establish their particle size, form and composition. In connection with a project to induce artificial precipitation of rain by seeding clouds with silver iodide crystals the size of these particles was estimated in the electron microscope.

X-RAY DIFFRACTION

Crystal Structure Analysis of Acetates

Systematic crystal structure analyses have been undertaken in an attempt to explain the anomalous behaviour and magnetic irregularity observed with the acetates of certain of the transition elements. The internal structures of copper, chrome and nickel acetate have been successfully determined and, in the case of the first two, have revealed a completely unexpected crystal structure which, among other things, suggests such unknown phenomena as metal-to-metal bonds. It is certain that further investigation in this direction will contribute to the understanding of the unexplained characteristics of these compounds.

Physical Characteristics of Metals and Alloys

A start has been made with an investigation using X-ray diffraction methods to establish to what degree crystal size, cold working, temperature, crystal lattice defects, etc., influence the characteristics of metals and alloys. Preliminary investigations have indicated that intense monochromatic radiation will be indispensable for this investigation. A curved crystal monochromator has now been developed for the purpose and it is expected that this apparatus will increase the X-ray intensity by a factor of 20.

X-ray Analysis

Although X-ray diffraction methods find their principal application in the determination of the atomic arrangement in crystals, there are, however, a number of applications of a more practical nature for which an exact knowledge of the atomic arrangement in crystalline samples is not necessary. On behalf of Industry and Government agencies, such methods have been applied with considerable success to a number of different investigations of which the following are some examples :

1. Quantitative identification of the constituents of synthetically prepared cements.

2. Uitkenning van korrosieprodukte op hoogspanningskragdrade.
3. Chemiese uitkenning van minerale, slakke, ertse, korrosieprodukte ens.
4. Kwantitatiewe bepalings van kwarts in stofmonsters uit myne en fabriek. Hierdie ondersoek staan in verband met silikosisnavorsing.
5. Opsporing van grafietkonsentrasies in streke waar koolneerslae voorkom.
6. Bepaling van die hoeveelheid, asook die kristallyneghalte, van uraniniet in Randse mineraal-ertse.
7. Uitkenning van sinteties-voorbereide koolwaterstofverbindinge uit wolvette.
8. Ontleding en korrelasie tussen die kristal-grootte en samestelling van 'n aantal ysteroksied-monsters en hul katalisasie-eienskappe.

SPEKTROSKOPIE

Met die doel om die struktuur van die molekules te bepaal is die studie van spektra van twee-atomige molekule voortgesit.

Aluminiummonofluoried-spektrum

Die spektrum van die aluminiummonofluoried-molekuul is ondersoek en van die agt bandesisteme wat waargeneem is, is sewe nuwe sisteme. Vier van die nuwe sisteme is ontleed. Daar is bewys dat die ontleding van die een bekende sisteem, wat in die literatuur aangegee word, foutief is en 'n juiste ontleding van die sisteem is deurgevoer. Die konstantes van die molekule kon met groot noukeurigheid bepaal word.

Spekro-isotopie

Benewens massaspektrometriese metodes, wat gebruik word om relatiewe voorkomsverhoudings van isotope te bepaal, word daar ook in die jongste tyd van sogenaamde spekro-isotopiese metodes gebruik gemaak waarin instrumente met hoë oplosvermoë aangewend word. Die metode word tans vir die bepaling van loodisotoopverhoudings ontwikkel. Navorsing is veral toegespits op die verkryging van 'n holkatode-ontlading waarin die eerste en tweede geïoniseerde spektra met slegs 'n milligram materiaal bevredigend opgewek word. Aandag is ook geskenk aan die ontwikkeling van die nodige spektroskopiese toerusting, insluitende die fotovermenigvuldiger-meeteenheid.

Mikrogolfspektrometrie

Die konstruksie van 'n mikrogolfspektrometer het die stadium bereik waarin waarnemings van 'n gedeelte van die absorpsiespektrum van asynsuur gemaak kon word. Interessante gevolgtrekkings is oor die struktuur van die molekuul gemaak.

2. Identification of corrosion products on high tension wires.
3. Chemical identification of minerals, slags, ores, corrosion products, etc.
4. Quantitative determinations of quartz in dust samples from mines and factories. These were undertaken in connection with silicosis research.
5. Location of graphite concentrations in areas where coal deposits occur.
6. Determination of the quantity and degree of crystallinity of uranite in Rand mineral ores.
7. Identification of synthetically prepared hydrocarbon compounds from wool grease.
8. Analysis of a number of iron oxide samples and correlating their crystal sizes and composition with their catalyzation characteristics.

SPECTROSCOPY

A study of the spectra of diatomic molecules has been continued with the aim of establishing their structure.

Aluminium Fluoride Spectrum

The spectrum of the aluminium monofluoride molecule has been investigated. Of the eight systems of lines observed, seven are new. Four of the new systems were analysed. The analysis of the one known system described in the literature has been proved to be incorrect. A correct analysis has been established. The constants of the molecule could be calculated with great accuracy.

Spectro-isotopy

In addition to mass spectrometric methods which are used to determine the relative abundance of isotopes, use has recently been made of the so-called spectro-isotopic methods in which instruments with a high resolving power are used. These methods are being developed for the determination of lead isotope ratios. Research has been directed mainly towards the development of a hollow cathode discharge in which the first and second ionized spectra can be produced with as little as a milligram of material. Attention has also been devoted to the development of the necessary spectroscopic equipment including a photomultiplier recording unit.

Microwave Spectrometry

The construction of a microwave spectrometer has reached the stage where readings of a part of the absorption spectrum of acetic acid can be made. Interesting conclusions have been drawn concerning the structure of the molecule.

SPEKTROCHEMIE

Meganisme van Vonke en Boë

Die spektrochemiese ontledingmetode is empiries en die mees bevredigende ontledingstoestand moet dus in elke laboratorium waar die metode gebruik word, eksperimenteel vasgestel word. Om die spektrochemiese metode op 'n meer fundamentele fisiese basis te plaas, word daar teenwoordig baie studies i.v.m. die meganisme van vonke en boë onderneem. Die benodigde apparaat, onder andere 'n „multi-source” ligbroneenheid, waarmee die mees uiteenlopende ontledingstoestand verkry kan word, is opgebou. Gegewens i.v.m. die meganisme en eienskappe van vonke kan nou versamel en bestudeer word.

Direklesende metodes

Ten einde spektrochemiese ontledings vinniger en met groter noukeurigheid uit te voer word daar in die buiteland van direklesende metodes gebruik gemaak, waarin die fotografiese plaat deur die fotovermenigvuldigerbuis vervang word. As eerste stap tot die invoering van direklesende metodes in die laboratorium is 'n medium Hilger-spektrograaf toegerus met direklesende toebehore.

Spoorelementnavorsing

Die belangrikheid van navorsing oor die spoor-elementinhoud van grond vir die landbou word al meer en meer besef. Die ontwikkeling van ontledingsmetodes i.v.m. die projek is weens 'n tekort aan personeel vertraag. Twee beamptes van die Departement van Landbou is tans besig in hierdie laboratorium met die ontwikkeling van spektrochemiese metodes vir die ontleding van plantmateriaal. 'n Beampte van die Afdeling Tuinbou is besig met die ontwikkeling van 'n vlamfotometriese metode vir die bepaling van kalium, natrium en kalsium in plantmateriaal.

Spektrochemiese Ontledings

Ten opsigte van spektrochemiese tegnieke en ontledings het die laboratorium omvangryke dienste aan die nywerheid en ander organisasies verleen. Gedurende die jaar in oënskou is ongeveer 300 ontledings uitgevoer en 4 persone is vir roetine-laboratoriums van regeringsdepartemente opgelei. Die talle ontledings wat gedoen is het o.a. die volgende ingesluit: die bepaling van magnesium in kalkklip, lood en sink in ertse, transisielemente in kwik en spoorelemente in lood.

Koolsuurgas- en Suurstofontleders

By die studie van die metabolisme van Naturelle wanneer hulle in 'n myn werk, is die bepaling van die konsentrasie koolsuurgas en suurstof in asemteue van belang. Die moontlikheid van fisiese metodes vir die bepaling van hierdie twee gasse word ondersoek.

SPECTROCHEMISTRY

Mechanisms of Arcs and Discharges

The spectro-chemical methods of analysis are empirical and the most satisfactory conditions must, therefore, be established experimentally in each laboratory where these methods are used. In order to place them on a more fundamental physical basis, many studies are at present being undertaken concerning the mechanics of sparks and arcs. The necessary equipment, including a "multi-source" light unit, with which the most divergent discharge conditions can be obtained has been constructed. Data concerning the mechanism and characteristics of sparks can now be collected and studied.

Direct Reading Methods

In order to speed up spectrochemical analyses and to increase their accuracy, use is made overseas of direct reading methods in which the photographic plate is replaced by a photomultiplier tube. As a first step to the introduction of direct reading methods in the laboratory a Hilger medium spectrograph has been fitted with a direct reading attachment.

Trace Element Research

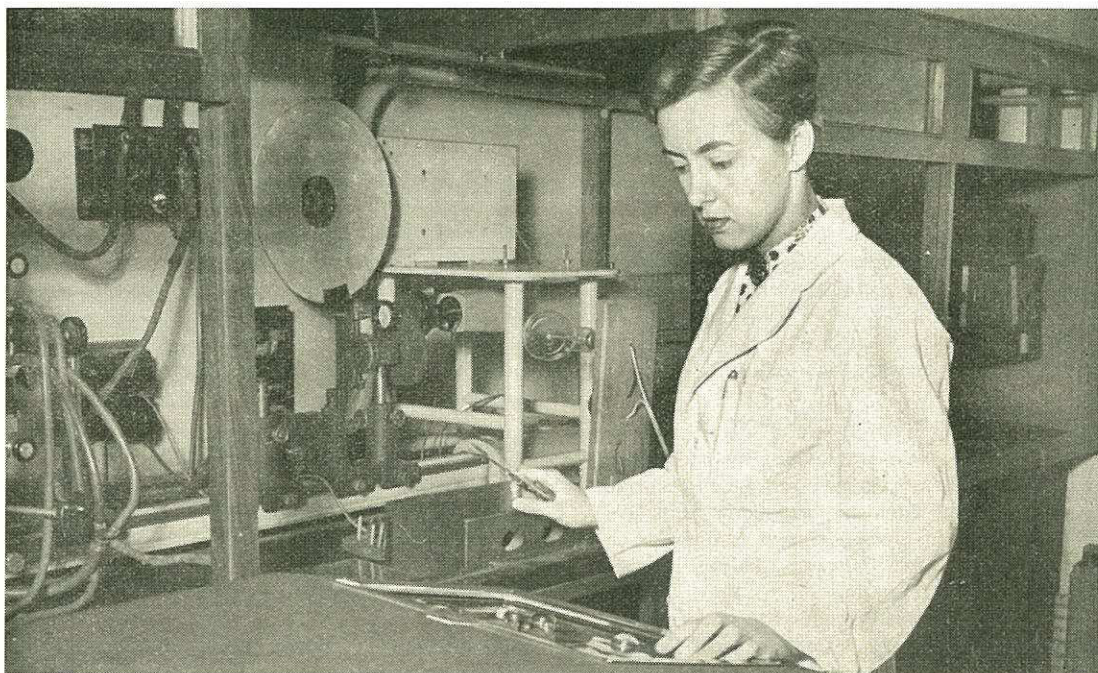
The importance to agriculture of research in trace elements in soils is being realised more and more. The development of analytical methods for this purpose has, however, been delayed by the shortage of staff. Two officers of the Department of Agriculture are at present occupied in this laboratory with the development of spectrochemical methods for the analyses of plant material. An officer from the Division of Horticulture is busy with the development of a flame photometric method for the determination of potassium, sodium and calcium in plant material.

Spectrochemical Analyses

In the field of spectrochemical techniques and analyses, the laboratory has rendered numerous services to industry and other organizations. During the year under review about 300 analyses were carried out, and four persons trained for routine laboratories of Government departments. The analyses have included, among others, the determination of magnesium in limestone, lead and zinc ores, transition elements in mercury, and trace elements in lead.

Carbon Dioxide and Oxygen Analysers

In the study of the metabolism of Natives working in mines the determination of carbon dioxide and oxygen in the breath is of importance. The possibility of using physical methods for the determination of these two gases is being studied.



Die apparaat wat gebruik word vir die afneem van spektra in die spektrochemiese bepaling van lood-alloëe wat gebruik word by die vervaardiging van batterye.

The apparatus used for photographing spectra in the spectrochemical determination of lead and lead alloys used in the manufacture of batteries.

Infrarooi-spektrometrie

Sekere fundamentele gebreke in die enkelstraal-infrarooispektrometer is vasgestel. Veranderinge word op die oomblik aangebring en dit word voorsien dat die werking en oplosvermoë van hierdie instrument aansienlik verbeter sal word.

Infra-red Spectrometry

Certain fundamental shortcomings of the single beam infra-red spectrometer have been observed. Modifications are at present being made and it is expected that the operation and resolution of this instrument will be considerably improved.

OPTIKA

Fotometriese Yking

'n Fotometriese toets- en ykingseenheid is in bedryf gebring. Dit is tans moontlik om ykings op ligstroom en ligstreke tot 'n noukeurigheid van ongeveer 1% uit te voer. Ses ligstroomstandaarde en een ligsterkestandaard is vir die Suid-Afrikaanse Buro vir Standaarde gestandaardiseer.

By die gebruik van foto-elektriese toerusting vir noukeurige kwantitatiewe opnames is dit nodig om die fotometriese eienskappe van die toerusting te bepaal. Vir hierdie doel is 'n spektroradiometer vir spektraal-gevoeligheidsbepalings voltooi. 'n Liniëriteitstoets nader voltooiing.

OPTICS

Photometric Calibration

A photometric calibration and test unit has been put into operation. It is now possible to calibrate instruments for the measurement of light radiation and intensity to an accuracy of about 1 per cent. Six luminous flux standards and one luminous intensity standard were standardized for the S.A. Bureau of Standards.

In the use of photoelectric equipment for exact quantitative surveys, it is necessary to know the photometric characteristics of the equipment. For this purpose a spectroradiometer has been built for sensitivity measurements.

A linearity tester is nearly complete.

Goniofotometrie

Om die oppervlaktevoorkomste van materiale in terme van hul kaatsingseienskappe noukeurig fisies te kan ondersoek is 'n universiële goniofotometer ontwerp. Die apparaat sal dit moontlik maak om die nodige metings uit te voer op oppervlaktes wat of spekulêr of verstrooid reflekteer.

Spektrofotometrie

Benewens roetinebepalings vir ander laboratoria is daar aandag gegee aan spektraalrefleksiebepalings op pigmentmonsters in die ultraviolet en velmonsters in die sigbare gebied. Die bepaling is hoofsaaklik ten behoeve van navorsingsinrigtings gedoen.

Ontwerp van Optiese Sisteeme en Elemente

Daar bestaan steeds 'n groot vraag by navorsings-eenhede en universiteite na optiese sisteme en elemente vir spesiale navorsing en toetse, wat nie in die handel beskikbaar is nie. 'n Optiese sisteem is ontwerp en vervaardig om elektriese instrumenskale gedurende toetsbepalings waar te neem.

'n Verdere ontwikkeling van ontwerpmetodes het dit moontlik gemaak om 'n $f/5.7$ Cooke triplet, wat oor 12° gekorrigeer is, met sukses te ontwerp. Hierbenewens is 'n aantal teleskoop-tipe akromaat-objektiewe, telemikroskoopobjektiewe, oogstukke, asook 'n verskeidenheid van ander elemente ontwerp.

Vervaardiging van Optiese Elemente

Spesiale elemente word in toenemende mate en veral vir wetenskaplike organisasies vervaardig, soos byvoorbeeld akromaatobjektiewe, optiese plattes, straaldelers, groot vensters met optiese plat en ewewydige oppervlakke, porroprismas, Huygens oogstukke, hoë kwaliteit spieëls en 'n verskeidenheid kleinere elemente.

Toets van Optiese Instrumente

'n Aantal mikroskope is ten behoeve van die Unie Tenderraad getoets.

HITTE

Standaard van Temperatuur

In voortsetting van die werk om die primêre vaste temperatuurpunte in die laboratorium in te stel is 'n sel vir die drievoudpunt van water vervaardig. Vergelykende toetse sal uitgevoer word tussen hierdie sel en 'n sel wat reeds in die Britse N.P.L. vergelyk is met soortgelyke selle wat in Engeland en Amerika vervaardig is. Hierdeur sal 'n baie noukeurige en maklik reproduceerbare metode in bedryf kom waarmee die nulpunt op die temperatuurskaal verkry kan word.

Goniophotometry

A universal goniophotometer for the investigation of the surface properties of materials in terms of their reflective characteristics has been designed. This apparatus will make it possible to carry out the necessary measurements on surfaces which give either specular or dispersed reflection.

Spectrophotometry

In addition to routine measurements for other laboratories, attention has been given to spectral reflection measurements on pigment samples in the ultra-violet and skin samples in the visible range. The determinations were undertaken mainly at the request of research institutions.

Design of Optical Systems and Elements

There is a steady demand from universities and research units for optical systems and elements which are not commercially available. An optical system for the observation of electrical instrument scales during test measurements has been designed and built.

A further development of methods of design has made it possible to design successfully an $f5.7$ Cooke triplet corrected over 12° . In addition a number of telescope-type achromatic objectives, telemicroscope objectives, eyepieces and a variety of other elements have been designed.

Manufacture of Optical Elements

Special elements are being made in increasing numbers particularly for scientific organizations. Examples are achromatic objectives, optical flats, beam splitters, large windows with optically flat and parallel surfaces, porro-prisms, Huygens eyepieces, high quality mirrors, and a variety of smaller elements.

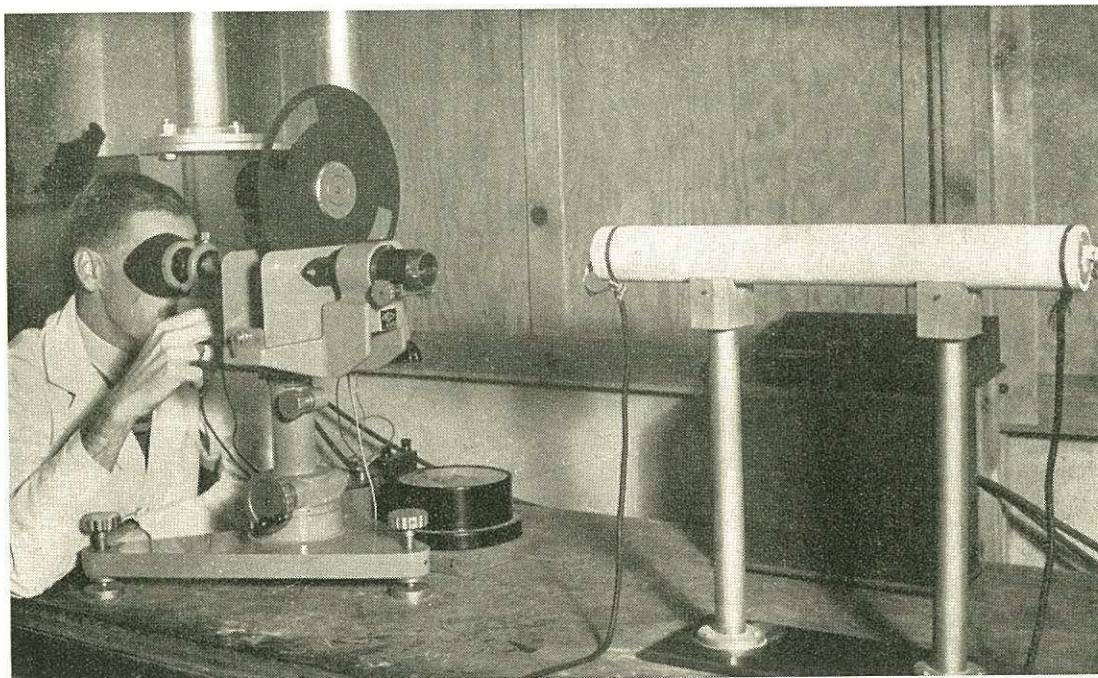
Testing of Optical Instruments

A number of microscopes were tested on behalf of the Union Tender and Supplies Board.

HEAT

Standard of Temperature

In continuation of the work of setting up the primary fixed temperature points in the laboratory, a cell for the triple point of water has been constructed. Comparative tests will be carried out between this cell and a cell which has been compared in the British N. P. L. with similar cells made in England and the U.S.A. By this means very exact and easily reproducible methods will be brought into use for fixing the zero point on the temperature scale.



Die standaard optiese pirometer wat in die N.F.L. ontwerp en in die werkplaas van die W.N.N.R. gebou is. Die instrument is in staat om temperature noukeurig tot 1500° met afwyking van 2°C te meet.

The standard optical pyrometer designed in the N.P.L. and constructed in the C.S.I.R. workshops. This instrument is capable of measuring temperatures accurately to within 2°C up to 1500°C.

Met die oog op ykings vir hoë temperature bo die goudpunt, is 'n standaard optiese pirometer in die laboratorium ontwerp en vervaardig. Die goudpunt is tot binne 2°C vasgestel. Verdere verfynings word beplan om die noukeurigheid te verhoog.

Ten behoeve van die nywerheid en Regeringsdepartemente is 'n groot aantal termometers, termokoppels, termokoppelpirometers en optiese pirometers geëyk.

Bepaling van Hitte-geleidingsvermoë

Roetine toetse op hitte-geleidingsvermoë van insulasiewaardes het in die afgelope jaar so toegeneem dat ernstige aandag gegee word aan die uitbreiding van die fasiliteite van die laboratorium. 'n Plaatgeleidingsvermoë-apparaat, waarmee koueplaat-temperature van 10°F bereik kan word is in die laboratorium in bedryf gebring. Om te voldoen aan die aanvraag vir geleidingsvermoëbepalings by temperature tot 500°C., is 'n silindriese apparaat gebou. Aangesien die toerusting egter nie vir roetinebepalings geskik is nie, word 'n plaatapparaat vir hoë temperature ontwikkel.

For calibrations above the gold point, a standard optical pyrometer has been designed and constructed in the laboratory. The gold point was fixed to within 2°C. Further improvements are planned to increase the accuracy.

A large number of thermometers, thermo-couples, thermo-couple pyrometers and optical pyrometers were calibrated on behalf of Industry and Government departments.

Measurement of Heat Conductivity

The number of routine tests of the heat conductivity of insulating materials has increased to such an extent during the past year that serious attention has been given to the extension of the facilities of the laboratory. A plate conductivity apparatus in which a cold plate temperature of 10° F. can be obtained has been brought into use. In order to keep up with the demand for conductivity measurements at temperatures up to 500° C., a cylindrical apparatus has been built. As this equipment is not suitable for routine measurements a plate apparatus for high temperatures is being developed.

Hittevloei in die Aardkors en Rotsgeleidingsvermoëbepalings

'n Studie van hittevloei in die aardkors is nie alleen van belang vir die geofisika in die algemeen nie maar ook vir die beplanning van diep mynbou. In voortsetting van die projek is geleidingsvermoëbepalings uitgevoer op 30 rotsmonsters wat uit 'n boorgat verkry is. Die hittevloei by verskillende plekke in die O.V.S. en Transvaal is bereken aan die hand van geleidingsvermoëgewens wat deur hierdie laboratorium en die Geologiese Eenheid van die Raad op Atoomkrag versamel is.

Algemene Dienste

Ten behoeve van die nywerheid en ander liggame is onder andere die volgende bepalings uitgevoer: soortlike warmte van boumateriale en chemikalieë, smeltpunte van ertse en verbrandingstemperature van D.D.T.-kerse.

GEOFISIKA

Magnetisasie van Rotse

Monsters uit dagsome in die Pilansbergstreek is ondersoek in 'n poging om die verskynsel van omgekeerde magnetisering, wat dikwels in hierdie monster voorkom, te probeer verklaar; en ook om vas te stel of die magnetiese eienskappe van die rotse aanduidings inhou aangaande die aarde se vroeëre magnetiese veld. Die resultate van hierdie ondersoek toon 'n groot uitwyking in beide die rigting en intensiteit van magnetisering. Ten einde vas te stel of genoemde uitwyking dwarsdeur die rotsstrata voorkom, en of hulle slegs tot oppervlakmonsters beperk is, word metings op monsters wat uit diep myn verkry word nou beplan.

Seismiese Opnames

In samewerking met die Bernard Price Instituut is 'n studie gemaak van die seismiese sturings wat ontstaan het as gevolg van 'n ontploffing van 80,000 pond springstof te Thabazimbi. Die resultate van hierdie waarnemings sal toegepas word op ondersoeke i.v.m. die eienskappe van die aardkors asook op meer praktiese probleme soos aangetref word in die mynbou.

Instrumentasie

Op aanvraag van Geologiese Opnames is 'n langafstand seismiese instrument herstel en gemoderniseer. Die werk het o.a. 'n elektroniese ossillatoreenheid as 'n byvoegsel ingesluit.

Die kortafstand seismiese instrument wat in hierdie onderafdeling ontwikkel is, is met goeie gevolge aangewend om fundamente vir die oprigting van groot geboue te ondersoek. Uit talle navrae van persone in

Heat Flow in the Earth's Crust and Rock Conductivity Measurements

A study of heat flow in the Earth's crust is of importance not only to geophysics in general, but also in the planning of deep-level mining operations. In continuation of this project, heat transmissivity measurements were made on 30 rock samples obtained from a borehole. The heat flow at different places in the O.F.S. and Transvaal was calculated from conductivity data collected by this laboratory and the Geological Unit of the Atomic Energy Board.

General Services

On behalf of Industry and other bodies the following determinations have been carried out: specific heats of building materials and chemicals, melting points of minerals, and the burning temperature of D.D.T. candles.

GEOPHYSICS

Magnetization of Rocks

Samples from outcrops in the Pilansberg area have been studied in an attempt to explain the reversed magnetism which often occurs, and also to establish whether the magnetic characteristics of the rocks give any indication as to the Earth's earlier magnetic fields. The results of this investigation indicate a wide divergence in both the direction and intensity of magnetization. In order to establish whether the above divergence persists throughout the rock strata, or whether it is limited to the surface samples, measurements on samples from deep mines are now planned.

Seismic Surveys

In co-operation with the Bernard Price Institute a study has been made of the seismic disturbances caused by the explosion of 80,000 pounds of explosives at Thabazimbi. The results of these observations will be applicable to investigations in connection with the Earth's crust as well as to more practical problems such as are met with in mining.

Instrumentation

At the request of the Geological Survey a long-range seismic instrument has been repaired and modernized. The work included the provision of an electronic oscillator unit as an accessory.

The short-range seismic instrument developed in this subsection has been applied with good results while investigating foundation conditions preparatory to the erection of large buildings. From the numbers of

Suid-Afrika en die buiteland oor die instrument en die gebruik daarvan blyk dit dat dit groot praktiese toepassingsmoontlikhede inhou.

FISIKA VAN MATERIE

Massa en Lengte Standaarde

'n Temperatuurgereelde kamer is nou beskikbaar waarin drie standaardskaal, 'n skaal vir roetine werk, en 'n golflengtekomparator vir lengtestandaardisasie opgestel is.

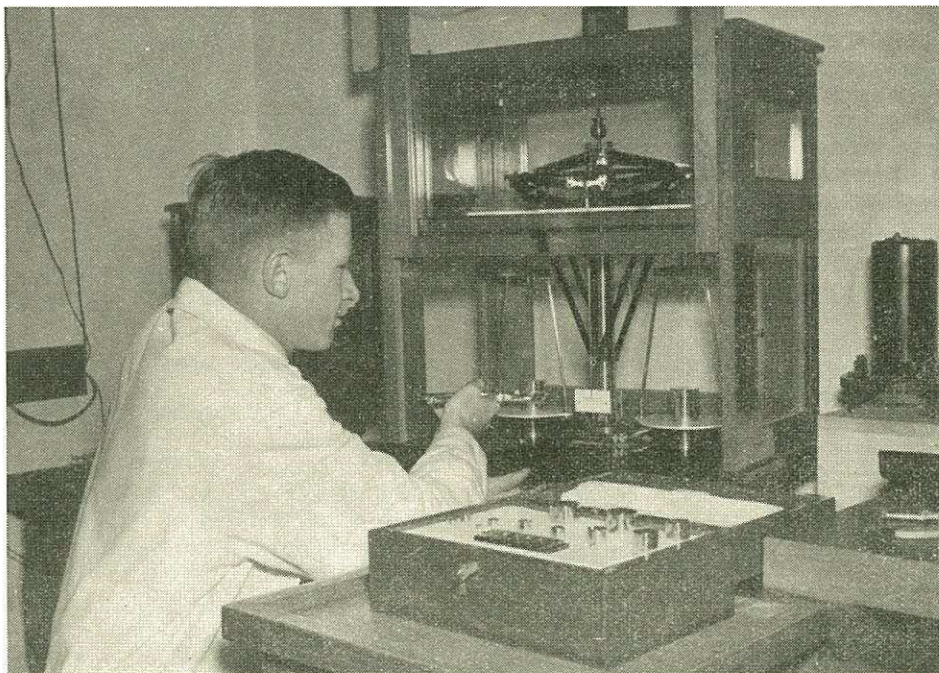
Die kilogramskaal het gedurende die jaar aangekom en werk baie bevredigend. Veranderinge, ten einde noukeurigheid te verhoog, is aan die 500 gram skaal aangebring en 'n noukeurigheid van 10^{-7} word verkry tot by 100 gram. 'n Bykomstige skaal word nog benodig in die 100 gram gebied om aan te sluit by die mikrogramskaal waarmee 'n noukeurigheid van 1 mikrogram verkry word. Die golflengtekomparator is reeds getoets vir die vergelyking van lengtes, maar is nog nie gebruik vir absolute lengtebepalings nie. 'n Groot aantal ontledingsgewigte is vir nywerheidsondernemings geëyk. 'n Chemiese skaal is getoets waarop verbeterings voorgestel en aangebring is om die werking van die skaal te verbeter.

enquiries from people in South Africa and overseas concerning the use of the instrument it appears to have great practical possibilities.

PHYSICS OF MATTER

Standards of Mass and Length

The three standard balances, a balance for routine work and the wave-length comparator for length standardization have now been set up in an air-conditioned room. The kilogram balance arrived during the year and is working very satisfactorily. Modifications to the 500-gram balance now make it possible to weigh accurately to 10^{-7} at 100 grams. A supplementary balance is still needed in the 100 gram region to link up with the microgram balance with which an accuracy of 1 microgram is obtainable. The wave-length comparator has been tested for the comparison of lengths, but is not yet in use for absolute length measurements. A large number of analytical weights have been calibrated for Industry. A chemical balance has been tested and the modifications suggested to improve its action have been made.



Die standaard kilogramskaal. Dit is een van die standaardinstrumente wat deur die N.F.L. gebruik word vir die noukeurige kalibrering van die analitiese gewigte vir die Nywerheid.

The standard kilogram balance. This balance is one of the standard instruments used by the N.P.L. for the accurate calibration of the analytical weights for Industry.

Lugdrukmeting

Die vervaardiging van die primêre standaardbarometer is voltooi en die instrument is op 'n tydelike fondament opgestel. Toetse het getoon dat die meganiese afwerking van die barometer ten volle bevredigend is maar dat die skuddings in die gebou die noukeurigheid van 0.0005 cm. tot 0.0015 cm. verminder. 'n Druktenk vir die yking van kwikbarometers word tans vervaardig. Die Streeksassosiasie vir Afrika van die Wêreld Meteorologiese Organisasie is verwittig van die bestaan van hierdie fasiliteite en dat dit vir vergelyking van barometers tussen state beskikbaar is.

Bepaling van Atmosferiese Windvlae

In medewerking met 'n gemenebes-navorsingskomitee word navorsing gedoen op atmosferiese windvlae in die Unie. 'n Registreereenheid wat vir die doel aangewend word, het reeds veertig vlugte met 'n vliegtuig van die S.A.L.M. oor die Unie meegemaak. Daardeur is gegewens oor die voorkoms van windvlae verkry.

Foto-elastisiteit

Ten einde eksperimentele ontledings te maak van die voorkoms van spanning in strukture onder gegewe toestande van belasting is die geriewe vir foto-elastiese ondersoeke verder uitgebrei. 'n Hidroliese belastingsraamwerk is vervaardig en in gebruik gestel.

Ten behoeve van die Nasionale Bounavorsingsinstituut is 'n studie gemaak van die spannings wat optree aan die endpunte van die kanteelbalk van 'n betonbrug, wat deur die Provinsiale Padraad opgerig word.

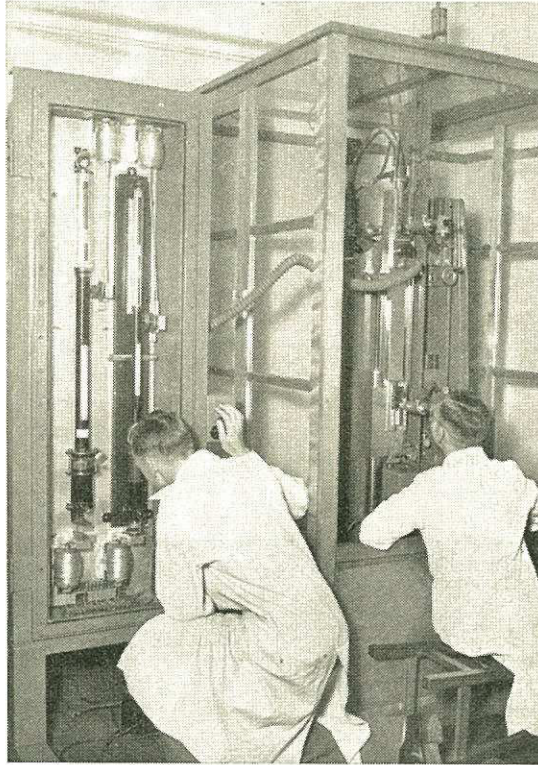
AKOESTIEK

Verstaanbaarheid van Spraak

Dit is 'n bekende feit dat klank in sale ernstig versteur kan word deur weerkaatsings wat nie gelyktydig met die direkte klankgolf by die oor van die waarnemer

Measurement of Atmospheric Pressure

The construction of the primary standard barometer is complete and the instrument has been installed on a temporary foundation. Tests indicate that the mechanical operation of the barometer is completely satisfactory



Die primêre standaard-barometer vir die Unie van Suid-Afrika in die Nasionale Fisiese Laboratorium.

The primary standard barometer for the Union of South Africa in the National Physical Laboratory.

but that vibrations in the building decrease the accuracy from 0.0005 cm. to 0.0015 cm. A pressure vessel for the calibration of mercury barometers is now being made. The African Regional Association of the World Meteorological Organization has been informed of the existence of these facilities and that they are available for interstate comparison of barometers.

Measurements of Gusts

In co-operation with a Commonwealth research committee, research is being undertaken on atmospheric gusts in South Africa. A recorder which is being used for this purpose has already made some forty flights over the Union in an aircraft of the S.A.A.F. and data concerning the incidence of wind gusts have been obtained.

Photoelasticity

In order to make experimental analyses of the stresses in structures under given conditions of loading, the facilities for photoelastic investigations have been further extended. A hydraulic loading frame has been built and is now in use.

On behalf of the National Building Research Institute a study has been made of the stresses encountered at the end of the cantilever of a concrete bridge being built by the Provincial Roads Administration.

ACOUSTICS

Intellegibility of Speech

It is a known fact that sound in halls can be seriously disturbed by echoes which do not reach the ear of the listener simultaneously with the direct sound wave.

aankom nie. Die uitwerking op verstaanbaarheid van spraak is afhanklik van beide die relatiewe intensiteit en die vertraging tussen die direkte en die weerkaatste klankgolwe. Die invloed wat die twee faktore op die verstaanbaarheid het word ondersoek.

Standaardlyste van woorde wat geskik is vir artikulasietoetse word opgestel. Die Engelse lys is voltooi en daar word tans aan die Afrikaanse lys gewerk.

Klankabsorberende Materiaal

Vir die bepaling van die akoestiese eienskappe van klankabsorberende materiaal is 'n klein resonansiebuis ontwerp en gebou. Dit gee bevredigende resultate oor die frekwensiebestek 125 tot 4,000 hertz.

Toepassing van Soniese Metodes

Die apparaat wat vroeër ontwikkel is om elastiese eienskappe van betonmonsters deur middel van resonansiemetodes te bepaal is tot so 'n mate vereenvoudig dat geen elektroniese onderdele gebruik word nie. Die vervaardigingskoste is dus baie gering, sodat die toerusting geskik is vir algemene gebruik in veldtoetse.

Om die elasticiteit en viskositeit van bitumineuse materiale te bepaal is 'n apparaat vir die Bitumineuse Bindstofnavorsingseenheid ontwikkel wat van soniese metodes gebruik maak.

The effect on the intelligibility of speech is dependent both on the relative intensity and the delay between the direct and reflected waves. The influence of these two factors upon intelligibility is being investigated.

Standard lists of words suitable for articulation tests are being drawn up. The English list is complete and work is in progress on the Afrikaans list.

Sound Absorbent Material

For the determination of the acoustic properties of sound absorbent material a small resonance tube has been designed and constructed. It gives satisfactory results over the frequency range 125 to 4,000 c.p.s.

Application of Sonic Methods

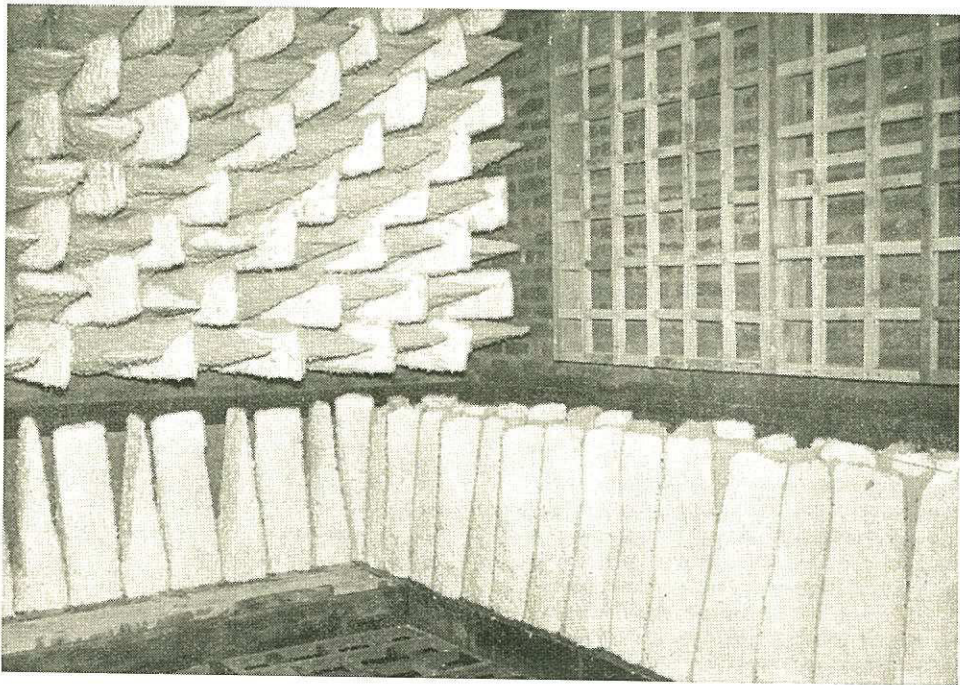
The apparatus developed previously to determine the elastic properties of concrete samples by means of resonance methods has been simplified to such an extent that no electronic parts are necessary. The cost of manufacture is, therefore, very low and the equipment is suitable for general use in field tests.

In order to determine the elasticity and viscosity of bituminous materials an apparatus based on the use of sonic methods has been developed for the Bituminous Binder Research Unit.



Die verval van 'n betonmonster weens verwerking kan bepaal word deur sy elastiese hoedanighede te meet met behulp van die audio-elasticiteitsmeter wat in die Afdeling Akoestiek van die N.F.L. ontwikkel is.

The deterioration of a concrete sample by corrosion can be determined by measuring its elastic properties with this audio-elasticity meter invented in the Acoustics Section of the N.P.L.



Die installering van wie van klankabsorberende materiaal in die weerklankvrye kamer van die nuwe gebou vir die Afdeling Akoestiek van die Nasionale Fisiese Laboratorium.

The installation of wedges of sound absorbing material in the anechoic chamber of the new building for the Acoustics Section of the National Physical Laboratory.

Akoestiek van Geboue

Aan verskillende liggame is raad verleen oor die akoestiese ontwerp en behandeling van sale. Enkele gevalle wat spesiale vermelding verdien is die volgende :

1. Die Departement van Justisie is met raad bedien in verband met die elektromeganiese opname van hofverrigtinge. Geskikte apparaat vir opnames is aanbeveel. Om die gunstigste toestande vir elektromeganiese opname te bewerkstellig is 'n akoestiese behandeling vir 'n hofsaal voorgeskryf.
2. Die S.A.U.K. is met raad bedien in verband met die akoestiese ontwerp van nuwe ateljees te Kaapstad. Materiale is getoets, berekenings is gemaak en volledige spesifikasies vir die akoestiese behandeling van elke vertrek in die gebou is opgestel.

Lawaai in die Nywerheid

Raad is verleen in verband met die voorkoming en demping van lawaai in geboue en fabrieke.

Acoustics of Buildings

Advice has been given to sundry bodies on the design and acoustic treatment of halls. The following examples are worthy of special mention :—

1. The Department of Justice was given advice in connection with the electromechanical recording of court proceedings. Suitable equipment was recommended, and acoustic treatment of a courtroom was prescribed to ensure favourable conditions for recording.
2. The S.A.B.C. was advised on the acoustic design of new studios in Cape Town. Materials were tested, calculations made, and complete specifications were drawn up for the acoustic treatment of every room in the building.

Noise in Industry

Advice was given in connection with the prevention and reduction of noise in buildings and factories.

ELEKTRIESE STANDAARDE

Standaardisasie

Die verwysingstandaard van elektriese spanning, wat uit 23 Weston normaalselle bestaan, word instand gehou en van tyd tot tyd gebruik om selle wat van ander liggame ingestuur word, te yk. Vir laasgenoemde doel word 'n verbeterde vorm van komparator gebou, terwyl die studie van gewysigde selle, wat baie minder ruimte inneem, voortgesit word.

Die verwysingstandaard van elektriese weerstand, wat uit ses 1-ohm Thomas-tipe weerstande bestaan, is instand gehou. Spesiale aandag word tans aan die bou van 'n lae weerstand gegee, wat 'n hoë stroom sal kan dra met 'n geringe temperatuurstyging en 'n gevolglike verwaarloosbare weerstandsverandering.

Die nuwe gelykstroom/wisselstroom oordraginstrument vir wisselstroomstandardisasie, waarvan in die vorige verslag melding gemaak is, het ten volle aan die verwagtinge voldoen en word tans gereeld gebruik. 'n Tegniek is ontwikkel waardeur die gebruik van 'n volle lang skaal vermy en die taak van die operateur vergemaklik word deur alle lesings op een punt van die skaal te neem. Dit bring ook 'n aansienlike besparing aan ruimte.

Toebehore is gebou waarmee enige frekwensie van 1,000 herz tot 10 Megahertz in stappe van 1,000 herz uit die standaard saamgestel kan word met 'n noukeurigheid wat ooreenkom met dié van die standaard.

Ten gevolge van verontrustende verskille wat waargeneem is gedurende vergelykings tussen die bestaande verwysingstandaarde van kapasitansie is 'n nuwe reeks vergelykings met 'n standaard wat onlangs deur die N.P.L., Teddington, geëyk is, gemaak. Daaruit het geblyk dat alle die lugkapasiteite se waardes tot 'n hoë noukeurigheid onveranderd is terwyl die mikakapasiteite se waardes aansienlik verander het. In die vervolg sal alleen lugkapasiteite as verwysingstandaarde gebruik word.

Magnetiese Metings

Vordering is met die bou van 'n permeameter gemaak en magnetiese metings op monsters is alreeds daarmee gedoen. Dit is egter nog nie in sy finale vorm nie en verbeterings word nog oorweeg.

Roetine Ykings

Ykings is vir buiteliggame gedoen van weerstande, wyserinstrumente, potensiometer-spanningsverhoudingsweerstande, newesluitings, horlosies, tydstrekmeters e.d.m. Verder is toetse op olie- en ystermonsters ten behoeve van die nywerheid, uitgevoer.

ELECTRICAL STANDARDS

Standardization

The reference standard of electromotive force which consists of 23 Weston Normal cells is maintained and from time to time used for the calibration of cells sent in by outside bodies. For this purpose an improved form of comparator is being constructed. The study of a modified form of cell which takes up far less space is being continued.

The reference standard of electrical resistance which consists of six 1 ohm Thomas-type resistors has been maintained. Special attention is now being given to the building of a low resistance which can carry a high current with very small rise in temperature and resultant negligible change in resistance.

The new DC/AC transfer instrument for alternating current standardization mentioned in the previous report has come up to expectation and is now in regular use. A technique has been developed whereby the use of the complete scale length can be avoided and the task of the operator simplified by taking all readings at one point on the scale. It also saves a considerable amount of space.

Equipment has now been built with which any frequency from 1,000 c.p.s. to 10 megacycles per second in steps of 1,000 c.p.s. can be derived from the standard with an accuracy which equals that of the standard itself.

As a consequence of disturbing differences noted during comparisons between the existing reference standards of capacitance, a new series of comparisons has been made with a standard recently calibrated by the N.P.L. at Teddington. From this it is apparent that all the air capacitors have maintained their accuracy while the values for the mica capacitors have changed. In future only air capacitors will be used as reference standards.

Magnetic Measurements

Progress has been made with the construction of a permeameter. Although magnetic measurements of samples have been made, it is, however, still not in its final form and improvements are being considered.

Routine Calibrations

Calibrations undertaken for outside bodies include resistors, pointer instruments, potentiometer/volt ratio boxes, shunts, watches, and time interval meters. In addition tests were carried out on oil and iron samples on behalf of industry.

ELEKTRONIKA

Vervaardiging van Vakuumbuise

Toerusting is ontwerp en gebou om spesiale vakuumbuise in die laboratorium te vervaardig, wat nie in die handel beskikbaar is nie.

Servomeganismes

Instrumente vir die ontleding van die gedrag van servomeganismes is voltooi. Hiermee is dit moontlik om 'n voorgestelde beheersisteen (of 'n skaalmodel daarvan) in die laboratorium op te stel en deur 'n beperkte reeks metings daarop, sy gedrag onder verskillende omstandighede, wat in die praktyk mag voorkom, te voorspel.

'n Hele aantal beheersisteme is vir die nywerheid ontwerp en gebou en dit will voorkom asof al meer en meer van hierdie diens gebruik gemaak sal word.

Rekenmasjiene

'n Navorsingsbeampte is met 'n UNESCO-beurs na die buiteland gestuur ten einde analoog-rekenmasjiene te bestudeer. Daar word reeds aandag gegee aan die ontwerp van onderdele van die rekenmasjiene.

In X-straaldiffraksie-ontledings kom tydrawende berekenings voor in die bepaling van die molekulêre struktuur van 'n kristal. 'n Rekenmasjiene, met die spesifieke doel om sulke berekenings te vergemaklik, is nou ontwerp en sy voltooiing wag alleen op die aankoms van sekere komponente van oorsee.

Gronddruk sel

Ten einde gronddruk te meet is 'n sel vir die Nasionale Bounavorsingsinstituut ontwerp waarin verandering van druk 'n verandering van magnetiese weerstand veroorsaak, wat dan met 'n ballistiese brug waargeneem word. Toets het bevestig dat hierdie sel baie voordele bo ander selle het. Dit is eenvoudig, goedkoop en word nie beïnvloed deur veranderinge in temperatuur, vogtigheid of rowwe hantering nie.

BEDANKINGS

Soos in die verlede moet daar met besondere waardering melding gemaak word van die hartlike samewerking en wedersydse hulpbetoning wat van die volgende nasionale institute ondervind is: National Physical Laboratory (Groot Brittanje), National Bureau of Standards (V.S.A.), National Research Council (Kanada), Physical Laboratory of the Commonwealth Scientific and Industrial Organisation (Australië), Atomic Energy Research Establishment (Engeland), Bernard Price Instituut vir Geofisika en die Suid-Afrikaanse Buro vir Standaarde.

ELECTRONICS

Manufacture of Vacuum Tubes

Equipment has been designed and built for the manufacture in the laboratory of specialised vacuum tubes not available commercially.

Servomechanisms

Instruments for the analysis of the behaviour of servomechanisms have been completed. It is now possible to set up a proposed control system (or a scale model of it) in the laboratory and by means of a limited series of readings to predict its behaviour under various conditions likely to be encountered in practice.

A number of control systems have been designed and built for Industry. It appears likely that increasing use will be made of this service.

Computers

A research officer has been sent overseas on a UNESCO bursary to study analogue computers. Some attention has already been given to the design of components for the computer.

In X-ray diffraction analyses, tedious computations are necessary for the working out of the structure of crystals. A computer has now been designed specifically for this purpose and its completion awaits only the arrival of certain components from overseas.

Soil Pressure Cell

A cell in which a change in soil pressure is measured in terms of changes in magnetic resistance which can be observed with the aid of a ballistic bridge has been designed for the National Building Research Institute. Tests have confirmed that this cell has many advantages: It is simple, cheap and is not influenced by changes of temperature, humidity or rough handling.

ACKNOWLEDGEMENTS

As in previous years appreciation is expressed for the whole-hearted co-operation and assistance received from the following national institutes: the National Physical Laboratory (United Kingdom), National Bureau of Standards (U.S.A.), National Research Council (Canada), Physical Laboratory of the C.S.I.R.O. (Australia), Atomic Energy Research Establishment (United Kingdom), Bernard Price Institute for Geophysics, and the South African Bureau of Standards.

Ook word met erkentlikheid verwys na die gasvryheid wat personeellede in die volgende institute geniet het tydens buitelandse studiereise: Chalmers Institute of Technology, Göteborg, Institut für physikalische Chemie (der Universität Freiburg), National Physical Laboratory, National Bureau of Standards, Atomic Energy Research Establishment (Isotopes Division) en Commissariat a l'Energie Atomique (Section Messures).

Die volgende beurstoekening aan 'n personeellid van die laboratorium word met dank erken: „U.N.E.S.C.O. 1952 fellowship in the field of mathematical computing machinery.”

At the same time indebtedness is acknowledged to the following institutes for the hospitality enjoyed by staff members during overseas study tours: Chalmers Institute of Technology, Institut für physikalische Chemie (der Universität Freiburg), National Physical Laboratory, National Bureau of Standards, A.E.R.E. (Isotopes Division) and Commissariat a l'Energie Atomique (Section Messures).

The following grant to a member of the laboratory's staff is acknowledged with thanks: UNESCO 1952 Fellowship in the field of Mathematical Computing Machinery.



Die nuwe kernfisikagebou wat tans op die nuwe terrein van die W.N.N.R. in aanbou is. Die ventilators vir die Siklotronsaal wat 30 voet onder die grond is, kan links op die voorgrond gesien word.

The new nuclear physics building under construction at the new C.S.I.R. site seven miles east of Pretoria. The ventilators for the cyclotron hall, which is 30 feet below surface, can be seen in the left foreground.

Navorsingseenheid Werk- tuigkundige Ingenieurswese

Direkteur: DR. A. J. A. ROUX.

In die tweede jaar sedert die stigting van die Navorsingseenheid Werktuigkundige Ingenieurswese is aansienlike vordering gemaak met die daarstelling van 'n laboratorium wat in die eerste plek om dringende en belangrike probleme, waarmee die nywerhede te kampe het, opgebou word.

Die steeds toenemende mate waarin die nywerheid hom tot die Eenheid rig vir raad en hulp in verband met die oplossing van tegniese probleme is dan ook verblydend. Vanweë die beperkte beskikbare geriewe en klein personeel was dit egter nie moontlik om aan al die versoeke te voldoen nie en dit het duidelik aan die lig gekom dat die laboratorium aansienlik sal moet uitbrei om aan sy doel te beantwoord. Onderzoek word tans ingestel na die moontlikheid om ook die navorsingspotensiaal van Ingenieursdepartemente van Universiteite verder te benut.

Vir die gesonde en vinnige groei van die Eenheid kom die Raad se dank toe aan die Advieskomitee wat weereens 'n jaar van uitmuntende diens gelewer het.

INGENIEURSMATERIALE

Voorvervorming en Plastiese Eienskappe van Metale

Dit is bekend dat gedurende sekere vervormingsprosesse van metale, soos draad-trek, ens., inwendige spannings in die materiaal ontstaan as gevolg waarvan die meganiese en veral die plastiese eienskappe van die betrokke metaal beïnvloed word. Ten einde vas te stel op watter wyse en in welke mate vervorming hierdie eienskappe beïnvloed, moet die proses eers vir die eenvoudigste metaalstruktuur, d.w.s. eenkristalle, ondersoek word en daarna kan pogings aangewend word om die resultate toe te pas in polikristallyne metale wat in die nywerheid gebruik word.

Vir hierdie ondersoek is 'n spesiale trek- en drukapparaat in die laboratorium ontwikkel waarmee dit moontlik is om 'n metaalmonster te rek en te stuike, sonder dat die monsterstaaf van inspankoppe verander moet word, soos dit by die gewone trek- en drukmasjiene die geval is. 'n Begin is gemaak met die ondersoek van eenkristalle van sink.

Vermoeidheid van Metale

Swigting van strukture en masjiendele as gevolg van vermoeidheid is sonder twyfel een van die belangrikste probleme waarmee die ingenieurspraktyk te kampe

Mechanical Engineering Research Unit

Director: DR. A. J. A. ROUX

Although the Mechanical Engineering Unit was established only two years ago, considerable progress has been made towards setting up a laboratory to cater specifically for the problems with which Industry is confronted.

It is thus gratifying to note that Industry is turning to the Unit in increasing measure for the solution of technical problems. Owing to limited facilities and small staff, it was, however, impossible to comply with all the requests, and it is clear that the Unit will have to be expanded considerably if it is to serve its purpose. Attention is at present being given to the possibility of using the research potential of engineering departments in the universities to a greater extent.

The Council wishes to express its thanks to the Advisory Committee which has again rendered a year of valuable service, and to which the rapid and healthy growth of the Unit is due.

ENGINEERING MATERIALS

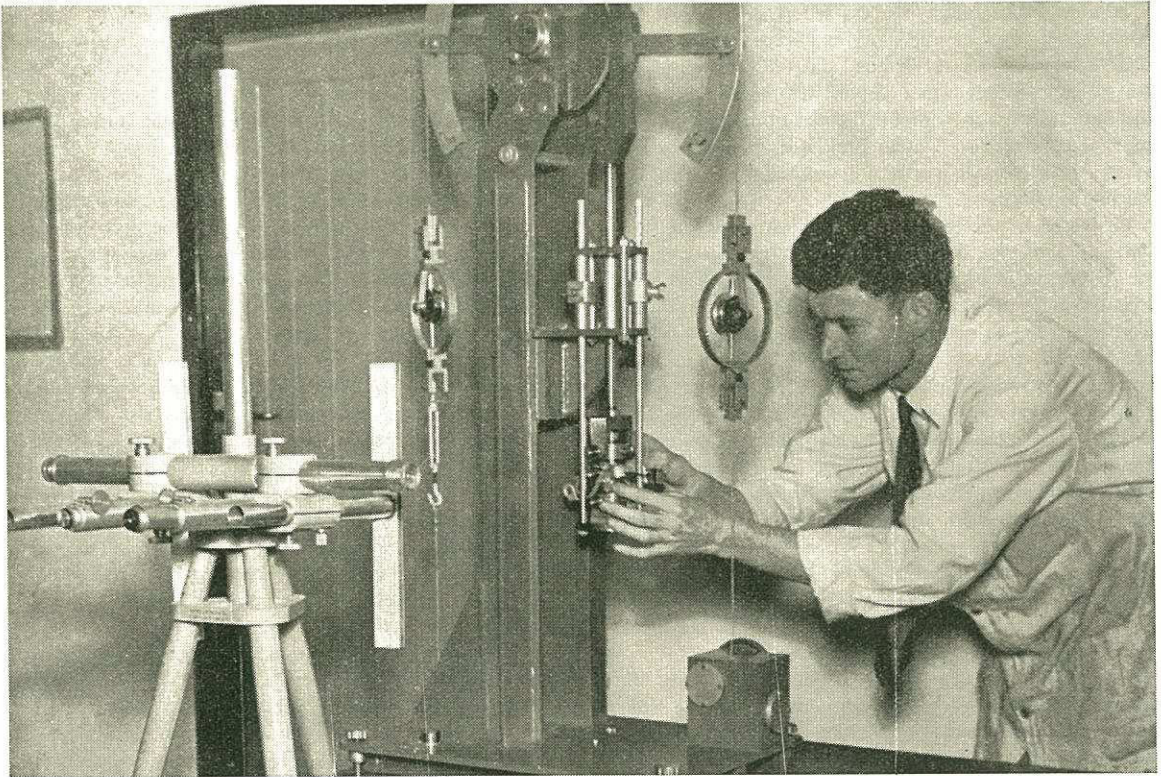
Pre-deformation and Plastic Properties of Metals

It is known that during certain deformation processes such as wire-drawing internal stresses are set up which influence the mechanical and more particularly the plastic properties of the metal concerned. In order to establish how and to what degree deformation influences these properties, the simplest metal structure, *i.e.*, a single crystal, must first be investigated and then an attempt can be made to apply the results to the polycrystalline metals used in industry.

For this investigation a special compression/tensile testing apparatus has been constructed in the laboratory. With this it is possible to subject the sample to both compression and tension without altering the grips as in the case of machines commonly used for this purpose. A start has been made with an investigation of single crystals of zinc.

Fatigue in Metals

Failure of structures due to fatigue is undoubtedly one of the principal problems with which engineers are confronted in practice. It is estimated that of the



Die druk- en trek toetsapparaat vir fundamentele studies van die plastiese eienskappe van metale.

The compression/tensile testing apparatus for fundamental studies of the plastic properties of metals.

het. Volgens deskundiges is die swigtings wat in hoogspeedmasjiene voorkom, in 90 persent van gevalle die gevolg van vermoeidheid. In Suid-Afrika is die mynbedryf met die oog op vermoeidheid in boorstawe, hyskabels, ens., die Spoorweë met die oog op spoorstawe, brûe en rollende materiaal en ander nywerhede met die oog op strukture wat aan dinamiese kragte onderhewig is, gemoeid met hierdie probleem.

Om fundamentele navorsing te doen en nywerhede wat spesifieke probleme het met ondersoekingswerk by te staan, word 'n laboratorium vir navorsing op die gebied van vermoeidheid opgebou. 'n 100 ton Amslermasjien, 'n 10 ton Baldwin universele masjien en enkele kleiner masjiene is op bestelling en hulle sal hopelik eersdaags afgelewer word.

MEGANIKA VAN VASTE STOWWE

Rotsstorting in Mynbou

Die verskynsel wat „rotsstorting” genoem word, is een waarin rots skielik uit die vloerwand, werksfront of dakwand van 'n uitgraving uitbars en wat as gevolg van ander kragte behalwe swaartekrag voorkom.

failures in high-speed machines some 90 per cent. result from this cause. In South Africa the mining industry is faced with the problem in the form of fatigue in drill steel, winding ropes, etc.; the railways in rails, bridges and rolling stock; and other industries in structures subjected to dynamic forces.

A laboratory is now being built up for fundamental research in fatigue and will be used for investigations on behalf of industries with specific problems in this field. A 100-ton Amsler machine, a 10-ton Baldwin universal machine and some smaller machines are on order and it is hoped that they will be delivered shortly.

MECHANICS OF SOLIDS

Pressure Bursts in Mining

The phenomenon known as a “pressure burst” is one in which rock suddenly bursts forth from the footwall, working face or hanging wall of a stope, and is due to forces other than that of gravity.

Alhoewel die goudmynbedryf sedert sy ontstaan met rotsstortings van hierdie aard te kampe gehad het, is daar egter rede om te vermoed dat die frekwensie van rotsstortings toeneem met diepte. Om hierdie rede mag dit onprakties word om op dieptes oor 8,000 voet te myn, tensy die een of ander praktiese oplossing gevind word al is dit dan net 'n oplossing waardeur die frekwensie verminder word.

Op versoek van een van die goudmyn-groepe is teen die einde van 1952 besluit om twee van die personeellede vir 'n periode van ses maande deelyds beskikbaar te stel om die probleem te ondersoek. Ondergrondse werksplekke waar rotsstortings voorgekom het is besoek om 'n studie te maak van die aard van die breekvlakke en die omstandighede waaronder die stortings plaasgevind het. 'n Aanvang is gemaak met statistiese ontleding van die gegewens in verslae oor rotsstorting met die doel om 'n korrelasie tussen die frekwensie van rotsstortings en mynmetodes, diepte, ens., te probeer vind, terwyl teoretiese werk onderneem is om die spanningsverdeling wat in die omgewing van uitgrawings ontstaan, te bereken. Verder is 'n uitgebreide program in werking gestel om die meganiese eienskappe van die betrokke rots, d.w.s. druksterkte, elastisiteitsmodulus, hardheid, digtheid, plastisiteit, ens., te bepaal.

Uit die voorlopige ondersoek het geblyk dat die frekwensie van rotsstortings verminder in gevalle waar die werksfront deur skuifvlakke of ander oorsake vergruis is. Na aanleiding hiervan het die vraag ontstaan of rotsstortings onder sekere omstandighede nie verminder kan word deur kunsmatige vergruising nie en word ondergrondse toetse tans uitgevoer om vas te stel onder watter omstandighede die beste resultate met hierdie metode verkry kan word.

Intussen word die navorsing op versoek van die betrokke myngroepe op 'n groter skaal vir nog 'n jaar voortgesit.

Ontwerp van 'n Radarmas-sisteem

Op versoek van die Telekommunikasie Navorsingslaboratorium is die ontwerp van 'n radarmas-sisteem ten behoeve van die Departement van Verdediging onderneem.

TOEGEPASTE TERMODINAMIKA

Gasturbines

Vanweë die skaarste van water in Suid-Afrika, blyk die gasturbine 'n uitstekende kragbron vir lokomotiewe en elektriese krag-sentrales te wees omdat dit nie water verbruik soos in die geval van stoomasjiene en -turbines nie. Vir 'n wye toepassing van hierdie kragbron word dit egter noodsaaklik gegag dat steenkool as brandstof gebruik word.

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Although the mining industry has always had to contend with rock bursts of this nature, there is reason to believe that the frequency of bursts increases with depth. As a result it may not be practicable to mine at depths much below 8,000 feet unless at least a partial solution to the problem can be found.

At the request of one of the mining groups, it was decided to make the part-time services of two members of the Unit's staff available to study the problem for a period of six months. Underground sites where rock bursts had occurred were visited, and a study was made of the failure planes and the circumstances under which the bursts occurred. A start has been made with the statistical analysis of the data contained in reports concerning rock bursts, in the hope of finding some correlation between their frequency, the depth at which they occur, methods of mining, etc., while theoretical work is being undertaken on the distribution of stresses in the vicinity of excavations. Further, an exhaustive programme of research is being undertaken to determine the mechanical properties of the rock involved; *i.e.*, strength in compression, modulus of elasticity, hardness, density, plasticity, etc.

From the preliminary investigation it appears that the frequency of rock bursts decreases in cases where the working front is shattered by faults or other causes. Following this lead the question arises as to whether the frequency of pressure bursts cannot, under certain conditions, be decreased by artificially crushing the rock, and tests are now being carried out underground to determine the conditions under which the best results will be obtained with this method.

In the meantime, at the request of the mining group concerned, the research is to be continued for another year on a larger scale.

Design of a Radar Aerial System

At the request of the Telecommunications Research Laboratory a radar antenna system was designed for the Department of Defence.

APPLIED THERMODYNAMICS

Gas Turbines

Bearing in mind the limited supplies of water in South Africa, the gas turbine appears to be an outstanding prime mover for locomotives and power stations because, unlike steam engines and turbines, it consumes no water. For this source of power to find general application, however, it would be essential for coal to be used as the fuel.

Om vas te stel op watter wyse Suid-Afrikaanse steenkool wat 'n hoë en betreklik vuur-vaste asgehalte bevat die beste benut kan word, is 'n apparaat ontwikkel om die invloed van intense klankgolwe op die verbranding van verpoëerde steenkool te bestudeer. 'n Nuwe rigting is in hierdie ondersoek ingeslaan deur die ontwerp van 'n termo-akoestiese ossillator wat, volgens voorlopige toetse, groot moontlikhede inhou vir die doeltreffende verbranding van verpoëerde steenkool. Die toestel besit ook die eienskap dat, afgesien van sy eenvoud, dit die doeltreffendheid van die gasturbine sal verhoog bo dié wat verkry word met gewone verbrandingskamers, omdat dit in plaas van 'n drukverlies oor die verbrandingskamer moontlik 'n drukverhoging kan bewerkstellig.

HITTEVOORTPLANTING

Hittevoortplanting tussen Oppervlakke en Vloeistowwe

Op versoek van die Nasionale Bounavorsingsinstituut en as gevolg van die belang wat die nywerheid in die algemeen daarby het, word die probleem van hitte-uitwisseling tussen vaste wande en vloeistowwe ondersoek en veral dié aspekte wat betrekking het op die gesamentlike invloed van natuurlike en geforseerde konveksie.

Die apparaat wat vir die doel van hierdie ondersoek opgebou is, is van so 'n aard dat die ondersoek uitgevoer kan word oor 'n wye gebied van die Reynoldsgetal vir geforseerde konveksie en van die Grashofgetal vir natuurlike konveksie. Die opstelling van die kontrole-paneel en instrumente sal eersdaags gereed wees sodat 'n begin met die ondersoek gemaak kan word.

Ontwerp van Klimaatkamer

Die ontwerp van die klimaatkamer wat deur die laboratorium ten behoeve van die Transvaalse Kamer van Mynwese onderneem is, nader nou voltooiing.

Met behulp van die klimaatkamer, wat 'n deel sal vorm van die navorsingslaboratorium van die Kamer van Mynwese se Fisologiese Navorsingseenheid, sal dit moontlik wees om enige stel ondergrondse klimaatstoestande na te maak, en die mens se reaksies onder sulke toestande te ondersoek.

Om aan die vereistes te voldoen moet voorsiening gemaak word dat die vier klimaatfaktore onafhanklik van mekaar beheer kan word en wel tussen breë perke. Die klimaatkamer bestaan uit 'n windtonnel van die geslote kringloop tipe met 'n horisontale sowel as 'n vertikale werkseksie wat die toetskamers vorm. Die twee teenoorgestelde wande van elke toetskamer in die rigting van lugvloei is in die vorm van 'n rooster sodat lug daardeur kan vloei. Die oppervlaktemperatuur van elk van die ses wande (in albei toetskamers) kan onafhanklik van mekaar beheer word, terwyl die lugtem-

In order to find out how South African coal with its high (and relatively high melting) ash content can be used to best advantage, an apparatus has been developed for the study of the influence of intense sound-waves on the combustion of pulverized coal. A new approach to this problem has been made by the design of a thermo-acoustic oscillator which in preliminary tests offered promising possibilities for the efficient burning of powdered coal. In spite of its simplicity this equipment has the additional advantage that it will increase the efficiency of the gas turbine above that obtained with conventional combustion chambers, because in place of a pressure drop it can theoretically bring about a pressure rise across the combustion chamber.

HEAT TRANSFER

Heat Transfer Between Surfaces and Fluids

At the request of the National Building Research Institute, and for the benefit of Industry in general, the Unit is studying the problem of heat transfer between fluids and solid walls with particular reference to those aspects relating to the combined effect of natural and forced convection.

The apparatus constructed for the purpose has been designed in such a way that the investigation can be carried out over a wide range of Reynolds and Grashof numbers for forced and natural convection respectively. The control panel and instrumentation will shortly be completed so that a start can be made with the investigation.

Design of a Climatic Chamber

The design of the climatic chamber for the Transvaal Chamber of Mines is now nearing completion.

With the aid of this piece of equipment which will form part of the research laboratory of the Chamber of Mines Physiological Research Unit, it will be possible to duplicate any set of climatic conditions encountered underground and investigate the reactions of men subjected to them.

In the design, provision had to be made for the four climatic factors to be controlled independently over a wide range. The climatic chamber consists of a wind tunnel of the closed circuit type with both horizontal and vertical working sections which constitute the test rooms. The two opposite walls of each test room in the line of air flow are in the form of grilles through which air can flow. The surface temperatures of each of the six containing walls in both test rooms can be independently varied while the air temperature in the wind tunnel and the humidity in a side tunnel can be controlled.

peratuur in die windtonnel en die lugvotigheid in 'n sy-tonnel beheer word.

Aangesien groot dele van die ontwerp oorspronklike werk behels, moes noukeurige berekenings en toetse deurgevoer word om te verseker dat die verskillende onderdele aan hulle doel sal beantwoord. Die belangrikste enkele bou-element in die klimaatskamer is die roosters wat nie alleen as poreuse mure moet dien nie maar ook moet voldoen aan ander streng vereistes. Hierdie probleme is egter bevredigend opgelos wat grootliks daartoe sal bydra om die klimaatskamer 'n waardevolle navorsingsapparaat te maak. Die totale koste vir die ontwerp, bou en oprigting van die klimaatskamer word op ongeveer £90,000 geskat.

Die vervaardiging van die roosters is van so 'n gespesialiseerde aard dat dit deur die laboratorium onderneem moes word. Hierdie taak, tesame met die ontwerp van die klimaatskamer word vir die Kamer van Mynwese onderneem teen 'n vergoeding van £11,500.

Ontwerp en Vervaardiging van Mens-kalorimeter

Die mens-kalorimeter wat net soos die klimaatskamer deel sal vorm van die toerusting van die Kamer van Mynwese se Fisiologiese Navorsingseenheid, sal gebruik word om die verskil van die hitte-inhoud van die menslike liggaam tussen twee temperatuurvlakke te bepaal. Die een temperatuurvlak sal konstant gehou word in die kalorimeter terwyl die ander by enige gegewe klimaats-toestand in die klimaatskamer gehandhaaf sal word.

Aangesien 'n soortgelyke kalorimeter in die V.S.A. gebou is en tans geyk word, het die Kamer van Mynwese besluit om met die ontwerp en vervaardiging van die instrument te wag totdat die toetsresultate van die Amerikaanse eenheid bevredigend is. Ten einde egter onnodige vertraging te vermy, is op versoek van die Kamer van Mynwese besluit om voorlopige werk in verband met die ontwerp te onderneem teen 'n vergoeding van £1,000. Nadat hierdie kontrak verstryk het, is 'n tweede kontrak van £1,250 gesluit vir die ontwikkeling van meer bevredigende ventilasietoestande in die kalorimeteromhulsel en die ontwerp van die omhulsel self.

VLOEISTOFMEGANIKA

Die Meet van Lae Lugspeede

Die meet van lugsnelhede onder 25 voet per minuut, stel 'n probleem wat veral vir Suid-Afrika met sy warm klimaat van groot praktiese belang is. Ten einde instrumente wat vir hierdie doel deur die nywerheid gebruik word, te yk en meer geskikte instrumente te ontwikkel, is 'n aanvang gemaak om die nodige geriewe vir hierdie ondersoek op te bou.

Since much of the design involved original work, exhaustive calculations and tests had to be carried out to ensure that the various components would serve the purpose for which they were designed. The most important structural elements in the climatic chamber are the grilles which not only had to serve as porous walls but also had to comply with other stringent conditions. This problem was, however, solved satisfactorily and will contribute much towards making the chamber a valuable research instrument. The total cost for the design, construction and installation of the climatic chamber is estimated at about £90,000.

The manufacture of the grilles is of such a specialised nature that it had to be undertaken by the laboratory. This work, together with the design of the chamber, is being undertaken on contract for the Chamber of Mines which is contributing the sum of £11,500.

Design and Construction of a Human Calorimeter

The human calorimeter, which, like the climatic chamber, will form a part of the equipment of the Chamber of Mines Physiological Research Unit, will be used to determine the heat content of the human body between two temperature levels. The one temperature level will be kept constant in the calorimeter while the other will be maintained at a given climatic condition in the chamber.

As a similar calorimeter has been built and is at present being calibrated in the United States, the Chamber of Mines has decided to delay the design and construction of its instrument until satisfactory test results have been obtained in the American instrument. In order to avoid unnecessary delay, however, the Chamber of Mines authorised preliminary work on the design to be undertaken at a cost of £1,000. At the end of this contract a second contract of £1,250 was entered into for the development of a more satisfactory ventilation system for the calorimeter shell and the design of the shell itself.

FLUID DYNAMICS

The Measurement of Low Air Speeds

The measurement of low air speeds of the order of 25 feet per minute poses a problem which is of particular importance in South Africa with its warm climate. A start has been made with the building up of the necessary facilities for the calibration of instruments used for this purpose in Industry, and for the development of more suitable instruments.

Lugvloei deur Roosters

In verband met die ontwerp van die klimaatskamer was dit noodsaaklik om ondersoek in te stel na die ontwerp van roosters ten einde 'n gelykmatige lugverdeling stroomaf te kry met 'n lae turbulensie.

Met behulp van 'n klein lugkanaal wat vir hierdie doel ontwerp en vervaardig is, is die invloed van rooster-spasiëring op die lugverdeling en die beste verhouding van spaziëring tot roosterlem-wydte, bepaal. Ook die lugturbulensie op verskeie afstande stroomaf van die rooster is gemeet om die invloed van lugsnelheid en roosterlem-wydte daarop vas te stel.

Doeltreffendheid van Ventilatore van Spoorweg-rytuie

Ten behoeve van die Administrasie, het die laboratorium onderneem om die doeltreffendheid van ses verskillende tipe ventilatore te ondersoek. Hierdie ondersoek wat tans nog aan die gang is, word uitgevoer in 'n laagspoed-windtonnel met 'n 10 voet werkseksie.

Doeltreffendheid van Dakventilatore

Dakventilatore word in Suid-Afrika vry algemeen gebruik om vars lug deur geboue en veral fabrieksgeboue, te suig. In samewerking met die Buro vir Standaarde is enkele jare gelede 'n voorlopige toetskode opgestel.

Air Flow Through Grids

In connection with the design of the climatic chamber it was necessary to make an investigation of the design of grids in order to obtain an even distribution of air with low turbulence.

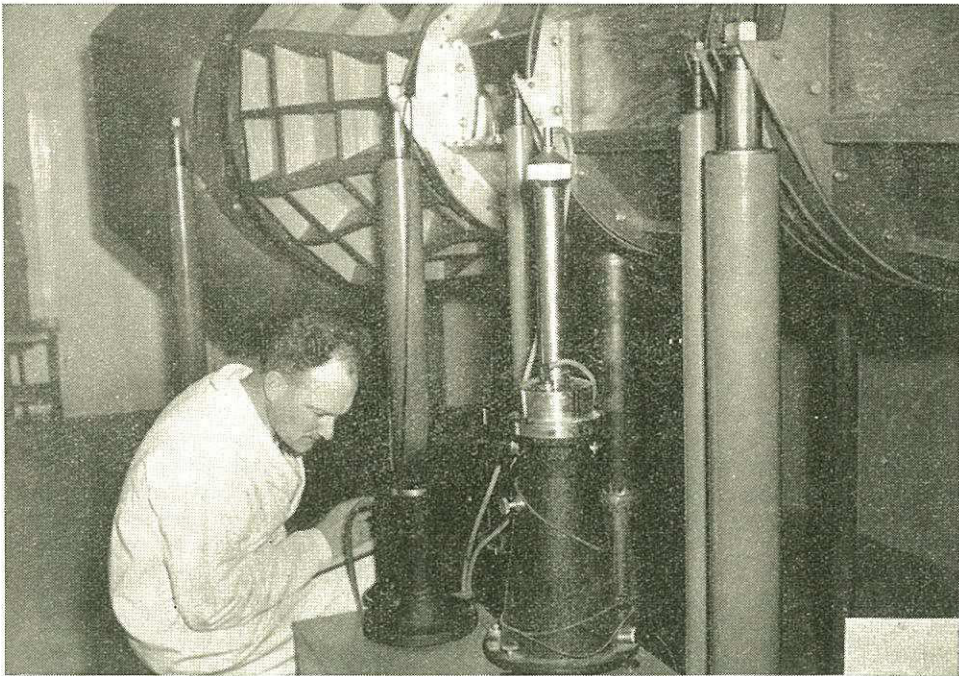
With the aid of a small air channel designed and built for the purpose, the influence of the spacing of the individual bars of the grilles on the air distribution and the most favourable ratio between spacing and bar width were determined. At the same time the air turbulence at different distances downstream from the grille was measured in order to study the influence of air speed and grid-bar width.

Efficiency of Ventilators in Railway Coaches

On behalf of the S.A.R. & H. Administration the laboratory undertook to investigate the efficiency of six different types of ventilators. This investigation, which is still in progress, is being carried out in a low-speed wind tunnel with a 10-foot working section.

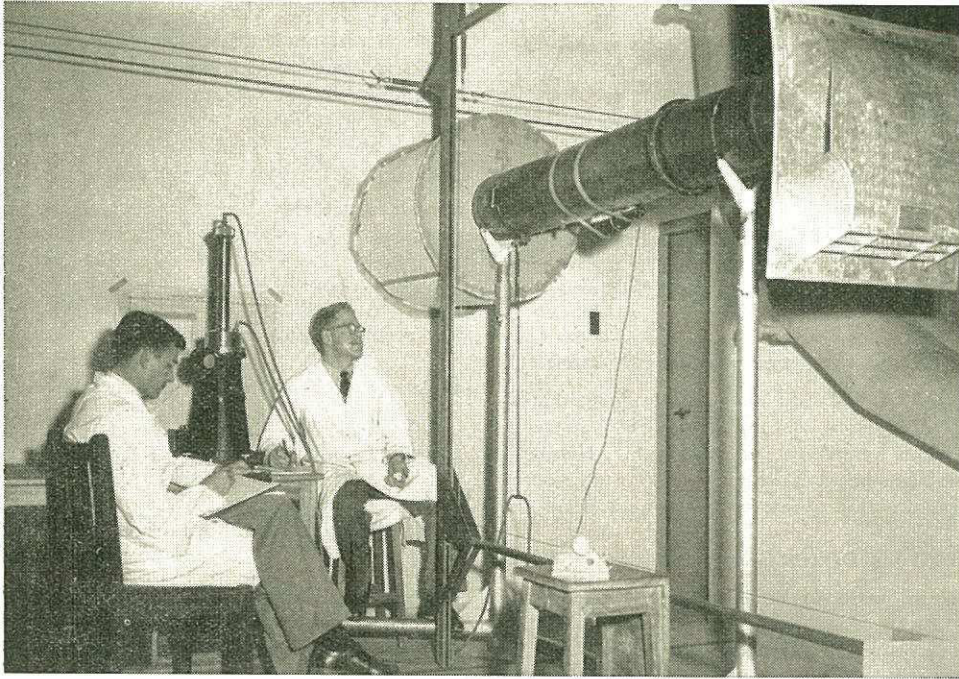
Efficiency of Roof Ventilators

Roof ventilators are in general use in South Africa to draw fresh air through buildings and particularly industrial buildings. In collaboration with the S.A.



'n Toets wat aan die gang in die 24-duim agtkantige windtonnel in die laboratorium van die Navorsings-eenheid vir Werktuigkundige Ingenieurswese.

A test in progress in the 25 inch octagonal wind tunnel in the laboratories of the Mechanical Engineering Research Unit.



Die 10 voet dwarsnit laespoed windtonnel van die N.E.W.I. word hier in werking gesien tydens die toets van 'n dakventilator.

The 10 ft. cross-section low speed wind tunnel of the M.E.R.U. is here seen in use for the testing of a roof ventilator.

Met behulp van die 10 voet laagspoed-windtonnel, wat onlangs in bedryf gebring is, word die eksperimentele prosedure wat in die kode vasgestel word, tans nader ondersoek. Sodra hierdie voorbereidende werk afgehandel is, sal 'n aanvang gemaak word met die toets van die verskillende tipe dakventilatore ten behoeve van die onderskeie vervaardigers.

Weerstand van Mynskagte

Om die ventilasiesisteen vir 'n myn bevredigend te beplan is dit noodsaaklik om betroubare gegewens te hê oor die weerstand van mynsgagte teen lugbeweging, en veral oor die invloed van die binne-struktuur van 'n skag op die weerstand. Die laboratorium tree tans op as raadgevers vir een van die myngroepe in 'n reeks praktiese eksperimente wat deur hulle in hierdie verband uitgevoer word.

Roetine en Ander Dienste

Gedurende die jaar in oënskou is 'n hele aantal lugspoed-instrumente ten behoeve van die nywerheid en ander laboratoria geëyk. Ongeveer veertig navrae is gedurende die afgelope jaar deur die laboratorium behandel.

Bureau of Standards a preliminary test code was drawn up a few years ago. With the aid of the 10-foot, low-speed wind-tunnel which has recently been installed, the experimental procedure laid down in the code is now being more closely investigated. As soon as this preliminary work is complete a start will be made with the testing of different types of roof ventilators for various manufacturers.

Resistance of Mine Shafts

In order to plan the ventilation system of a mine effectively, it is necessary to have reliable data concerning the resistance of mine shafts to air movement, and in particular concerning the influence of the internal structures in the shaft on the resistance. The Unit is acting as consultant to one of the mining groups in a series of practical experiments which they are carrying out in this field.

Routine and Other Services

During the year under review a large number of air-speed instruments have been calibrated for industry and other laboratories. About forty enquiries were dealt with by the laboratory during the year.

Telekommunikasie Navorsingslaboratorium

Hoof van die Laboratorium: MNR. F. J. HEWITT.

Gedurende die afgelope paar jaar was die werksaamhede van die Radio-afdeling van die Laboratorium weereens hoofsaaklik toegespits op die gebied van radiogolf-voortplanting en atmosferiese sturingspeile, die ontwikkeling van metodes vir kristalbehering van 'n veranderbare frekwensie en die studie van weerlig deur middel van radar.

Die Advieskomitee vir Telekommunikasies wat leiding gee aan die werksaamhede van hierdie afdeling van die Laboratorium, het een keer gedurende die jaar bymekaar gekom en die Laboratorium spreek met genoeë sy waardering uit vir die bystand wat deur lede van hierdie komitee verleen is.

Die Afdeling Verdedigingsradar is uitsluitlik gemoeid met werk vir die Departement van Verdediging op 'n kontrakgrondslag. Gedurende die afgelope jaar was die werksaamhede van hierdie Afdeling hoofsaaklik in verband met die ontwikkeling van nuwe toerusting met sekere besondere kenmerke.

Die Frekwensie-Voorspellingsdiens

Die frekwensie-voorspellingsdiens gebaseer op voortdurende metings van kenmerke van die ionosfeer by Johannesburg en Kaapstad tesame met resultate wat van oorsee verkry is, is voortgesit met die uitreiking van gereelde voorspellings van voortplanting van hoë frekwensies vir Suidelike Afrika.

Die Raad is baie dank verskuldig aan die Departement van Pos- en Telegraafwese wat verantwoordelik is vir die werking van die ionosfeerregistreerder in Kaapstad.

Die registreerder wat in Nairobi ge-installeer is, het nie heeltemal bevredigende resultate gelever nie. Pogings word aangewend om die moeilikhede te oorbrug met die oog op die belangrikheid van hierdie streek vir verbinding tussen Suid-Afrika en Europa.

Die ionosfeerregistreerder in Leopoldville, wat in die Laboratorium gebou is deur 'n tegnikus wat vir dié doel van die Belgiese Kongo gestuur is, werk uiters bevredigend. Die gegewens word tans in die Belgiese Kongo ontleed en die resultate word gereeld ontvang.

Ionosferiese Studies

Die terugkeer van 'n beampte van oorsee waar hy besig was met teoretiese ionosferiese werk aan die Cavendish-Laboratorium, Cambridge, het dit moontlik gemaak om werk op hierdie gebied te onderneem. Daar is ook 'n aanvang gemaak met die ondersoek na die

Telecommunications Research Laboratory

Head of the Laboratory: MR. F. J. HEWITT

During the year the work of the Radio Section of the Laboratory has again been primarily in the field of radio wave propagation and atmospheric noise levels, the development of methods of variable frequency crystal control and the study of lightning by radar.

The Telecommunications Advisory Committee, which guides the activities of this section of the Laboratory, met once during the year and the Laboratory has pleasure in recording its appreciation of the assistance given by members of this Committee.

The Defence Radar Section is concerned entirely with work for the Department of Defence on a contract basis. During the past year its activities have been primarily in connection with the development of new equipment with certain special features.

The Frequency Prediction Service

The frequency prediction service, based on continuous measurements of ionospheric characteristics at Johannesburg and Cape Town combined with results received from overseas, has been continued with the issue of regular predictions of high frequency propagation for Southern Africa.

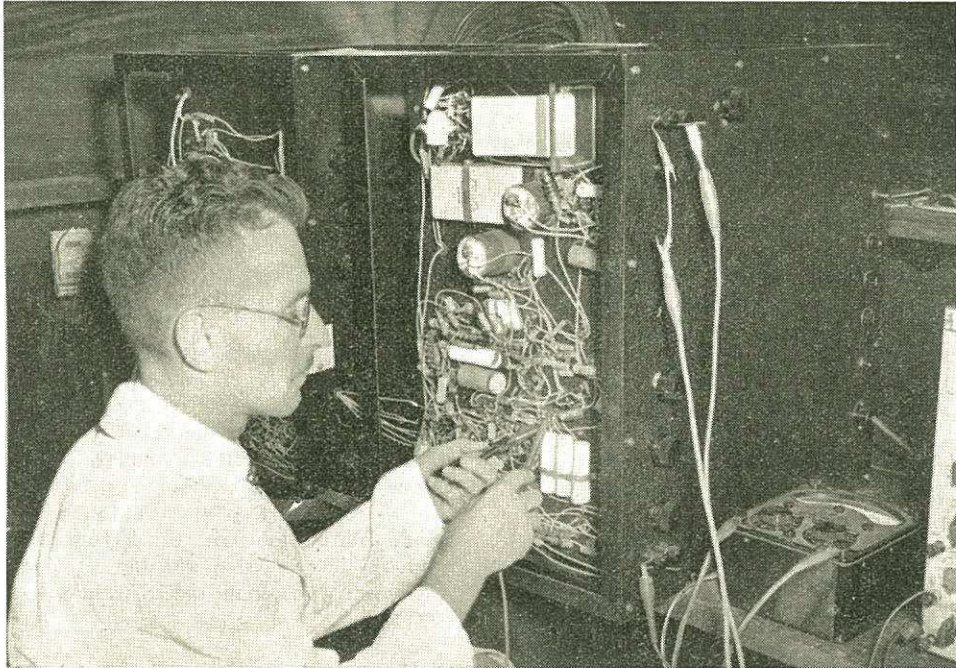
The Council is indebted to the Department of Posts and Telegraphs, who are responsible for the operation of the ionosphere recorder at Cape Town.

Various problems have arisen during the initial stages of operation of the recorder in Nairobi. Efforts are being made to overcome the difficulties in view of the importance of this region for communication between South Africa and Europe.

The ionosphere recorder in Leopoldville, which was built in the Laboratory by a technician sent from the Belgian Congo for the purpose, is operating very satisfactorily. The data are now being analysed in the Belgian Congo and the results are coming forward regularly.

Ionospheric Studies

The return of an officer from overseas, where he was engaged on theoretical ionospheric work at the Cavendish Laboratory, Cambridge, has enabled work in this field to be undertaken. Work has commenced on the investigation of the variation of the electron density



Toerusting wat in die Telekommunikasie Navorsingslaboratorium gebou word vir navorsing na die eenskappe van die laer ionosfeer. Gereelde aantekeninge word gemaak van ionosferiese kenmerke deur die Laboratorium in verband met sy frekwensievoorspellingsdiens.

Equipment built in the Telecommunications Research Laboratory for investigations into the properties of the lower ionosphere. Regular recordings of ionospheric characteristics are made by the Laboratory in connection with its frequency prediction services.

verandering van elektrondigtheid en botsingsfrekwensie in die laer ionosfeer deur middel van 'n nuwe metode. Dit is moontlik dat hierdie werk ook inligting sal verskaf oor ionosferiese absorbering hoewel dit nie die onmiddellike doelwit is nie.

and collision frequency in the lower ionosphere using a new method. It is possible that this work will provide information on ionospheric absorption although this is not the immediate objective.

Radio-steuringspele en Navigasiehulpmiddels

Die meting van radio-steuringspele op 100 kiloherz is onderneem ten einde die uitwerking van atmosferiese radio-steurings op verskillende radiohulpmiddels vir oavgasie te bereken. Uitbreiding van hierdie metings na Noord-Rhodesië en Oeganda was nie heeltemal suksesvol nie en resultate is nog beperk tot die Unie van Suid-Afrika en Nairobi.

Die studie van die voorkoms van neerslagsteuring en die uitwerking van kransontlading op vliegtuie tydens vlugte duur voort en die apparaat is nou in 'n Skymaster van die Suid-Afrikaanse Lugdiens ge-installeer wat op binnelandse roetes vlieg.

Die Raad is baie dank verskuldig aan die Afdeling Burgerlike Lugvaart, die Suid-Afrikaanse Lugvervoer-raad en aan die Suid-Afrikaanse Lugdiens vir hulle ondersteuning in hierdie werk.

Radio Noise Levels and Navigational Aids

The measurement of radio-noise levels at 100 Kc/sec. was undertaken with a view to assessing the effect of atmospheric radio noise on various radio aids to navigation. Extension of these measurements to Northern Rhodesia and Uganda have not been entirely satisfactory and results are still limited to the Union of South Africa and Nairobi.

The study of the occurrence of precipitation static and corona effects in aircraft in flight is continuing and the equipment is now installed in a South African Airways Skymaster flying on internal routes.

The Council is indebted to the Division of Civil Aviation, the Southern Africa Air Transport Council and to the South African Airways for their support in this work.

Die uitwerking van atmosferiese steuring op die M.K. VII Decca Navigatorontvangtoestel is vir die Decca Navigatormaatskappy waargeneem op 'n kontrakbasis.

Die eksperimentele automatiese L.F.-H.F. steurings-registreerder met meer as een frekwensie het bevredigende diens gelewer gedurende die afgelope jaar maar of hierdie soort toerusting gebruik sal word om die bestaande laefrekwensie-registreerders te vervang, sal afhang van oorsese ontwikkeling van soortgelyke toerusting wat dalk verkrygbaar mag word op 'n internasionale basis.

Opname van Aardkonstantes

'n Omvattende opname om die uitwerking van Suid-Afrikaanse grond en terrein op die voortplanting van laefrekwensiegolwe vas te stel, is onderneem. Die werk nader nou voltooiing en resultate sal in die nabye toekoms gepubliseer word.

Die Raad is baie dank verskuldig aan die Unie Verdedigingsmag en die Afdeling Burgerlike Lugvaart vir hulle bystand.

Kristalbeheer van veranderbare frekwensie

'n Metode van kristalbeheer wat in die Laboratorium ontwikkel is, verskaf doeltreffende kristalstabiliteit en noukeurigheid wat tog volkome buigbaar is en slegs een kristal gebruik. Dit kon aangewend word vir ontvangtoestelle, senderbeheer, seinopwekkers, toerusting vir die meet van frekwensies en dergelike apparaat.

Twee modelle van 'n ontvangtoestel wat volgens hierdie beginsel werk—juiste weergawes van die Laboratorium se model—is deur 'n Suid-Afrikaanse vervaardiger opgebou en was vir 'n geruime tyd in gebruik by die Unie Verdedigingsmag en dit blyk baie bevredigend te wees. Die vervaardiger het, in die loop van die ontwikkeling van bykomende modelle, die aanleg algeheel hersien tot een wat veel meer geskik is vir hoeveelhedsproduksie.

Laboratoriumtoetse het getoon dat hierdie nuwe aanleg heeltemal bevredigend is wat werkverrigting betref.

Gedurende die afgelope jaar is 'n ontwikkelaar voltooi wat volgens hierdie beginsels werk. Die algehele stabiliteit is uitsluitlik die van die kristal self by alle frekwensies bo 1 Megahertz en die instellingsnoukeurigheid is in die omtrek van 50 Herz. Hierdie ontwikkelaar is deur die Ingenieursafdeling van die Poskantoor gebruik vir die frekwensiebeheer van een van hulle senders en na aanleiding daarvan het die Poskantoor aanduidings gegee van hulle voorneme om 20 tot 30 ontwikkelaars wat op hierdie beginsels gebaseer is te bou vir beheerdoeleindes op hulle nuwe uitsendings-terrein.

The effect of atmospheric noise on the Mk. VII Decca Navigator Receiver has been observed for the Decca Navigator Company on a contract basis.

The experimental multi-frequency automatic L.F.—H.F. noise recorder has operated satisfactorily during the past year but whether or not this type of equipment will be built to replace the existing low frequency recorders will depend on the development overseas of similar equipment, which may become available on an international basis.

Ground Constants Survey

An extensive survey to determine the effect of South African soil and terrain on the propagation of low-frequency waves has been undertaken. The work is now nearing completion and results will be published in the near future.

The Council is indebted to the Union Defence Force and the Division of Civil Aviation for assistance.

Variable Frequency Crystal Control

A method of crystal control developed in the Laboratory provides effectively crystal stability and accuracy with complete flexibility, using only one crystal. It is applicable to receivers, transmitter control, signal generators, frequency measuring equipment and similar devices.

Two models of a receiver operating on this principle, exact copies of the Laboratory's prototype, have been constructed by a South African manufacturer and have been in use by the Union Defence Force for some time; they appear to be very satisfactory. The manufacturer, in the course of development of additional models, has adopted a completely revised layout more suitable for production in quantity. Tests in the Laboratory have shown that this new layout is entirely satisfactory from the point of view of performance.

During the year a generator was completed, operating on these principles. The overall stability is effectively that of the crystal itself at all frequencies above 1 Mc/sec. and the setting accuracy is in the region of 50 cycles/sec. This generator has been used by the Post Office Engineering Division for the frequency control of one of their transmitters and, as a result, the Post Office have indicated that they intend to build 20 to 30 generators based on this principle for control purposes at their new transmitting site. The South African Broadcasting Corporation have also decided to adopt this method of control for the new short-wave centre at Bloemfontein and will build 15 generators for this purpose. The Division of Civil Aviation are considering the use of this method.

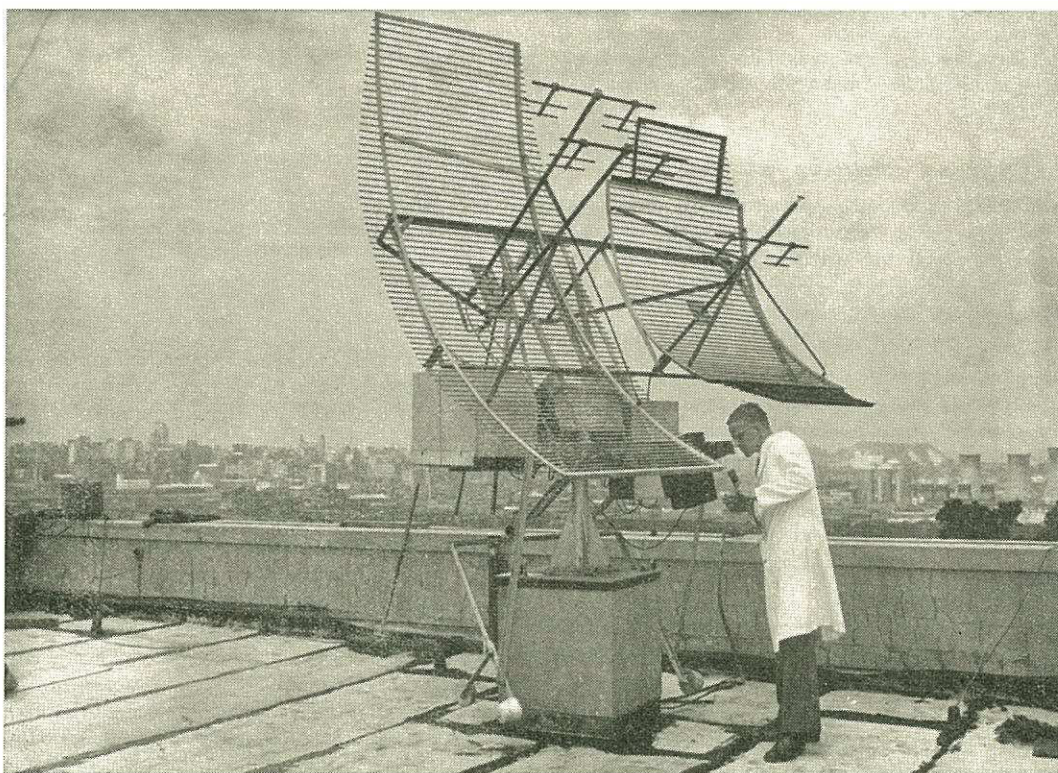
Die Suid-Afrikaanse Uitsaaikorporasie het ook besluit om hierdie metode van beheer oor te neem vir die nuwe Kortgolfsentrum te Bloemfontein en sal 15 ontwikkelaars vir die doel oprig. Die Afdeling Burgerlike Lugvaart oorweeg die gebruik van hierdie metode.

Die Laboratorium het gevolglik die ontwerp van 'n vereenvoudigde ontwikkelaar onderneem om spesifiek aan die behoeftes van hierdie organisasies te voldoen.

Die ontwerp van 'n noukeurighedsfrekwensie-ontwikkelaar om gebruik te word as 'n instrument vir die meet van frekwensies, nader voltooiing. Saam met 'n noukeurighedsfrekwensie-standaard behoort dit in staat te wees om enige frekwensie tot by 20 megahertz met 'n noukeurigheid van 1 hertz te ontwikkel sonder enige spesiale opstellingsproses. Die hele eenheid sal kleiner wees as die gemiddelde kommunikasie-ontvangtoestel.

The Laboratory has therefore undertaken the design of a simplified generator specifically to meet the needs of these organisations.

The design of a precision frequency generator for use as a frequency measuring instrument is nearing completion. Used with a precision frequency standard, it should be capable of generating any frequency up to 20 Mc/sec. with an accuracy of 1 cycle/sec. without any special setting up procedure. The whole unit will be smaller than an average communications receiver.



Radaranne op die dak van die Bernard Price-Instituut vir Geofisiese Navorsing aan die Universiteit van die Witwatersrand, Johannesburg. Die toerusting word deur die T.N.L. gebruik vir fundamentele studies oor die werking van weerligontladings wat 'n voortdurende bron van moeilikheid is in kragoordragingslyne.

Radar antenna on the roof of the Bernard Price Institute for Geophysical Research at the University of the Witwatersrand, Johannesburg. This equipment is used by the T.R.L. in fundamental studies of the mechanism of lightning discharges which are a frequent source of trouble in power transmission lines.

Ondergrondse Verbindings

Toerusting wat vir die Kamer van Mynwese vervaardig word volgens spesifikasies i.s. werkvermoë wat deur die Laboratorium neergelê is, is in die Laboratorium ondersoek. Advies aangaande verskeie ontwerpbesonderhede is aan die vervaardiger gegee waar moeilikheid ondervind is om aan die werkvermoë van die Laboratoriummodel te voldoen soos in die spesifikasies bepaal is.

Ondersoek van weerlig met radar

Radar kan waardevolle inligting verskaf oor verskeie prosesse in weerligontladings wat moeilik bekombaar is met ander metodes.

Gedurende die afgelope jaar is spesiale toerusting vir die doel gebou en heelwat opnames van radarweerklanke van weerlig is verkry. Die duur van hierdie weerklanke en hulle gedrag toon dat verskillende prosesse in die ontlading, tesame met die hoofgeleidingskanaal, in staat is om waarneembare radaropgawes te verskaf.

Verdere werk is onderweg met die oog op verbeterde onderskeidingsvermoë wat dit moontlik sal maak om meer inligting te verkry.

Afdeling Verdedigingsradar

Die tweede en groter skema wat vir die Departement Verdediging onderneem is, naamlik, die ontwikkeling van radartoerusting met sekere besondere trekke om aan te pas by Suid-Afrikaanse toestande, maak goeie vordering. Voorlopige veldproewe met 'n eenvoudige vorm van die apparaat behoort vroeg in 1954 moontlik te wees, maar weens die skaarste aan geskikte personeel is die datum van voltooiing van die hele skema, nog nie bepaal nie.

Huisvesting

Die Laboratorium is sedert sy ontstaan in die Departement van Elektriese Ingenieurswese aan die Universiteit van Witwatersrand gehuisves.

Die stigting van die Afdeling Verdedigingsradar het veroorsaak dat alle beskikbare ruimte in beslag geneem is en daar bestaan geen moontlikheid vir verdere uitbreiding van werksaamhede onder die huidige omstandighede nie.

Underground Communications

Equipment being manufactured for the Chamber of Mines to performance specifications laid down by the Laboratory has been tested in the Laboratory. Advice on various design details has been given to the manufacturer where difficulty was experienced in meeting the performance achieved in the Laboratory model and laid down in the specifications.

Investigation of Lightning by Radar

Radar can provide information on various processes in lightning discharges which may be difficult to obtain by other methods.

During the past year special equipment was built for the purpose and many records of radar echoes from lightning were obtained. The duration of these echoes and their behaviour show that various processes in the discharge, in addition to the main conducting channel, are capable of giving detectable radar returns.

Further work is in progress towards providing improved resolution which should enable more information to be obtained.

Defence Radar Section

The second and larger project undertaken for the Department of Defence, namely, the development of radar equipment with certain special features to suit South African conditions, is progressing well. Initial field trials of a simple version of the equipment should be possible early in 1954, but owing to the difficulty of obtaining suitable staff, the date of completion of the whole project is still indefinite.

Accommodation

The Laboratory has, since its inception, been housed in the Department of Electrical Engineering of the University of the Witwatersrand.

The establishment of the Defence Radar Section has resulted in all available space being fully occupied and no possibility of further expansion of activities exists in the present circumstances.

Nasionale Bounavorsingsinstituut

Direkteur: MNR. J. E. JENNINGS.

Hierdie jaar is gekenmerk deur 'n toename in die belangstelling en werksaamhede van die Kaapstadse Streeksonderkomitee van die Advieskomitee vir Bounavorsing. Daar was 'n groeiende belangstelling in Bounavorsing in die Kaapse Skiereiland, veral op die gebied van behuising en probleme wat in verband staan met die waterdigmaking van geboue en herhaalde voorstelle is gemaak dat 'n gedeelte van die werk in Kaapstad uitgevoer moet word. Die wyse waarop dit die beste gedoen kan word, word ondersoek. Die Advieskomitee vir Bounavorsing het met tussenposes van twee maande vergader en het weereens voortgegaan om waardevolle leiding aan die Instituut te gee.

NAVORSING MET BEHULP VAN BEURSE

Gedurende die jaar het die Instituut beurse, skenkings en kontrakte ter waarde van £18,500 gehanteer. Hierdie bedrag verteenwoordig 17 persent van die totale uitgawe van die Instituut. Melding word hieronder gemaak van sommige van die meer belangrike ondersoeke wat met behulp van beurse uitgevoer is.

Beurse vir Rioloverwering (*Skenker:* Die Instituut van Munisipale Ingenieurs).

Hierdie beurse, ter waarde van £3,500 p.j. het ten doel om die snelle verwering van rioolpype te voorkom. Hierdie verwering wat uitsluitlik op dié dele van die pyp bokant die wateroppervlak voorkom, is te wyte aan die inwerking van swawelsuur wat gevorm word deur swawelbakterië. Die probleem is so ernstig dat instortings van rirole in sekere dele van die land binne tien jaar na oprigting voorgekom het en daar word gemeld dat miljoene ponde op die spel is.

Die probleem word van drie kante benader :—

- (a) 'n Veldbeampte het 'n studie gemaak van die plaaslike toestande van verwering ten einde vas te stel tot welke mate die probleem opgelos kan word deur 'n wysiging in die ontwerp of werking van die stelsels. Aan die hand van opnames is gevind dat verwering gewoonlik geassosieer word met dié dele van rirole waar die vloeiturbulent is, aangesien hierdie toestande aanleiding gee tot 'n sneller vrystelling van swawelwaterstof uit die afloopwater. Metodes word in die veld ondersoek waardeur die persentasie swawelwaterstof in die rioolslyk verminder kan word. 'n Ander moontlik-

National Building Research Institute

Director: MR. J. E. JENNINGS

The year has been marked by increased interest and activity of the Cape Town Regional Sub-committee of the Building Research Advisory Committee. There has been a growing interest in Building Research in the Cape Peninsula, particularly on the matters of costs of housing and waterproofing problems in buildings and there are repeated suggestions that some of the work should be conducted in Cape Town: ways of doing this are being explored. The Building Research Advisory Committee has met at two-monthly intervals and has again continued to give valuable guidance to the work of the Institute.

SPONSORED RESEARCH

The Institute has handled fellowships, grants and contracts to the value of £18,500 during the year. This represents 17 per cent. of the total expenditure of the Institute. Brief notes on some of the more important sponsored investigations are given below.

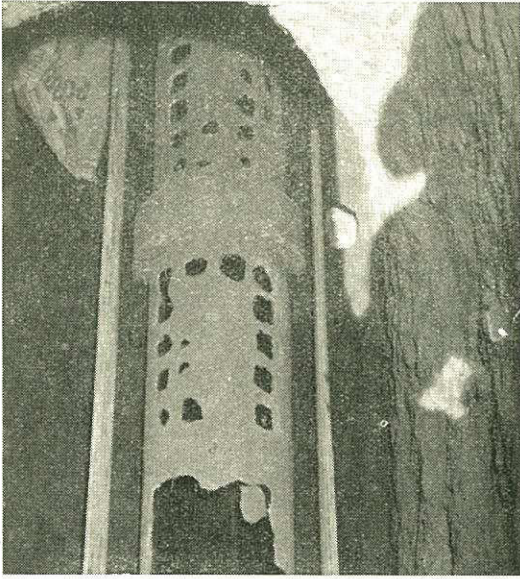
Sewer Corrosion Fellowships (*Sponsor:* The Institution of Municipal Engineers)

These fellowships, of value £3,500 p.a., have as their object the prevention of the rapid deterioration of concrete sewers due to attack on the crowns of the pipes caused by sulphuric acid produced on the surface of the concrete by sulphur bacteria.

The problem is so acute that in certain localities collapse of sewers has occurred within ten years of laying and it is stated that several millions of pounds are at stake.

The approach adopted is threefold :—

- (a) A field officer has been studying the local conditions of failure in order to determine the extent to which the problem can be met by a modification in the design or operation of the systems. It has been found from surveys that corrosion is generally associated with those portions of sewers where turbulence in the flow is encountered, these conditions giving rise to rapid release of hydrogen sulphide from the sewage. Measures to reduce the amount of hydrogen sulphide in the sewage are being investigated in the field. Another



A concrete sewer pipe corroded by acid produced as a result of bacterial action.

Die verwerking van 'n betonrioolpyp deur suur wat as gevolg van bakteriese werking gevorm is.

heid wat tans ondersoek word, is die vrystelling van opgeloste swawelwaterstof onder beheerde toestande.

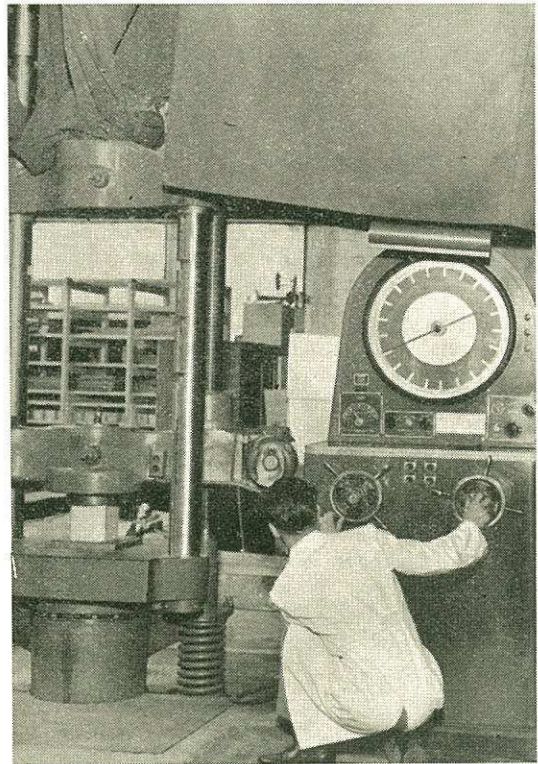
- (b) 'n Mikrobioloog (Werksaam in die Nasionale Chemiese Navorsingslaboratorium) het die bakterieë wat verantwoordelik is vir die produksie van swawelsuur op pype, afgesonder en 'n studie is gemaak van kulture op betonmonsters in die laboratorium. Onderzoek duur voort na metodes vir die beperking van die groei van bakterieë, en die moontlikhede om bakteriedoders met die beton te meng, lyk belowend.
- (c) 'n Betontegnoloog ondersoek op die oomblik die moontlikheid om die weerstand van beton teen swawelsuurinwerking te versterk. Daar is gevind dat die waarskynlike lewensduur van die beton aansienlik verleng kan word deur die gebruik van mengsels wat self onderhewig is aan suur-aanvalle.

Die verklaring hiervoor lê in die feit dat 'n aansienlike groter volume materiaal beskikbaar gestel word vir die neutralisering van die suur met die gevolg dat 'n veel langer tydperk sal verloop voordat verwerking ernstige afmetings begin aanneem. Die stadium is nou bereik waar verbeterings in spesifikasies en ontwerpe vir nuwe rirole aanbeveel kan word: hulpmiddels vir bestaande rirole word nog ondersoek.

procedure under investigation is the release of dissolved hydrogen sulphide under controlled conditions.

- (b) A microbiologist (working in the National Chemical Research Laboratory) had isolated the bacteria responsible for the sulphuric acid on the pipes, and cultures have been studied on concrete specimens in the laboratory. Investigation is proceeding on the limiting conditions for growth of the bacteria and the possibilities of incorporating bactericides in the concretes look promising.
- (c) A concrete technologist is working on the problem of increasing the resistance of the concrete to sulphuric acid attack. It has been found that by the use of aggregates which are themselves subject to acid attack, the probable life of the concrete can be considerably increased.

The explanation of this lies in the fact that a considerably greater volume of material is available for neutralising the acid, in consequence of which a much longer period will



Die bepaling van die drukkvasheid van 'n betonmonster in die 200,000 lb. toetsmasjien.

Determining the compressive strength of a concrete specimen in the 200,000 lb. testing machine.

Naturellebehuisingskoste (Onderneem m.b.v. 'n skenking deur die Nasionale Behuisings- en Beplanningskommissie).

Hierdie werk, wat onder leiding van 'n groep komitees gedoen word, die lede waarvan deskundiges van buite die W.N.N.R. is en wat op 'n vrywillige basis werk, nader nou voltooiing. Bewys is gelever dat dit prakties moontlik is om die goedkoopste tipe Naturellehuise teen ongeveer die helfte minder te bou as wat oorspronklik die geval was. Kostevermindering kan teweeggebring word deur:—

- (a) Besnoeiing van die strukturele bestanddele van die gebou. In hierdie deel van die werk is sorgvuldig gelet op die sterkte, termiese eienskappe, duursaamheid en bestandheid teen reën van die voorgestelde geboue;
- (b) vermindering in gebruik en koste van boumateriaal;
- (c) vermindering in gebruik en koste van arbeid;
- (d) vermindering van indirekte koste.

Met hierdie werk is groot belangstelling aan die dag gelê deur die verskillende organisasies verbonde aan die boubedryf en daar was 'n progressiewe vermindering in koste namate resultate beskikbaar gestel is. Die finale verslae word ongeveer aan die einde van die huidige jaar verwag.

Sosio-ekonomiese studies as agtergrond vir Navorsing aangaande Naturellebehuising (Onderneem m.b.v. 'n skenking deur die Sosiale Navorsingsraad).

Sosio-ekonomiese opnames wat deur die Instituut en 'n aantal ander organisasies uitgevoer is, het daarop gedui dat die stedelike Naturellebevolking in drie ekonomiese groepe verdeel kan word wat betref behuisingsbenodigdhede en dat 'n verskillende tipe van behuising aan elk verskaf moet word. Die hoogste ekonomiese klas sal beter behuising verlang en ten volle in staat wees om daarvoor te betaal; die laagste ekonomiese klas kan slegs voorsien word van behuising wat gelyk is aan 'n skuiling wat nie die gesondheid of sedelikheid sal beïnvloed nie. Weens die omvang van hierdie werk, is baie staatsdepartemente gevra om behulpsaam te wees met die skema.

Slakkesement

Gedurende die jaar is 200 ton slakkesement vir proefdoeleindes by Yskorwerke, Pretoria, vervaardig onder die leiding van die Instituut en met sukses gebruik in behuising- en besproeiingskemas.

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elapse before corrosion become serious. The stage has now been reached where improvements in specifications and designs can be recommended for new sewers: remedies for existing sewers are still under investigation.

Native Housing Costs (Sponsored by grant from the National Housing and Planning Commission).

This work, which is being conducted under the guidance of a group of committees staffed with outside experts working on a voluntary basis, is now nearing completion. It has been shown that for the lowest-cost forms of Native housing it is practicable to build for a cost approaching half of that which applied at the start of the project. Cost reductions can be effected by:

- (a) Reducing the structural components of the building. Throughout this portion of the work careful check has been kept on the strength, thermal characteristics, durability and rain resistance of the reduced constructions suggested;
- (b) reduction in usage and costs of materials;
- (c) reduction in usage and costs of labour;
- (d) reduction in indirect costs.

Throughout this work great interest has been displayed by the various organisations connected with building and there has been a progressive lowering of costs as results have been made available. The final reports are expected about the end of the current year.

Socio-economic Studies as a Background for Native Housing Research (Sponsored under grant from the Council for Social Research).

Socio-economic surveys carried out by the Institute and by a number of other organizations have indicated that for housing purposes the urban Native population should be considered in three economic groups and different classes of housing should be provided for each. The highest economic class will desire, and be able to pay fully for good class housing; the lowest economic class can only be provided with housing which approaches that shelter which will not affect health or decency. Because of the wide field covered in this work, many Departments of the Government have been called in to assist with the project.

Slag Cement (Contract by Iscor).

During the year a pilot batch of 200 tons of this cement has been produced at Iscor Works, Pretoria, under the guidance of the Institute and very successfully used on housing and irrigation projects.

NASIONALE NAVORSING

Argitektuur

Die werk by Kwa-Thema, die tweede proefdorp vir Naturelle, wat onderneem is met die doel om die dienskoste te verminder, is voortgesit. Die ontwikkelingsdigtheid, wat vir die hele dorp verkry is, is 6.7 wonings per akker met dienskoste, insluitende grond, teen £80 per woning. In een deel van die dorp is 'n hoë digtheid van 8 wonings per akker verkry met dienskoste teen £52 per woning. Hierdie proefneming is voorlopig in 'n ander dorpie herhaal.

Hulp aan die Suid-Afrikaanse Nasionale Teringvereniging i.v.m. die ontwerp van 'n goedkoop teringnedersettingskema het gelei tot die oprigting van die eerste skema teen 'n koste van minder as £100 per bed in Alexandradorp.

Funksionele Doeltreffendheid van Geboue

Om die moontlike termiese reaksies van geboue onder verskillende klimaatstoestande te bepaal, is 'n metode ontwikkel vir die keuse van weerkundige ontwerpsegegewens. Toegepas op data vrygestel deur die Weerburo, kan weerkundige ontwerpsegegewens vasgestel word vir verskillende sentra in die Unie.

NATIONAL RESEARCH

Architecture

Work has proceeded on Kwa-Thema, the second Native experimental town undertaken with the object of reducing the costs of services. The density of development achieved for the whole town has been 6.7 dwellings/acre with service costs including land at £80 per dwelling. In one section of the town a high density of 8 dwellings/acre has been achieved with a cost of services at £52 per dwelling. This experiment has been repeated on a pilot scale in another township.

Assistance given to the South African National Tuberculosis Association on the design of low cost tuberculosis settlement scheme has resulted in the first scheme at a cost of less than £100 per bed at Alexandra Township.

Functional Efficiency of Buildings

In order to assess the probable thermal behaviour of buildings in different climates, a method of design weather data selection has been developed and applied to Weather Bureau records to establish design weather conditions for various centres in the Union.



'n Vergelykende toets vir die bepaling van die beskerming teen sonhitte wat verskaf word deur 'n betonblad wat met verskillende dakmateriale bedek is.

A comparative test to determine the protection against solar heat afforded by a concrete slab covered with various roofing materials.

Na aanleiding van 'n uitgebreide reeks toetse wat uitgevoer is op eksperimentele Naturellehuise te Pretoria, is daar gevind dat dit moontlik is om te voorspel wat die waarskynlike termiese reaksies van huise van verskillende boumateriale onder tipiese somer- en winterontwerpstoestande sal wees. Ongelukkig is die beskikbare fisiologiese gegewens oor hoe die termiese toestande die gesondheid en welvaart van bewoners beïnvloed onder Suid-Afrikaanse toestande, baie karig en word die medewerking van die Departement van Gesondheid nou gesoek ten einde behulpsaam te wees met die vasstelling van aanneemlike binnehuuslike-temperatuurgrense.

Werk i.v.m. die meer fundamentele gesigspunte van hitte-oordrag in geboue is hervat en 'n stel toetse met plafonisolasie word beplan. Daar word ook beoog om die beplanning van dagligverligting in geboue te bestudeer en 'n spesiale kunsmatige hemelruim is vir hierdie doel gebou.

Ter ondersteuning van argitekte en ontwerpers in hulle studie van die probleme wat betrekking het op sonlig in geboue, is 'n nuwe instrument, bekend as 'n sonskaduskoop, ontwerp. Dit word saam met modelle gebruik om sonlig- en skadupatrone op enige spesifieke plek, tyd van die dag of dag van die jaar aan te tui.

'n Eksperimentele sonverhitte-watereenheid vir huishoudlike gebruik is gebou. Met die ontwerp hiervan is daar gepoog om die konstruksiekoste so laag as moontlik te hou. Hierdie eenheid sal nou geïnstalleer word op die dak van 'n huis in Pretoria en 'n studie sal gemaak word van sy doeltreffendheid oor 'n lang periode onder praktiese toestande.

Aandag word steeds geskenk aan die ontwikkeling van geskikte metodes en apparaat vir die meet van termiese geleidingsvermoë en oppervlaksabsorptiwiteite vir sonuitstraling van verskillende boumateriale onder toestande van sonstraling.

Boustawwe

Toetse is uitgevoer om die reënbestandheid van verskeie muurkonstruksies vas te stel en hierdie resultate is gebruik om die minimum-vereistes te bepaal vir verskillende dele van die land. Terselfertyd is 'n studie gemaak van verskeie metodes met behulp waarvan mure waterdig gemaak kan word.

Werk is onderneem i.v.m. spesifikasieproewe vir boukalk en 'n toets wat bevredigende reproduseerbaarheid in ooreenkoms met bekende reaksies getoon het, is hiervoor uitgewerk. Hierdie resultate sal aan die Buro vir Standaarde gestuur word vir insluiting in 'n spesifikasie wat op die oomblik opgestel word. Hulp word ook aan vervaardigers verleen wat poog om hulle produkte te verbeter.

Studies is onderneem i.v.m. die ontwikkeling van buigbare voë vir huisriole in streke waar grondbeweging

As a result of an extensive series of tests conducted on Native houses at Pretoria, it has been found possible to predict the probable thermal behaviour of houses of different construction, under the summer and winter design day conditions, for the principle centres in the Union. Unfortunately, the available physiological data on the subject of thermal conditions in relation to the health and well-being of the occupants, under South African conditions, are very limited and the assistance of the Department of Health is now being sought to assist in the matter of laying down acceptable indoor temperature limits.

Work is being resumed on the more fundamental aspects of heat transmission in buildings and a group of tests on ceiling insulations is planned. It is also intended to study the planning of day-lighting in buildings and a special artificial sky has been built for this purpose.

As an aid to architects and designers in studying problems of sunlight in relation to buildings, a new instrument, called a solar shadowscope, has been devised. It is used with models to indicate sunlight and shadow patterns representative of any place, time of day or day of the year.

An experimental domestic solar water heating unit has been constructed with particular reference to cheapness of construction. This unit will now be installed on the roof of a house in Pretoria and a study made of its performance over a prolonged period under practical conditions of operation.

Work is still proceeding in developing suitable methods and apparatus for measuring the thermal conductivities and also the surface absorptivities to solar radiation of different building materials.

Materials for Buildings

Tests have been undertaken on the rain-resistance of various wall constructions and these have been related to the minimum performances required in various parts of the country. At the same time studies have been made of a variety of ways of waterproofing walls.

Work has been undertaken on specification tests for building limes and a test which shows satisfactory reproducibility and correlation with known behaviour has been produced for building limes. These results will be passed to the Bureau of Standards for incorporation in a specification at present being drawn up. Assistance is also being given to manufacturers who are endeavouring to improve their products.

Studies have been undertaken on the development of flexible joints for housedrains in areas where soil



Hierdie vloere van voorafgespanne kleiteëls word tot breekpunt getoets tydens navorsing wat onderneem word deur die Afdeling Strukturele Ingenieurswese van die Nasionale Bounavorsingsinstituut.

These pre-stressed clay tile floors are being tested to destruction in research being undertaken by the Structural Engineering Division of the National Building Research Institute.

plaasvind. Bevredigende metodes waarby bitumineuse stowwe gebruik word, is ontwikkel.

Die betekenis van faktore wat die duursaamheid van beton beïnvloed is bestudeer en metodes is ontwikkel waardeur die lewensduur van beton in aggressiewe omgewings verleng kan word. Die studies het faktore soos die uitwerking van veranderinge in die skeikundige samestelling van sement, die gebruik van kalkhoudende mengsels en die uitwerking van goeie verdigting en geskikte hardwordingsprosedures ingesluit. In samewerking met die Verfnywerheid-navorsingsinstituut is die werk voortgesit i.v.m. die prestasie van dakverf met spesiale verwysing na sy adhesie en duursaamheid.

Grondmeganika en Fondamente

'n Studie van die styging van geboue op uitgedroogde kleigronde, het getoon dat die beweging van vog na die grond onder die geboue gewoonlik nie te wyte is aan die uitwerking van temperatuurverskille nie. Die gevolg van inmenging in die verdampingsproses by die grondoppervlak, wat ontstaan deur die oprigting van die gebou, word tans ondersoek. Hierdie studies word voortgesit en baie proefgeboue wat met behulp van die Nasionale Behuisings- en Beplanningskommissie, Myn-korporasies en private liggame opgerig word, word

movements take place. Satisfactory procedures using bituminous materials have been developed.

The significance of factors affecting the durability of concrete have been studied and methods of increasing the life of concrete in aggressive environments have been developed. The studies have included factors such as the effects of changes in the chemical composition of cement, the use of calcareous aggregates and the influences of good compaction and suitable curing procedures.

In collaboration with the Paint Industries Research Institute work has proceeded on the performance of roof paint with special reference to its adhesion and durability.

Soil Mechanics and Foundations

Studies of the heaving of buildings on desiccated clay soils have shown that the migration of moisture to the soil under the buildings is not due, in the main, to temperature gradient effects. The effect of interfering with the condition of evaporation at the soil surface, introduced by the construction of the building, is now being investigated. These studies are continuing and many experimental buildings, erected with the assistance of the National Housing and Planning Commission,

dopgehou. Pogings word aangewend beide m.b.v. laboratorium- en veldtoetse om 'n verklaring te vind vir die styging van geboue en om sodoende te kan voorspel wat die snelheid en graad van styging wat verwag kan word, sal wees.

'n Metode van ontwerp vir versterking van onderuitgeholde heipale is ontwikkel na waarneming van spanningswrigtings in sekere heipale te Vereeniging.

'n Voorlopige ontleding van die konsolidasie van sedimente is gedoen met die oog op die verbetering van die bestendigheid van slykdamme by goudmyne in die Oranje Vrystaat.

Strukturele Ingenieurswese

Verdere werk is uitgevoer i.v.m. die versterking van steenmure ten einde die bars van geboue op uitswellende grond te voorkom. Toepassing hiervan op 'n groot aantal volkskaalse toetse het as gevolg gehad dat die geboue minder barste ontwikkel het as wat normaalweg die geval sou wees.

Werk word gedoen op holteëlvloere en sekere gebruike van voorafgespanne betonkonstruksie. 'n Interessante reeks proewe wat op die oomblik 'n aanvang neem, staan i.v.m. die bestandheid teen brand van voorafgespanne vloere en 'n oond wat bestand is teen brand is reeds ontwerp vir hierdie doel. Hulp word ook verleen met die volkskaalse belastingstoetse op brûe. Werk i.v.m. praktykskodes vir die ontwerp van spesiale strukture word ook beplan.

Ondersoek na die volkskaalse belastings van prototipe Naturellehuisstrukture is voltooi.

STREEKSKONFERENSIE OOR BEHUISINGSNAVORSING

(Kommissie vir Tegniese Samewerking in Afrika Suid van die Sahara).

Gedurende November 1952 is 'n konferensie oor behuisingsnavorsing in Pretoria gehou deur die Kommissie vir Tegniese Samewerking in Afrika Suid van die Sahara. Die konferensiewerk is hoofsaaklik behartig deur die Departement van Buitelandse Sake en die Wetenskaplike en Nywerheidsnavorsingsraad.

Die sewe boekdele wat voorberei is om die verrigtinge van die konferensie te dek, verteenwoordig die eerste gesamentlike poging tot die boekstaving van ondervinding i.s. behuisingsnavorsing op die Vasteland van Afrika. Baie onopgeloste probleme het aan die lig gekom en staan meestal in verband met die behuising van die inheemse bevolking. As gevolg van die Konferensie, is aanbeveel dat 'n Interstreekskomitee gevorm moet word om die werk op sekere meer dringende probleme voort te sit. Die organisasie hiervan sal waarskynlik vir ten minste drie jaar behartig word deur die Nasionale Bounavorsingsinstituut.

Mining Corporations and private bodies, are under observation. Efforts are being made, both in the laboratory and in field experiments, to arrive at the mechanism of heaving so that prediction may be made of the rate and degree of heave to be anticipated.

A method of designing the reinforcement in underreamed piles has been developed following on the observation of tension failures in some piles at Vereeniging.

A preliminary analysis of the consolidation of sediments has been made for application to the problem of the stability of slimes dams at gold mines in the Orange Free State.

Structural Engineering

Further work has been carried out on the reinforcement of brick walls to prevent cracking of buildings on heaving soil foundations. The principles have been applied on many full-scale experiments, and, though cracking is not entirely eliminated, it is very much less severe than is normally the case.

Work is being conducted on hollow tile floors and some applications of prestressed concrete construction. An interesting series of tests have been commenced on the fire-resistance of prestressed floors, and a fire-resistance furnace has been designed for the work. Assistance is also being given on the full-scale load testing of bridges: work on codes of practice for the design of special structures is planned.

Work on the full-scale loading of prototype Native house constructions has been completed.

REGIONAL CONFERENCE ON HOUSING RESEARCH

(Commission for Technical Co-operation in Africa South of the Sahara).

In November, 1952, a Conference on housing research was organised in Pretoria on behalf of the Commission for Technical Co-operation in Africa South of the Sahara. This work fell principally to the Department of External Affairs and to the Council for Scientific and Industrial Research.

The seven volumes of Proceedings which have been prepared represent the first concerted effort at documentation of housing research experience on the African Continent. Many unsolved problems were disclosed, mostly referring to the housing of the indigeneous population. As a result of the Conference it has been recommended that an Interterritorial committee be established to continue work on a group of more urgent problems and the organisation of this work will probably fall to the National Building Research Institute for at least three years.

ALGEMEEN

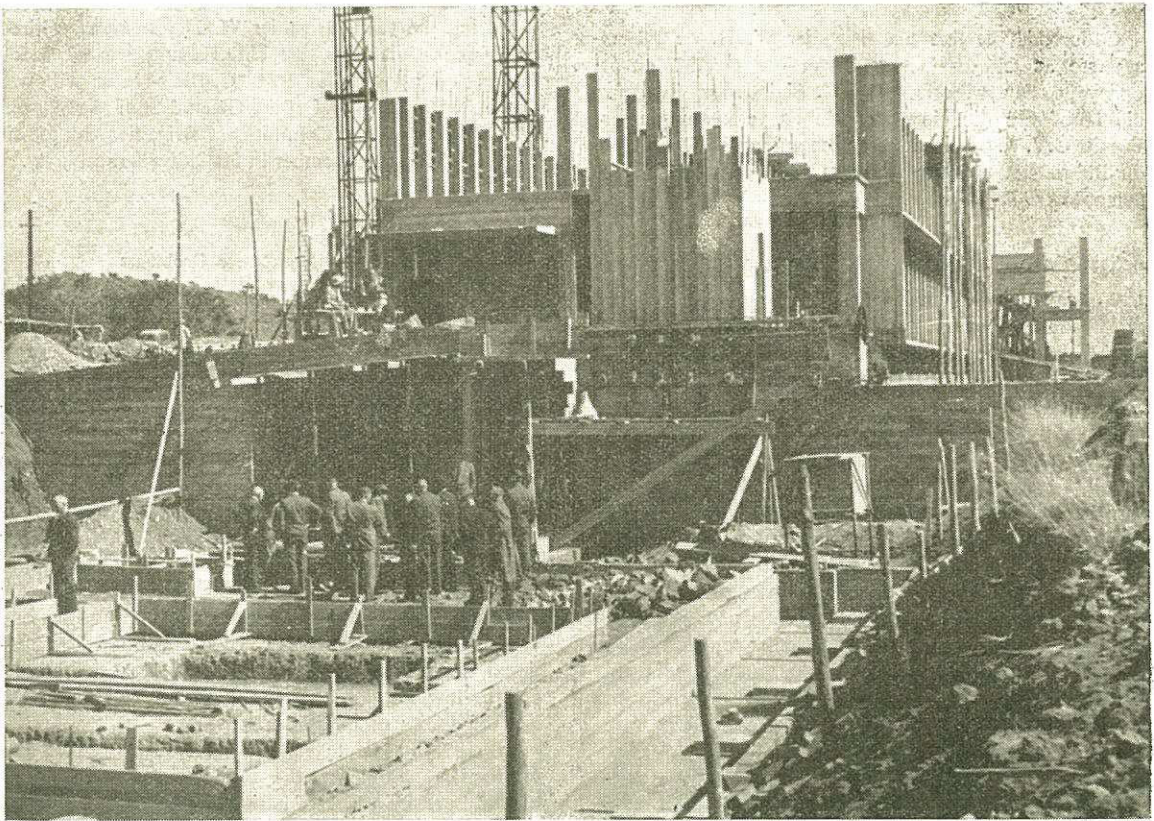
'n Verblydende teken van die waarde wat aan die werk van die Instituut geheg word, is die toenemende waardering van navorsingsbevindinge deur die Nywerheid. Veral op die gebied van Naturellebehuising was daar 'n voortdurende aandrang om die aanwending van resultate, dikwels nog voordat die werk behoorlik voltooi en opgeteken was.

Die aantal navrae van algemene aard het ook grootliks vermeerder en baie ingenieurs, argitekte, bou-aannemers en ander persone wat in die boubedryf en aanverwante vertakkinge van siviele ingenieurswese geïnteresseerd is, maak teenswoordig gebruik van die dienste wat deur die Instituut gelewer word.

GENERAL

A gratifying indication of the value placed on the work of the Institute has been the increasing appreciation of research findings by Industry. In the field of Native housing in particular, there has been continual pressure from outside for the application of results, frequently before the work has been fully completed and written up.

The number of general enquiries has also increased greatly and more engineers, architects, builders and others interested in the building industry and allied branches of civil engineering are now making use of the services provided by the Institute.



Lede van die W.N.N.R.-Advieskomitee vir Bounavorsing maak 'n studie van werk wat onderweg is aan die nuwe gebou vir die Nasionale Bounavorsingsinstituut.

Members of the C.S.I.R. Building Research Advisory Committee studying work in progress on the new building for the National Building Research Institute.

Nasionale Instituut vir Personeelnavorsing

Direkteur: DR. S. BIESHEUVEL.

Nasionale Advieskomitee vir Personeelnavorsing

Die Raad betuig sy dank teenoor lede van die Nasionale Advieskomitee vir Personeelnavorsing vir hulle aanhoudende belangstelling in die werksaamhede van die Instituut en vir hulle raadgewing i.s. die opstelling van die navorsingsprogram.

Op aanbeveling van die Komitee, is twee memoranda opgestel; een handel oor die instandhouding van mannekrag en beroepsvoorigting aan jongmense, en die ander een handel oor die beste aanwending van die N.I.P.N. se hulpbronne, die bespreking waarvan 'n waardevolle oriëntering aan die toekomstige ontwikkeling van die N.I.P.N. verskaf het.

Gedurende die jaar het Brigadier W. H. du Plessis afgetree as Chirurg-Generaal van die U.V.M. en is opgevolg deur Brigadier P. C. C. Blair-Hook wat deur die Hoof van die Generale Staf as verteenwoordiger van die U.V.M. op die Komitee genomineer is. Brigadier du Plessis het toegestem om aan te bly as lid in sy persoonlik hoedanigheid.

Behoeftes aan Navorsing na Mannekragprobleme

Werkverrigting en ander veldstudies wat gedurende die jaar uitgevoer is, het die noodsaaklikheid van 'n sistematiese studie van verskillende mannekragprobleme beklemtoon. Tekorte aan tegnisi, ingenieurs, klerklike en administratiewe personeel word in steeds-toenemende mate ondervind. Die getalle van diegene wat tot hierdie beroepe toetree as leerlinge, skiet ver tekort. Daar is ook 'n tekort aan Naturellearbeid, veral op die gebied van landbou en mynweese. Gevolglik kan betreklik min gebruik gemaak word van wetenskaplike metodes vir personeelkeuring. Ander probleme i.v.m. personeelnavorsing soos afwesigheid, arbeidsomset en bekwaamheid word betreklik meer belangrik. 'n Studie van hierdie probleme bring 'n mens egter onvermydelik terug na die skaarste-faktor wat beroepsbestendigheid in die hand werk, lei tot wanverdeling van arbeid en tot lae standaarde van werksbekwaamheid wat te wyte is aan gebrek aan vermoë of motivering.

In sy raadgewing aan werkgewers aangaande weringsbeleid en produktiwiteitsprobleme, voel die N.I.P.N. dat die gebrek aan basiese feite aangaande ons werkende bevolking 'n groot struikelblok is. Stappe sal gedoen moet word om die nodige inligting wat 'n wye veld dek, in te win.

Die nodige ondersoek is oorweeg en 'n plan is opgetrek vir 'n Bekwaamheidsopname om aan te dui

National Institute for Personnel Research

Director: DR. S. BIESHEUVEL

National Advisory Committee on Personnel Research

The Council expresses its gratitude to the members of the National Advisory Committee on Personnel Research for their continued interest in the activities of the Institute and for their guidance in the planning of its research programme.

On the suggestion of the Committee, two memoranda were produced, one on the conservation of manpower and vocational guidance of young persons, and one on the best use of the N.I.P.R.'s resources, the discussion of which has provided a valuable orientation for the N.I.P.R.'s development during the next few years.

During the year, Brigadier W. H. du Plessis retired as Surgeon-General of the U.D.F., and was succeeded in this post by Brigadier P. C. C. Blair-Hook, who was nominated by the Chief of the General Staff to represent the U.D.F. on the Committee. Brigadier du Plessis agreed to remain a member in his individual capacity.

Need for Research on Manpower Problems

Operational and other field studies carried out in the course of the year have emphasised the need for systematic study of various manpower problems. Increasingly severe shortages are being experienced of technicians, engineers, clerical and administrative personnel. The numbers of those entering these occupations at the training level are below requirements. Native labour is also short, particularly in agriculture and mining. As a result, comparatively little use can be made of scientific personnel selection methods. Other personnel research problems, such as absenteeism, labour turnover and work efficiency become relatively more important. Yet their study inevitably brings one back to the scarcity factor, which encourages occupational instability, leads to maldistributions of labour and to low standards of job efficiency resulting from lack of ability or of motivation.

In advising employers on recruitment policy and productivity problems, the N.I.P.R. has found itself handicapped by a lack of basic facts about our working population. Steps will have to be taken to obtain the necessary information which covers a wide field. The necessary investigations have been considered, and a plan has been drawn up for an ability survey, to indicate what proportions of manpower of particular grades would be available if all potentialities were fully

in watter verhoudings mannekrag van bepaalde grade beskikbaar sal wees indien alle potensialiteite ten volle ontwikkel word. Hierdie plan het belangrike militêre sowel as industriële implikasies en pogings word aangewend om dit spoedig ten uitvoer te bring.

'n Tweede ondersoek wat nog in wording is, is 'n opname van werkhoudings en van die sosio-ekonomiese agtergrond van industriële werkers. Die opname sal in die eerste instansie beperk wees tot die nywerhede waar studies van afwesigheid en arbeidsomset alreeds aan die gang is.

Naturelle-arbeid

Die behoefte aan navorsing na mannekrag in verhouding tot nie-Blanke arbeid is besonder dringend; eerstens omdat 93 persent, 89 persent en 65 persent onderskeidelik van diegene wat in diens is van die landbou, mynweese en die nywerheid, nie-Blanke is en tweedens, omdat so min bekend is aangaande die bekwaamhede van ons naturellebevolking en aangaande die faktore wat hulle produktiwiteit bepaal.

Op aanbeveling van die Advieskomitee vir Personeelnavorsing, het die Raad die stigting van 'n navorsingspan i.s. naturelle-arbeid goedgekeur as die eerste stap in die rigting van die daarstelling van 'n departement vir Naturelle-studies wat nie alleen besig sal wees met personeelprobleme met betrekking tot die gebruik van Naturelle-arbeid nie, maar ook met basiese studies van die mentaliteit van inheemse volkere Suid van die Sahara.

Die eerste taak van die span was die opstelling van 'n algemene keurings- en klassifiseringstoets vir naturelle-arbeid met spesiale verwysing na industriële werkers. Daar word gebruik gemaak van prestasietoets van aanpasbaarheid wat toegepas word deur middel van 'n klanklose rolprent wat dit moontlik maak om taalverskille en ongeletterheid uit te skakel. Die toets is tot dusver toegepas op werkers van 'n motormonterings-werkplaas, die boubedryf, 'n seepfabriek, 'n papierfabriek en 'n transportmaatskappy. Ander nywerhede het hulle bereidwilligheid tot samewerking te kenne gegee en die rekrute van werkverskaffingsburo's wat in twee stadsrade op die Rand opgerig is, sal ook getoets word. Om toe te laat vir die invloed van ouderdoms-, geslags- en opvoedkundige verskille is die toetsreeks ook toegepas op groot groepe skoliere tussen standarde 4 en 10. Die mynbedryf verskaf nog steeds die meeste geleenthede vir 'n studie van die produktiwiteit van Naturelle-arbeid. Opvolgingstudies van doeltreffendheid van keurings-toets, lewer steeds goeie resultate. Die toets is nou ten volle op 'n roetinebasis gevestig. Navorsing word gedoen om die aanpasbaarheidstoetsreeks met toets vir krag en uithouvermoë aan te vul. Indien hulle slaag, sal 'n meer diskriminerende indeling van Naturelle-arbeid moontlik gemaak word. Om te verseker dat die beste gebruik gemaak word van beskikbare arbeid,

developed. This plan has important military as well as industrial implications, and efforts are being made to have it carried out soon.

A second investigation, which is in preparation, is a survey of job attitudes and of the socio-economic background of industrial workers. This survey will in the first place be limited to those industries where studies of absenteeism and labour turnover are already in progress.

Native Labour

The need for manpower research in relation to non-European labour is particularly urgent, in the first place because of those employed in agriculture, mining and industry, 93 per cent., 89 per cent. and 65 per cent. respectively are non-Europeans, and in the second place because so little is known about the abilities of our Native population and about factors that determine their productivity.

On the recommendation of the Personnel Research Advisory Committee, the Council authorised the establishment of a Native labour research team, as a first step towards the establishment of a Native Studies department, which will concern itself, not only with personnel problems relating to the use of Native labour, but also with basic studies of the mentality of the indigenous peoples south of the Sahara.

Its first task has been to construct a general selection and classification test for Native labour, with special reference to industrial operatives. Use is made of performance tests of adaptability, administered by means of a silent film, which makes it possible to ignore language differences and illiteracy. The test has so far been applied to operatives from a motor assembly plant, the building trade, a soap factory, a paper mill and a transportation company. Other industries have indicated their willingness to collaborate, and the intakes of employment bureaux established in two municipalities on the Rand will also be tested. In order to allow for the effects of age, sex and educational differences, the test battery has also been applied to large groups of scholars between Standards 4 and 10.

The mining industry continues to provide most opportunities for the study of the productivity of Native labour. Follow-up studies of the efficiency of selection tests continue to give good results. The tests are now fully established on a routine basis. Research is in progress to supplement the adaptability test battery with strength and endurance tests. If these prove successful, a more discriminating classification of Native labour will be made possible. In order to ensure that optimum use is made of the available labour, a new system of Native labour control has been devised which ensures that ability, training achievement and

is 'n nuwe beheerstelsel vir Naturelle-arbeid ontwerp wat verseker dat bekwaamheid, opleidingsprestasie en beroeps ondervinding almal in aanmerking geneem word by die indeling van naturelle vir ondergrondse pligte. Hierdie stelsel is op die oomblik met groot sukses in werking op 'n aantal myne. Studies is ook gemaak van die faktore wat die houdings van naturellemynwerkers tot hulle werk bepaal.

Basiese Studies oor die Mentaliteit van Naturelle

'n Studie van die elektroënsefalogramme van 'n verteenwoordigende groep Unie-naturelle is voltooi. Die bevindings het grootliks verskil van dié wat in 'n soortgelyke ondersoek van Wes-Afrikaanse negers verkry is en wat 'n hoë voorkoms van abnormaliteit getoon het. Die E.E.G. van die Bantogroep was in hoofsaak identies met dié van 'n Blanke kontrolegroep. Die voorkoms van abnormaliteite was nie opvallend verskillend nie. Verdere werk in dié verband sal egter nog gedoen moet word en daar kan verwag word dat die ontwikkeling van hulle karakter enigszins verskillend sal verloop as by die gemiddelde Blanke, weens die ingewikkelde kulturele omstandighede waaronder Naturelle in die Unie opgroei. Dit is dus belangrik om vas te stel volgens watter waardestelsel en op watter manier die gedrag van Naturelle in verskillende stadiums van ontstamming en op verskillende opvoedkundige peile bepaal word aangesien hierdie karakterfaktore 'n belangrike invloed sal hê op die persoonlike eerlikheid en verantwoordelikeheidsin waarmee die Naturel na sy werk kom. By wyse van 'n begin is 'n studie onderneem na die houding van die opgevoede, volwasse Naturel teenoor die Westerse opvattinge van reg en verkeerd, gewoontes, wet en regspraak. 'n Ondervragingstegniek is ontwikkel wat vertroubare resultate lewer. Daar is reeds aangetoon dat eties-regskundige sowel as godsdienstige strafmaatreëls erken word. Die nuttigheid van hierdie tegniek vir personeelkeuring sal verder ondersoek word.

Ambagsvakleerlinge

Belangstelling in keuringstoetse vir ambagsvakleerlinge duur voort ten spyte van die algemene tekort aan geskikte kandidate. Daar was 'n vermeerdering in die aantal firmas wat gebruik maak van die fasiliteite wat deur die N.I.P.N. aangebied word om applikante vir vakleerlingenskap te toets. Afdoende opvolgingsmateriaal in die vorm van eksamenuitslae, ambagstoetspunte en bekwaamheidskatting is ingesamel om 'n omvattende bevestiging van die geldigheid van die toetsbattery te regverdig. Die toetse behoort dus eersdaags in gestandaardiseerde vorm verkrygbaar te wees vir gebruik deur die hele land om kandidate in te deel vir vakleerlingenskap in die geskoolde ambagte en vir toelating tot ambagskole.

job experience are all taken into account in allocating Native to underground duties. This system is now in successful operation on a number of mines. Studies have also been made of the factors determining the job attitudes of Native mine labourers.

Basic Studies of the Mentality of the Native

A study was completed of the electroencephalogram as measured in a representative group of Union Natives. The findings differed greatly from those obtained in a similar investigation on West African negroes, which reported a heavy incidence of abnormalities. The E.E.G. of the Bantu group turned out to be identical in essentials to that obtained from a European control group. The incidence of abnormalities was not significantly different. Further experimental work is, however, still necessary.

Because of the complex cultural circumstances under which Natives in the Union grow up, the development of their character can be expected to run a somewhat different course from that of the average European. Hence it is important to determine by what system of values and in what manner their conduct in various stages of detribalisation and at various educational levels is determined, for these character factors will have an important bearing on the personal integrity and sense of responsibility which the Native brings to his job. As a first step a study has been undertaken of the educated adult Native's attitude towards Western ideas of right and wrong, customs, law and administration of justice. A technique of enquiry has been developed which gives reliable results. It has already been shown that both ethico-legal and religious sanctions are correctly recognised. The usefulness of this technique for personnel selection purposes will be further investigated.

Artisan Apprentices

Interest in selection tests for artisan apprentices has been maintained, despite the general shortage of suitable candidates. There has been an increase in the number of firms that make use of the facilities provided by the N.I.P.R. to test applicants for apprenticeship. Sufficient follow-up material in the form of examination results, trade test scores and efficiency assessments, has been collected to warrant a comprehensive validation of the battery. The tests should, therefore, shortly be available in standardised form for use throughout the country to classify candidates for apprenticeship in the skilled trades and for entry into trade schools.

Keuring van Administratiewe Leerlinge

Administratiewe leerlinge is weer vir 'n groot nywerheidskorporasie op 'n Unie-wye basis gekeur. Met behulp van 'n siftingstoets het 'n rondreisende werwingspan ongeveer 40 kandidate gekies vir 'n breedvoeriger keuring in Pretoria. Laasgenoemde ondersoek het twee dae geduur, waarna die kandidate voor 'n keuringsraad verskyn het wie se besluite op toetsaanbevelings sowel as op hulle eie onderhoudsindrukke gebaseer was.

Beroepswaardering

'n Metode van beroepswaardering is met welslae voltooi ten behoeve van 'n nywerheidskorporasie in een van sy afdelings waar sowat 700 dagloners in 69 verskillende beroepe besig is. Die metode is betreklik eenvoudig en word nou in ander afdelings van die firma op die proef gestel. Indien gevind word dat dit van algemene toepassing is, sal dit ook beskikbaar gestel word aan ander nywerheidsinrigtings.

Afwesigheid

Die beheerkaart-tegniek vir die studie van afwesigheid is verder ondersoek om uit te vind hoe dit toegepas kan word op verskillende soorte afwesigheid, verskil-

Selection of Administrative Trainees

Administrative trainees were again selected for a large industrial corporation on a Union-wide basis. With the aid of a screening test, a travelling recruiting team picked about 40 candidates for more detailed testing in Pretoria. The latter test lasted two days, after which the candidates appeared before a selection board whose decision was based both on test recommendations and on their own interview impressions.

Job Evaluation

A method of job evaluation has been successfully completed on behalf of an industrial corporation in one of its departments, employing about 700 dailiy-paid workers in 69 different jobs. The method is comparatively simple and is now being tried out in other departments of the sponsoring firm. If it is found generally applicable, it will be made available to other industrial users.

Absenteeism

The control chart technique for the study of absenteeism has been further investigated to find out how it can be applied to different types of absence, different



Tydens 'n studie van afwesigheid en arbeidsomset onder verskillende klasse werknemers wat deur die N.I.P.R. onderneem is ten behoeve van 'n groot nywerheidskorporasie, is gegewens bereken en grafies voorgestel op 'n reeks statistiese kontrolekaarte.

In a study of absenteeism and labour turnover among different classes of employees, undertaken by the N.I.P.R. on behalf of a large industrial corporation, data are calculated and plotted on a series of statistical quality control charts.

lende klasse werkers, op 'n verskillende tydshasis (daaglik/weeklik) en wanneer die dae van die week afsonderlik geneem word. Daar is gevind dat die tegniek ewe veel van toepassing is op klein as op groot groepe werkers.

Arbeidsomset

Nuwe statistieke vir die ontleding van arbeidsomset langs wiskundige weë word ontwikkel uit gegewens wat oor 3,000 industriële werkers ingesamel is en 'n indiensnemingstydperk van 20 jaar dek vanaf die stigting van die organisasie waardeur hierdie navorsingskema gesteun word.

Navorsing i.s. Verdediging

Goeie vordering is gemaak met die algemene indelings-toets vir die Unie-Verdedigingsmag: die Aktiewe Burgermag sowel as die Staande Mag. Daar word gehoop dat die toets geskik sal wees vir die personeel van die Leër, Vloot en Lugmag, met uitsondering van vliegtuigbemanning wat vooraf op ander terreine gekoer word nog voordat hulle die lug-bemanningskeuringstoets aflê. Nadat dit in 'n voorlopige vorm op rekrute van die Leër en Lugmag toegepas is, word dit nou gestandaardiseer en bekragtig op 3,000 rekrute van die Aktiewe Burgermag. Die toets is ook bedoel as 'n keuringsinstrument in geval van algemene mobilisasie. Dit mag 'n nuttige instrument word by die studie van die arbeidspotensiaal van die Unie waarna vroeër in die verslag verwys is.

In samewerking met die Departement van Burgerlike Lugvaart, word 'n toets opgestel vir grondgeleide onderskepping en lugverkeersbeamptes. Navorsing na die oorsake van landings met ingetrekke onderstel wat onder leerling-loodse voorkom, word ook onderneem.

Navorsing na probleme i.s. mannekrag en die doeltreffendste gebruik van tegniese mannekrag in die S.A.L.M. duur voort.

'n Groot mate van roetineoetsing word nog vir die Staande Mag gedoen maar reëlins word getref om baie van hierdie roetine-funksies oor te plaas na die personeelkeuringseenhede wat nou in alle kommandamente gestig is.

Besonderhede oor toerusting vir die keuring van vliegtuigbemanning ten behoeve van die S.A.L.M. is ook tot die beskikking van ander lande van die Gemenebes gestel.

Elektroënsefalografie

Die elektriese potensiale wat deur die brein voortgebring en hoofsaaklik in die vorm van delta-(1.5-3.5 herz), teta-(4-7 herz), alfa-(8-13 herz) en betagolwe (14-30 herz) aangeteken is, is aan verdere ondersoek onderwerp ten einde vas te stel wat hulle sielkundige betekenis is. Veranderinge in die golfspektrum in

classes of employees, on different time bases (daily, weekly) and when individual days of the week are taken separately. The technique has been found equally applicable to small and to large working groups.

Labour Turnover

New statistics for the analysis of labour turnover on actuarial lines are being developed from data collected on 3,000 industrial lives, covering an employment period of 20 years from the foundation of the organisation which is sponsoring this research project.

Defence Research

Good progress has been made with the general classification test for the Union Defence Force, both the Active Citizens Force and the Permanent Force. It is hoped that the test will be suitable for Army, Navy and Air Force personnel, except aircrew who are pre-selected on other grounds, prior to doing the aircrew selection tests. After application in a preliminary form to Army and Air Force recruits, it is now being standardised and validated on 3,000 A.C.F. trainees. The test is also intended as a screening device in case of general mobilisation. It may prove a useful instrument for the study of the Union's labour potential, to which reference was made earlier in this report.

With the co-operation of the Department of Civil Aviation, a test is being constructed for ground control interception and air traffic controllers. Research is also being conducted into the causes of landings with retracted undercarriage among pupil pilots.

Research on manpower problems and on the most efficient use of technical manpower in the S.A.A.F. is proceeding.

Much routine testing is still being done for the Permanent Force, but preparations are being made to transfer many of these routine functions to the personnel selection units which have now been established in all Commands.

Details of equipment for aircrew selection designed on behalf of the S.A.A.F. have been made available to other Commonwealth countries.

Electro-encephalography

The electric potentials generated by the brain and recorded mainly in the form of delta (1.5-3.5 c.p.s.) theta (4-7 c.p.s.), alpha (8-13 c.p.s.) and beta (14-30 c.p.s.) waves, were subjected to further study to determine their psychological significance. Alternations in the wave spectrum correlated with type of mental

korrelasie met sekere tipes van geestesaktiwiteit is ondersoek in die hoop dat dit meer lig sal werp op die serebrale funksie. Baie sistematiese werk is gedoen in verband met die verandering in die E.E.G. in korrelasie met ouderdom, geslag en ras. Bydraes is ook gelewer tot die kliniese betekenis van die E.E.G. veral die reaksies tot fotiese prikkeling.

Die E.E.G. Departement dien nog altyd verskeie hospitale, klinieke en mediese praktisyns deur die lewering van roetineverslae oor pasiënte. Uit 'n navorsingsoogpunt gesien is hierdie werk besonder nuttig aangesien dit ons begrip van die ingewikkelde elektriese verskynsels wat met die werking van die brein geassosieer word, geleidelik uitbrei.

Studies oor die aard en meting van Temperament

Die werker se doeltreffendheid in en skikking by sy werk hang in 'n groot mate af van die samestelling van sy persoonlikheid. Die term dek baie gedrags-aspekte soos die manier waarop uitdrukking gegee word aan gevoelens, belange, houdings teenoor die werk en teenoor medewerkers, motivering, aanvaarding van sekere waardes en maatstawwe van gedrag, ens.

Om 'n begrip te kry van die oorheersende eienskappe en na aanleiding daarvan in staat te wees om 'n voorspelling te maak oor toekomstige gedrag, is 'n meting van die blywende aangebore determinante belangrik. Die belangrikste is dié wat gewoonlik saam gegroepeer word onder die hoof: Temperament. Hulle staan in verband met: (1) sy gedragstempo, gevoeligheid vir nuwe prikkels sowel as gebeurtenisse van die verlede, en sy veranderlikheid; (2) kapasiteit om vol te hou veral in die navolging van ander doelwitte as die bevrediging van instinkmatige begeertes; (3) gevoeligheid vir emosionele ondervindings. Baie min is nog bekend aangaande die geaardheid van hierdie temperaments-eienskappe en gevolglik is daar nog nie veel vordering gemaak met die praktiese temperamentskatting in verhouding tot personeelprobleme nie.

Die Departement Teoretiese Sielkunde het twee afdelings wat besig is met voltydse navorsing op hierdie onderwerp. Een benader dit vanuit 'n suiwer sielkundige oogpunt, die ander ondersoek die psigo-fisiologiese sy daarvan. Op die oomblik is die studies beperk tot die eerste twee temperamentshoedanighede wat bekend staan as „primêr-sekundêre funksie” en „aktiwiteit.”

'n Belangrike ontdekking is gedurende die jaar gemaak met betrekking tot eersgenoemde. Terwyl daar voorheen vasgestel is, soos vermeld in die Jaarverslag vir 1950/51, dat alfafrekwensie in die elektroënsefalogram (veronderstel om 'n aanduiding te wees van prikkelbaarheid in die sentrale senuweestelsel) positief verwant is aan die sekundêre funksie soos bepaal deur verskeie waarnemings- en psigo-motoriese toetse, en subjektiewe metodes, is daar nou vasgestel dat alfafrekwensie ook

activity were investigated to throw further light on cerebral function. Much systematic work was done on the changes in the E.E.G. correlated with age, sex and race. Contributions were also made to the clinical significance of the E.E.G. particularly the responses made to photic stimulation.

The E.E.G. Department continues to render a service to many hospitals, clinics and medical practitioners by rendering routine reports on patients. From a research point of view this work is useful as it is steadily increasing our understanding of the complex electrical phenomena associated with brain functions.

Studies on the Nature and Measurement of Temperament

The worker's efficiency in and adjustment to his job depends to a considerable extent on his personality make-up. This term covers many aspects of behaviour, such as the manner in which emotions are expressed, interests, attitudes towards the job and towards fellow-workers, motivation, acceptance of certain values and standards of conduct, and the like.

To gain an understanding of these dominant traits and to be able to predict future behaviour from them, measurement of the enduring constitutional determinants is important. The most significant are those generally grouped together under the heading of temperament. These have to do with: (1) tempo of behaviour, its susceptibility both to new stimuli and past events, and its variability; (2) capacity for sustained effort, particularly in pursuit of goals other than the satisfaction of instinctive desires; (3) susceptibility to emotional experience. Little is as yet known about the nature of these temperament attributes, and not much headway had therefore been made with the practical assessment of temperament in relation to personnel problems.

The Theoretical Psychology Department has two sections which are devoting themselves to full-time research on this subject, one approaching it from the purely psychological, the other from the psychophysiological angle. At the moment, studies are confined to the first two temperament attributes, known as “primary-secondary function” and “activity.”

With regard to the former, an important discovery has been made in the course of the year. Having previously found, as stated in the Annual Report for 1950/51, that alpha frequency in the electroencephalogram (believed to be indicative of level of excitability in the central nervous system) is positively related to secondary function as assessed by means of various perceptual and psychomotor tests and by subjective means, it has now been established that alpha frequency is also positively correlated with flicker threshold, which is the point at which the flicker produced when light flashes are presented in rapid succession and at increasing frequency, first ceases to be perceptible. The measurement of this phenomenon, has hitherto suffered

'n positiewe korrelasie toon met die flikkergrens, die punt waarby die afsonderlike flikker wat ontstaan wanneer ligflitse mekaar vinnig opvolg met toenemende snelheid, eerste onsigbaar begin word. Die meting van die verskynsel is tot dusver aan bande gelê deur gebreke in apparaat en prosedure, maar hulle is nou grotendeels uit die weg geruim deur middel van 'n nuwe apparaat wat plaaslik ontwerp en gebou is. Die verband wat vasgestel is tussen alfafrekwensie en die flikkergrens steun die veronderstelling aangaande die geaardheid van die sekondêre funksie waarop die temperamentstudies van die N.I.P.N. gebaseer is.

'n Omvattende ondersoek word tans beplan om die verwickelings van hierdie belangrike ontdekking op te volg en finale bevestiging van die hipotese te verkry.

Die ondersoek van die tweede temperaments-veranderlikheid, nl. aktiwiteit, het meer onmiddellike praktiese resultate opgelewer. 'n Eenvoudige opteltoets word gebruik vir die meet van skommeling in die peil van werkkapasiteit. Daar is gevind dat die toets 'n positiewe korrelasie toon met die werksprestasie van ambagsvakterleerlinge in 'n ingenieursfirma.

Apparaat vir Waarnemingsondersoeke

Verskeie instrumete vir die studie van waarneming is ontwerp en gemaak. Deur middel van een van hierdie

from imperfections in apparatus and procedure, but these have now been largely overcome by means of new apparatus, locally designed and constructed. The connection established between alpha frequency and flicker threshold supports the hypothesis about the nature of secondary function on which the temperament studies of the N.I.P.R. are based.

An elaborate investigation is now being planned to follow up the implications of this important finding, and to obtain final confirmation of the hypothesis.

The investigations of the second temperament variable activity, have produced more immediately practical results. A simple addition test is being used to measure fluctuations in level of work capacity. This test has been found to correlate positively with the work performance of artisan apprentices in an engineering firm.

Apparatus for Perceptual Investigations

Various instruments for the study of perception have been designed and constructed. By means of



Apparaat wat gebruik word vir die blootstelling van voorwerpe onder wisselende toestande van beligting in 'n eksperimentele studie van die sigbaarheid van padtekens.

Apparatus used for exposing objects under varying lighting conditions in an experimental study of the visibility of road signs.

instrumente, 'n apparaat vir die meet van oogskerpte onder verskillende beligtingstoestande, is 'n proef gedoen met twee tipes windskermglas wat eersdaags vir motorvoertuie gebruik sal word. Daar is gevind dat die donkerder glas ietwat meer doeltreffend was tydens bestuurstoestande in die nag met aankomende hoofligte hoewel dit in die algemeen sigbaarheid in die afwesigheid van verblinding effens verswak het. Aan die ander kant egter het die ondersoek opvallende individuele verskille geopenbaar in die vermoë om onder omstandighede wat spesifiek vir die toets geskep is, voorwerpe te herken. In vergelyking met hierdie verskille kan die sigbaarheid soos deur die glas bepaal as onbeduidend beskou word.

Intelligensietoets vir Volwassenes

Vyftien beurse is aan nagraadse studente toegeken om die Suid-Afrikaanse verwerking van die Wechsler-Bellevuetoets op 'n eksperimentele monster van die volwasse bevolking, 5,000 gevalle, toe te pas. Die monster sal uit gelyke getalle Afrikaans- en Engels-sprekendes tussen die ouderdomme van 20 en 60 jaar bestaan. Elke ouderdomsgroep is so saamgestel dat dit die korrekte verhouding van vyf beroepskategorieë, volgens die jongste sensussyfers, bevat.

Psigometriese Studies

Hierdie afdeling bepaal homself grotendeels tot tegniese probleme wat voortspruit uit die standaardisering van etlike keuringstoetse. 'n Apparaat is ook vervaardig vir die gebruik van skalogramontleding. Dit is die enigste apparaat van sy soort wat in die Unie beskikbaar is en sal die afdeling in staat stel om die mees gevorderde metodes van toetskonstruksie te gebruik.

Berekeningsdepartement

Die instelling van die ponskaartmetode het die aantekening en ontleding van navorsingsgegevens grootliks vergemaklik. Twee handponsmasjiene, twee „Powers” Sorteermasjiene en een „Powers” interpolator is in volle gebruik.

Wiskundige Statistieke

As gevolg van bedankings, was die afdeling nie in staat om veel tot stand te bring gedurende die jaar nie, behalwe vir sekere roetine werk.

Navorsingsbeurs i.s. Naturellearbeid

Die beurs wat deur die Raad aangebied is vir navorsing wat deur die N.I.P.N. uitgevoer moet word i.s. keuringstoetse vir Naturellearbeid is aan mnr. J. de Ridder toegeken. Hy werk saam met die Naturellearbeid-navorsingspan in verband met die uitwerking van ouderdom, geslag, opvoeding, vorige beroepsopleiding en ondervinding op prestasie in aanpasbaarheidstoetse wat spesiaal opgestel is vir gebruik op die myne.

one of these, an apparatus to measure visual acuity under different illumination conditions, a test was made of two types of windscreen glass, which are coming into use on motor vehicles. It was found that the darker of the two was somewhat more effective under conditions simulating night-driving with oncoming headlights, though on the average it slightly reduced visibility, in the absence of dazzle. On the other hand, the investigation disclosed marked individual variations in the ability to identify objects, under the circumstances specific to the test, in comparison with which differences in visibility determined by the glass could be considered to be negligible.

Adult Intelligence Test

Fifteen bursaries have been granted to post-graduate students to apply the South African version of the Wechsler-Bellevue test to an experimental sample of adult population numbering 5,000 cases. The sample will consist of equal numbers of Afrikaans and English speaking persons, between the ages of 20 and 60. Each age group has been made up to contain the correct proportion of five occupational categories, according to census figures.

Psychometric Studies

This department has largely confined itself to technical problems arising from the standardisation of various selection tests. Apparatus has also been made for the use of scalogram analysis. This is the only apparatus of its kind available in the Union, and will enable the department to use the most advanced methods of test construction.

Computing Department

The introduction of punch-card methods has greatly facilitated the recording and analysing of research data. Two hand punches, two Powers sorting machines and one Powers interpolator are in continuous operation.

Mathematical Statistics

Because of resignations, this department has been unable to function except in regard to routine matters during the course of this year.

Scholarship for Native Labour Research

The scholarship offered by Council for research on selection tests for Native labour, to be carried out in the N.I.P.R., was awarded to Mr. J. de Ridder. He is working with the Native Labour Research Team on the effect of age, sex, education, previous occupational training and experience on performance in the adaptability tests constructed primarily for use on the mines.

Publikasies

Behalwe verslae aan ondersteuners en soortgelyke geskrifte met 'n beperkte sirkulasie, het lede van die personeel 'n aantal verhandelinge voltooi wat handel oor ondersteunde of fundamentele navorsingsonderwerpe. Hiervan is 14 in die *N.I.P.N. Bulletin* gepubliseer en 9 het in Suid-Afrikaanse en oorsese wetenskaplike en ander tydskrifte verskyn. Nog vier is aangeleem vir publikasie. 'n Monografie deur A. G. Arbous „Taboes for Aptitude Testers,” wat deur die W.N.N.R. gepubliseer is, het gedurende Julie verskyn.

Personeel

Daar was geen vermeerdering in die aantal beskikbare persone met geskikte kwalifikasies vir personeelnavorsing nie, en die toestand kan beskryf word as uiters onbevredigend. Die praktyk om gematrikuleerde meisies bo gegraduateerdes as psigometrië en berekenaars op te lei wat baie suksesvol was, sal uitgebrei word tot gematrikuleerde seuns. Dit sal ook nodig wees om die Naturellearbeidnavorsingspan grotendeels van Naturelle wetenskaplike assistente te voorsien hoewel laasgenoemdes tot dusver nie minder skaars was as Blanke gegraduateerdes nie.

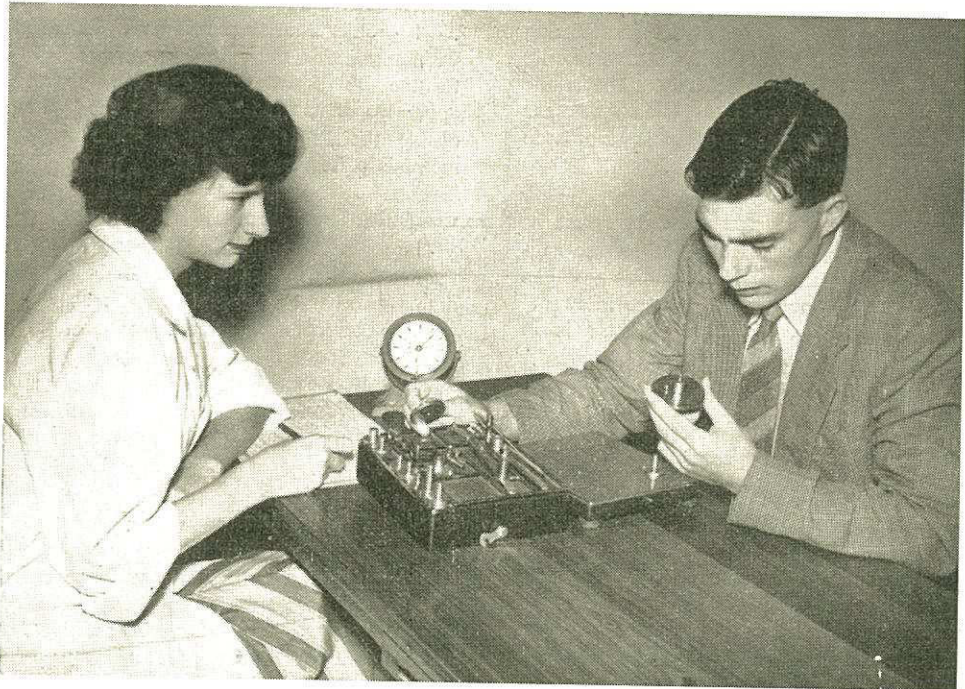
Publications

In addition to reports to sponsors and similar papers for a restricted circulation, staff members completed a number of papers dealing with sponsored or fundamental research topics. Of these, 14 were published in the *N.I.P.R. Bulletin*, and 9 appeared in South African and overseas scientific and other journals. A further 4 have been accepted for publication. A monograph by A. G. Arbous, *Tables for Aptitude Testers*, published by the C.S.I.R., appeared during July.

Staff

There has been no improvement in the supply of persons suitably qualified for personnel research and the staff position may be described as being most unsatisfactory.

The practice of appointing matriculated girls, rather than graduates, to be trained as psychometrists and computers, which has proved very successful, will be extended to matriculated youths. It will also prove necessary to staff the Native Labour Research team largely with Native scientific assistants, though so far these have not been easier to find than European graduates.



'n Toets vir meganiese aanleg waarin 'n werkende model opgestel word. Die toets is geldig verklaar vir die keuring en klassifisering van leerlingambagsmanne.

A mechanical aptitude test which involves the assembly of a working model. This test has been validated for the selection and classification of apprentice artisans.

Nywerheidsnavorsings- Inrigtings

In die volgende paragrawe word 'n kort oorsig gegee van die werk wat gedurende die jaar deur elk van die nywerheidsnavorsingsinstitute en die Navorsingseenheid vir Bituminese Bindstof gedoen is. Die institute is as nie-winsgewende maatskappye geïnkorporeer en word deur hulle eie beheerrade bestuur. Hulle staan dus onafhanklik van die W.N.N.R. en publiseer hulle eie afsonderlike jaarverslae. Aangesien 'n aansienlike gedeelte van hulle geldelike steun egter van die Raad afkomstig is, word opsommings van hulle werksaamhede hier gegee. Die Navorsingseenheid vir Bituminese Bindstof verskil van die ander in soverre dat dit nie onder die Maatskappye Wet geïnkorporeer is nie maar direk deur die W.N.N.R. bestuur word. Sy funksies is egter soortgelyk aan dié van die ander institute en dit is vanselfsprekend dat dit onder hierdie afdeling ingesluit word.

DIE LEERNYWERHEID-NAVORSINGSINSTITUUT

Direkteur: DR. S. G. SHUTTLEWORTH.

Die belangrikste ontwikkeling in die werk van die L.N.N.I. gedurende die afgelope jaar spruit uit die aanvraag vir dienste deur die personeel van die produktiwiteitsafdeling, wat gestyg het tot 20 produktiwiteits-technici wat almal op die fabrieksvloer optree. Opsienbare resultate is behaal en daar word bereken dat, die produktiwiteit van die Suid-Afrikaanse skoenbedryf teen 1956 baie gunstig sal vergelyk met die mees ontwikkelde oorsese fabriek.

Een van die voordele van die bogenoemde tipe van operasionele navorsing is die nouer integrasie van navorsers en fabriek, die gebrek waaraan miskien die grootste swaakteit van alle industriële navorsingsorganisasies is.

L.N.N.I. probeer om fabrieksvloer kontakte waar moontlik uit te brei deur grootskaalse eksperimente buitemuurs, en die gevolg van sulke eksperimente is die meer algemene toepassing van nuwe of verbeterde metodes wat deur die Instituut ontwerp is.

Aan die anderkant word dit wel besef dat nuwe of revolusionêre prosesse slegs kan voortvloei uit fundamentele navorsing, en vooruitgang is gemaak in die studie van die struktuur van chromium kompleksione (die vernaamste plantaardige looistof), en in die verklaring van die vernaamste meganismes van looiery. 'n Voortdurende stroom van oorsese publikasies oor hierdie onderwerpe word deur personeel van die L.N.N.I. in stand gehou. Fundamentele werk is ook

Industrial Research Institutes

In the following paragraphs a brief description is given of the work during the year of each of the industrial research institutes and the Bituminous Binder Research Unit. The institutes have been incorporated as non-profit companies and are managed by their own boards of control. They are thus independent of the C.S.I.R. and issue their own separate annual reports, but as a substantial proportion of their financial support is derived from the Council, summaries are given here. The Bituminous Binder Research Unit differs from the others in that it has not been incorporated under the Companies Act, but is administered directly by the C.S.I.R. Its functions, however, are similar to those of the other institutes and it is logical to include it in this section.

THE LEATHER INDUSTRIES RESEARCH INSTITUTE

Director: DR. S. G. SHUTTLEWORTH

The most significant development in the work of the L.I.R.I. during the past year has resulted from the demand for services from the productivity section staff, which has risen to twenty productivity technicians all operating on the factory floor. Spectacular results have been achieved and it is estimated that, by 1956, the productivity of the South African footwear industry will compare favourably with the most advanced overseas factories.

One of the advantages of the above type of operations research is the closer integration of research worker and factory, the lack of which is probably the major weakness of all industrial research organisations. The L.I.R.I. is endeavouring to increase factory floor contacts, wherever possible, by carrying out extramural large-scale factory experiments, and the result of these experiments has been a much wider application of new or improved methods developed at the Institute.

On the other hand, it is appreciated that new or revolutionary processes will spring mainly from fundamental research, and progress has been maintained in the study of the structures of chromium complexions (the main mineral tanning material) and of wattle tannin (the main vegetable tanning material), and in the elucidation of the main mechanisms of tannage. A regular flow of overseas publications on these subjects has been maintained by the L.I.R.I. staff. Long-range work has continued on the average foot shapes of various popu-

voortgesit op die gemiddelde voetvorm van verskillende bevolkingsgroepe, en die resultate word nou op groot skaal toegepas met spesiale L.N.N.I.-leeste.

Die toepassing van L.N.N.I. aanbevelings vir die bereiding van huide en velle word weerspieël in die toenemende gebruik van natriumfluosilikaat, en daar word geraam dat besparings van nagenoeg £300,000 jaarliks daardeur teweeggebring word. Fundamentele werk i.v.m. huide en velle proteïene duur steeds voort, en 'n proteïene-skeikundige word tans oorsee opgelei vir hierdie werk.

Gedurende die afgelope jaar het L.N.N.I. 65 verslae gepubliseer, waarvan 13 in oorsese wetenskaplike tydskrifte verskyn het.

VISNYWERHEID-NAVORSINGSINSTITUUT

Direkteur: DR. G. M. DREOSTI.

Die Instituut het gedurende die jaar aansienlik uitgebrei, soos weerspieël word deur 'n toename in die personeel van 20 na 27. Terwyl Lidmaatskap van die Instituut onveranderd gebly het, het die getal mededele verdubbel. Die inkomste van die Instituut het weereens toegeneem en het 'n bedrag van £34,800 bereik. Benevens die sub-stasie te Walvisbaai wat 'n vaste personeel het, is drie addisionele sub-stasies ingerig, n.l., te St. Helena-baai, Veldrif en Lambertsbaai. Hierdie laboratoria word gereeld beman deur personeellede wat toetse op industriële skaal by die fabriek uitvoer. Die huidige gebou te Kaapstad waarin die Instituut gehuisves word, is glad te klein, maar heelwat vordering is alreeds gemaak met die opstel van planne vir 'n nuwe en groter gebou by die Universiteit van Kaapstad.

Dit is onmoontlik om binne die beperkte bestek van hierdie verslag na alle navorsingserk wat gedurende die jaar afgehandel is, te verwys. Gevolglik sal slegs die belangrikste ondersoeke aangestip word.

Bewaring van Vars Vis

Ondersoek is gedoen in verband met die volgende aspekte: die verkoelingsnelheid van vis in ys—waardeur dit aan die lig gebring dat, in teenstelling met die trant van verslae in die literatuur, die omgewingstemperatuur wel 'n aansienlike invloed uitoefen op die snelheid waarmee vis verkoel kan word; die ontwikkeling van 'n metode met behulp waarvan ys wat aangewend is vir verkoeling, gereinig en weer gebruik kan word; kritiese studie in verband met verskeie objektiewe toetse waarvolgens die varsheid van vis bepaal kan word; toetse met verskillende chemiese preserveermiddels; die bewaring van visafval op treilers met behulp van formalien. In ooreenstemming met resultate van oorsese navorsers is gevind dat die gebruik van hierdie preserveermiddel gepaard gaan met geringe verliese aan proteïene.

lation groups, and results are beginning to find large-scale application in special L.I.R.I. lasts.

The adoption of the L.I.R.I. recommendations for hides and skins curing is demonstrated by the expanding consumption of sodium silicofluoride, and it is estimated that savings of the order of £300,000 per annum have been effected thereby. Fundamental work on hide proteins is progressing and a protein research officer is being trained overseas for this work.

During the past year the L.I.R.I. has published 65 reports and scientific papers, of which 13 have appeared in overseas scientific journals.

FISHING INDUSTRY RESEARCH INSTITUTE

Director: DR. G. M. DREOSTI

The Institute has grown considerably during the year, as witness the increase of staff from 20 to 27. Membership remained unaltered, but Associate Membership was doubled during the year. Income continued to increase and totalled £34,800 for the year. In addition to the permanently staffed substation at Walvis Bay, three others, namely, at St. Helena Bay, Veldrif and Lambert's Bay, have been established and are regularly used by staff engaged in investigations on an industrial scale at the factories. The present premises in Cape Town are very much overcrowded, but plans for building a new and larger Institute at the University of Cape Town are under way.

It is impossible in this brief space to refer to all the researches conducted during the year, and only the main investigations are indicated below.

Preservation of Fresh Fish

Investigations included work on the rate of cooling of fish in ice, in which it was found that, contrary to reports in the literature, the ambient temperature considerably influenced the cooling rate; development of a method whereby ice used in the chilling of fish could be cleaned and re-used; critical study of various objective tests for the freshness of fish; experiments with various preservatives; and experiments on the preservation of trawler offal with formalin, which confirmed the results of overseas workers, namely, that the use of the preservative led to slight losses of protein.

Die Sout en Droogmaak van Vis

Proewe word tans gedoen in verband met die doeltreffendheid van verskillende metodes vir die opsporing van soutliewende organismes, asook die verband tussen die konsentrasie van hierdie organismes en die snelheid waarmee vis bederf onder verskillende omstandighede. Daar is bewys dat, indien die skeepsruim benede 50°F. gereguleer word, pondvisse bedoel vir die maak van soutvis, op see gesout kan word in plaas van die vis in ys op te berg. Na aanleiding van toetse in verband met die droogmaak van vis, is 'n industriële ontwaterings-toestel ontwerp wat as 'n afsonderlike of 'n veelvuldige eenheid, gebruik kan word. 'n Prototipe van hierdie apparaat word tans op die proef gestel.

Bevriësing

Koelopbergings-toetse met kreef by temperature tussen +15°F. en -10°F. het aangedui dat dit noodsaaklik is om kreefsterte wat vir uitvoer verpak is by 'n temperatuur benede 5°F. te hou. Ondersoek is ingestel na die relatiewe voordele verbonde aan die bevriësing van stokvis aan boord teenoor opberging in ys aan boord gevolg deur bevriësing aan land.

Inmaak

As gevolg van suksesvolle toetse in verband met die inmaak van perlemoen, was dit moontlik om fabriekse skaal in te maak, met advies te bedien. Hierdie nywerheid maak tans goeie vordering. Verdere ondersoek is gedoen in verband met die inmaak van kreef. As gevolg hiervan is sekere inmaakmetodes aanvaar wat geleidelik tot 'n aansienlike verbetering in die kwaliteit van die ingemaakte produk. Aandag is hoofsaaklik gegee aan aspekte soos verkleuring van die vleis, verlies van smaak en die vorming van „struviet.“ Opbergings-toetse met tamatiepasta het aangetoon dat verswakking in gehalte en bederwing afhanklik is van die konsentrasie van die pasta, asook van die opbergings-temperatuur. 'n Chromatografiese metode vir die bepaling van suikers in tamatiepuree is ontwikkel. As gevolg van toetse wat uitgevoer is in verband met die hantering van sardyne, het die Instituut by die nywerheid aanbeveel dat sardyne wat vir inmaakdoeleindes bedoel is, in water by 40°F. opgeberg moet word. Toetse het aan die lig gebring dat die byvoeging van klein hoeveelhede gerookte olie 'n geurige, dog delikate „gerookte“ smaak aan ingemaakte sardyne besorg. Die koste verbonde aan hierdie rook-proses is gering en 'n apparaat vir dié doel is reeds ontwerp. Kwantitatiewe metings is gedoen om die verband tussen die boruimte en die vakuüm in 'n blik by verskillende hoogtes bo seespieël te bepaal.

Salting and Drying of Fish

Investigations are in progress on the significance of various methods of detecting halophilic organisms, and on the relation between the concentration of these organisms and the rate of spoilage of fish under different conditions. It was shown that pounders, intended for salting, could be salted direct at sea, instead of icing, provided that the hold temperature was kept below 50°F. Drying investigations led to the design of an industrial dehydrator for stockfish which can be used as one unit or, in effect, as a multiple stage drier. A prototype is now being tested.

Freezing

The storage life of frozen rock lobster was determined for temperatures varying from 15°F. to -10°F., which indicated the need for a storage temperature below 5°F. in the export tail industry. The relative advantages were studied of freezing stockfish at sea vs. chilling at sea, followed by freezing ashore.

Canning

As a result of successful canning investigations, assistance was given to industry in starting abalone canning in South Africa. The industry is developing rapidly. Investigations in the canning of rock lobster have led to the adoption of factory procedures which resulted in further substantial improvements in quality. The main aspects studied were discoloration of flesh, loss of flavour and struvite formation. Storage tests on tomato paste showed that deterioration and spoilage was a function of concentration of paste and storage temperature. A chromatographic method for determining sugars in tomato puree was evolved. Recommendations made to industry to store fresh pilchards, intended for canning, in water at 40°F. resulted from the Institute's pilchard handling investigations. It was found possible to impart an attractive light smoke flavour to canned fish very inexpensively, by adding small quantities of smoked oil, and an apparatus for smoking oil was designed for this purpose. The quantitative effect of altitude on the vacuum in the can was determined in relation to headspace.

Vismeeel

Die fisiese en chemiese faktore wat verantwoordelik is vir die selfverhitting van vismeel word tans ondersoek. Aanbevelings is alreeds by die Nywerheid gedoen met die doel om hierdie verskynsel sover moontlik te beperk. Die moontlikheid om kreefmeel met behulp van bestaande vismeelinstallasies te vervaardig, is in die loop van die jaar gedemonstreer. Volledige kosteberamings van verskillende metodes vir die herwinning van visafvalwater is gemaak, en as gevolg van aanbevelings aan die Nywerheid word sekere proefinstallasies tans uitgetoets. Indien suksesvol, sal die herwinning van visafvalwater waarskynlik aangepak word op 'n skaal wat meer as £600,000 per jaar beloop. Verskeie soorte goiing- en papiersakke vir die verpakking van vismeel is op die proef gestel en aanbevelings in die verband by die nywerheid gemaak. Die moontlikhede verbonde aan vervaardiging van 'n vismeelblom, geskik vir byvoeging tot graankosse en ander produkte, is ondersoek en belowende resultate is verkry. Verskeie wysigings van die huidige metodes vir die bepaling van proteïene-, vet- en voggehalte in vismeel en -olie is ondersoek, en in verband gebring met dié wat met behulp van die offisiële metodes wat tans deur die Instituut gevolg word, verkry is.

Benewens bostaande ondersoeke was die Instituut ook verantwoordelik vir die roetine-analise van bereide produkte soos vismeel en -olie, gekonsentreerde vissag, asook van grondstowwe soos sout en tamatiepuree. Alle besendings bevrore kreefsterte bestem vir die uitvoermark is ook ondersoek. Die Nywerheid betaal afsonderlik vir alle roetinedienste.

In die loop van die jaar het die Direkteur vier maande oorseë deurgebring met die doel om spesifieke tegniese probleme te ondersoek. Tydens sy verblyf aldaar het hy navorsingsinrigtings en visserysentrums in die Verenigde Koninkryk, Skandinawië en ander lande op die Europese Vasteland besoek.

Ter afsluiting is dit aangenaam om te meld dat daar deurgaans 'n hartelike en noue samewerking tussen die Instituut en die Nywerheid bestaan het. Aansoeke om tegniese advies in verband met spesifieke tegniese probleme het aansienlik vermeerder, en navrae was ook van 'n veel hoër gehalte as in die verlede.

SUIKERMEULE-NAVORSINGSINSTITUUT

Direkteur: DR. K. DOUWES DEKKER.

Gedurende 1952 is die werk van die Instituut gekenmerk deur nouer kontak met verskeie meule en 'n beter begrip van hulle probleme wat geleidelik tot waardevolle samewerking in 'n poging om hierdie probleme op te los. Baie fabriekke oorweeg die uitbreiding van hulle kapasiteit en die Instituut is deur 'n aantal van hulle

Fish Meal

The physical and chemical factors causing self-heating of fish meal are being investigated; and recommendations designed to minimise the danger of spontaneous combustion have already been made. The possibility of manufacturing rock lobster meal, in existing fish meal plants, was demonstrated. Complete cost estimates were calculated for various systems of stick-water recovery and, as a result of recommendations to industry, trial equipment is being installed for stickwater recovery. If successful this recovery will probably be undertaken on a scale amounting to more than £600,000 p.a. Various types of hessian and paper packages for fish meal were investigated and recommendations made to the Industry. Investigations into the possibility of producing fish flour for addition to cereal and other products were conducted with very promising results. Several modifications of the present methods of analyses of fish meals and oils for protein, fat and moisture were tested and related to the official examination service provided by the Institute.

In addition to the investigational work, the Institute continued to serve the Industry in doing routine analyses of final products such as fish meal and oil, condensed fish solubles, and on raw materials such as salt and tomato puree. Inspection of frozen rock lobster tails for export was also done on all export consignments. All routine services are paid for separately by Industry.

During the year the Director spent four months overseas investigating certain specific technical problems. He visited research institutions and fishing centres in the United Kingdom, Scandinavia and other countries on the Continent.

In conclusion, it is gratifying to be able to report that the relations between Industry and the Institute remained close and cordial. The demands for technical advice on specific problems were even more numerous than in previous years, and the standard of the enquiries was again higher than hitherto.

SUGAR MILLING RESEARCH INSTITUTE

Director: DR. K. DOUWES DEKKER

The work of the Institute in 1952 might be characterised by a firmer contact with many mills, a better understanding of their problems and consequently more valuable co-operation in attempts to solve these problems. Many factories are considering extension of their capacity and the Institute was asked by a number

genader om verslae op te stel in verband met die verdienstelikheid van verskillende moontlikhede. In hierdie verslae mik die S.M.N.I. altyd na die beklemtoning van die basiese beginsels van metodes van verwerking, benutting van stoom, bou van installasies ens. Daar word egter besef dat in die praktyk, plaaslike toestande dit dikwels nodig maak om af te wyk van aanbevelings wat op sulke beginsels gebaseer is.

In die tweede helfte van die jaar het dit moontlik geword om meer aandag aan navorsing in die beperkte sin te wy en 'n aanvang is gemaak met 'n laboratorium-onderzoek na die eienskappe van Natalse sappe met spesiale aandag aan hulle reaksies tydens die suiweringsproses.

Aansienlike tyd is gewy aan stoomketelnavorsing en gegewens is by 'n aantal meule ingesamel in verband met stooktegnieke, samestelling van rookgangasse, doeltreffendheid van die stoomketel ens.

Die S.M.N.I. het ook saamgewerk aan die hersiening van die *Aanbeveelde Metodes van Skeikundige Beheer* en aan 'n ondersoek na die afvalgehalte van individuele besendings suikerriet.

Tegnologiese navorsingsitems wat onderneem is en afsonderlike vermelding verdien is: sapsuiwering deur die suur voorsuiweringsproses, voortdurende weeg van bagasse om die veselgehalte van individuele besendings suikerriet te bepaal, stoomketeltoets en verskaling van verdampers.

Navorsing na probleme i.s. sapsuiwering is op laboratoriumskaal uitgevoer. Daar is gevind dat dit nodig sou wees om te onderskei tussen totale en beskikbare silika in ru sap ten einde 'n beter begrip te kry van die suiweringsproses.

'n Nuwe wysiging van die sogenaamde versenaatmetode vir die bepaling van CaO en MgO in sap is ontwikkel en was van groot nut in suiweringsonderseke.

Ander onderwerpe wat bestudeer is, is die volgende: die persentasie afval en toppe in heelriet, die suiwerheid van die sap uit die toppe, veselbepaling in monsters suikerriet, die persentasie suikerrietwas in ru suiker en uitgeputte molasse en die ontleding van monsters suiker.

Die publikasie van weeklikse en maandelikse *Verslae oor Vervaardigingsgegewens* is voortgesit en 'n jaarlikse opsomming is opgestel vir publikasie in die „*Proceedings of the S.A. Sugar Technologists Association Congress.*”

Agt-en-sestig besoeke is deur personeellede van die Instituut by fabriek afgelê om sake van algemene aard of bepaalde probleme te bespreek. Twaalf spesiale verslae oor verskillende onderwerpe is op versoek van die meule opgestel.

In die reeks *Mededelings van die S.M.N.I.* is nog vyf verhandelinge gepubliseer en vier ander is voorgelees op die vergadering van die S.A. Sugar Technologists' Association Congress. Sewe geskifte wat oor praktiese onderwerpe handel is in die *South African Sugar Journal* gepubliseer.

of them to draw up reports on the merits of various possibilities. In these reports the S.M.R.I. always aims at stressing the basic principles of processing methods, utilisation of steam, construction of plant, etc., but it is realised that in actual cases local conditions often make it necessary to depart from recommendations based on such principles.

In the second half of the year it became possible to pay more attention to research in the more limited sense and a laboratory investigation was started into the properties of Natal juices, aiming particularly at the behaviour of Natal juices during clarification.

Considerable time was spent on boiler research and at a number of mills data were collected on firing technique, composition of flue gases, efficiency of the boiler, etc.

The S.M.R.I. also co-operated in the revision of the *Recommended Methods of Chemical Control* and in an investigation carried out by the Sugar Central Board into the trash content of individual consignments of cane.

Items of technological research which were undertaken and which should be mentioned separately are: juice clarification by the acid pre-clarification process, continuous weighing of bagasse as a means to establish the fibre content of individual consignments of cane, boiler tests and scaling of evaporator plants.

Research on juice clarification problems was carried out on laboratory scale. It was found that to understand clarification better it will be necessary to differentiate between total and available silica in raw juice.

A new modification of the so-called "versenate" method for the determination of CaO and MgO in juice was developed and proved of great use in clarification investigations.

Other subjects studied were: the percentage of trash and tops in whole cane, the purity of the juice extracted from tops, the determination of fibre in cane samples, the percentage of cane wax in raw sugar and exhaust molasses and the analysis of sugar samples.

The publication of weekly and monthly *Reports on Manufacturing Data* was continued and an annual summary was drawn up for publication in the *Proceedings of the S.A. Sugar Technologists' Association Congress.*

Sixty-eight visits were paid to factories by the staff of the Institute to discuss matters of a general nature or special problems confronting the mills at that time. Twelve special reports were drawn up at the request of mills on various subjects.

In the series *Communications from the S.M.R.I.*, five more papers were published, and four papers were read before the S.A. Sugar Technologists' Association Congress. Seven papers dealing with practical subjects were published in the *South African Sugar Journal.*

VERFNYWERHEID-NAVORSINGSINSTITUUT

Direkteur: MNR. G. M. HAMILTON.

As gevolg van 'n bykans algehele verandering in personeel, is die navorsingsprogram van die Instituut hersien en projekte wat waarskynlik nie resultate binne 'n redelike tydperk sou afwerp nie, is uitgelaat en nuwe werk van belang begin.

'n Belangrike navorsingsitem is die vergelykende blootstelling van geverfde panele aan natuurlike en versnelde verwerking. Twee blootstellingsposte is tans in gebruik, een op die dak van Howard Kollege waar dit waarskynlik aan 'n groot deel van die soutbelaaide atmosfeer ontsnap, en een naby Reunion Lughawe, waar die Buro vir Standaarde goedgegunstiglik ruimte vir 400 panele beskikbaar gestel het. Verdere fasiliteite te Pretoria en Bloemfontein is vir die Instituut aangebied en hopelik sal poste later operig word te Kaapstad, Port Elizabeth en Beaufort-Wes.

Buitelug-blootstellingstoetse word gedoen op hout-, yster- en aluminiumpanele en 'n parallele verfreeks word blootgestel aan versnelde verwerking in 'n „Atlas Twin-Arc Weatherometer.” Hierdie verweringsprogram vervul 'n tweeledige funksie, in soverre dat dit nie alleen 'n waardebeplanning moontlik maak van verfbestanddele wat in die Unie beskikbaar is en in verfvorm met ingevoerde produkte vergelyk word nie maar ook gegewens oor die korrelasie tussen natuurlike en versnelde verwerking verskaf.

Werk gaan intussen voort oor die gebruik van vis- en sonneblomsaadolie in alkiedharse en het nou die stadium bereik waar sommige van die produkte aan waardebeplanningstoetse onderwerp word.

Voltooide Navorsingsprojekte

Voltooide navorsingsprojekte sluit die volgende in :—

Sinkchromate.—Dit kon bevestig word dat chloried en dan sulfaat die mees aggressiewe ione is teen staal wat met sinkchromaat beskerm is, maar geen nuwe feite is aan die lig gebring nie.

Die Inwerking van Vogtigheid op Pigmente.—Daar is bewys dat pigmente water absorbeer in 'n atmosfeer met 'n hoë voggehalte maar die effek is so gering dat dit oor die hoof gesien kan word in die finale produk.

Onderskeidende Toetse tussen Anatase en Rutiel Titaniumdioksied.—„Technical Paper No. 5” is aan lede uitgereik en het belangstelling van buite gewek.

Jodium waardes.—„Technical Paper No. 2” is uitgereik.

Pigmentoppervlaktes.—Deel I van hierdie projek is voltooi maar verdere werk sal nog aangepak word.

Beoogde navorsing sluit in die ontwikkeling van aanwaswerende skeepsverwe en 'n ondersoek na meer doeltreffende gebruike vir kasterolie.

PAINT INDUSTRIES' RESEARCH INSTITUTE

Director: MR. G. M. HAMILTON

As a result of an almost complete change of staff, the research programme of this Institute has been reviewed and items unlikely to yield results in a reasonable time have been discontinued whilst new work of interest has been introduced.

A major item of research is the comparative exposure of painted panels to both natural and accelerated weathering. At present, outside exposure stations are in use both on the roof of Howard College, which probably escapes much of the salt-laden air, and at a site near Reunion Airport, where the Bureau of Standards has kindly made available space for 400 panels. Further facilities have also been offered to the Institute at Pretoria and Bloemfontein and it is hoped later that sites will be selected at Cape Town, Port Elizabeth and Beaufort West.

Outside exposure tests are made on panels of wood, iron and aluminium, and a parallel series of paints is subjected to accelerated weathering tests in an Atlas twin-arc Weatherometer. This weathering programme fulfils a dual function, since it makes possible not only an assessment of materials available in the Union, which are compared in paint form with imported products, but also allows an investigation of the correlation between natural and accelerated weathering.

Work continues on an investigation into marine oil and sunflower seed oil alkyds and has reached the stage where some of the products are being evaluated by weathering tests.

Completed Projects

Completed research projects have included the following :—

Zinc Chromes.—It was confirmed that chloride followed by sulphate, were the most aggressive ions against steel protected with zinc chromate, but no new facts emerged.

The Effect of Humidity on Pigments.—It has been shown that, while pigments do absorb moisture at high humidities, the effect is so small as to be considered negligible in the final product.

Distinguishing Tests Between Anatase and Rutile Titanium Dioxide.—Technical paper No. 5 has been issued to subscribers and has attracted outside interest.

Iodine Values.—Technical paper No. 2 has been issued.

Surface Area of Pigments.—Part I of this work has been completed, but further work is still to be carried out.

Projected research includes the development of marine anti-fouling paints and an investigation into better methods of utilizing castor oil.

Ten einde te verseker dat die allerbeste advies beskikbaar is op die wye gebied van toegepaste wetenskappe wat betrekking het op die verfnywerheid, het die Beheerraad besluit om 'n Naamrol van Raadgewers in te stel. Dr. D. A. Sutton van die W.N.N.R. Chemiese Navorsingslaboratorium, 'n deskundige op die gebied van die organiese skeikunde van droënde olies, het ingestem om behulpsaam te wees in hierdie verband en andere sal genader word indien nodig.

Toetswerk

Afgesien van navorsingsprojekte, word 'n aansienlike en toenemende hoeveelheid toetswerk uitgevoer vir verbruikers en produsente en die beskikbare apparaat word pal gebruik.

Biblioteek en Inligting

Die Instituut se biblioteek van tegniese en wetenskaplike publikasies is betreklik omvattend. Uittreksels uit artikels van belang word periodiek gemaak en aan lede uitgereik. Die aantal tegniese navrae ontvang, groei gestadiglik en dek 'n baie wye veld in sommige gevalle met weinig betrekking op die verfnywerheid.

Ten einde die diens aan lede te verbeter is 'n refleks fotografiese kopiëereenheid opgerig wat die Instituut in staat stel om waar nodig afdrukke van dokumente te verskaf.

Opleidingsfasiliteite

Die Instituut is gewillig om die opleiding van juniorpersoneel te onderneem en neem ook deel aan die opleidingskema wat deur die „Oil and Colour Chemists' Association" gesteun word. Mnr. T. G. Moreton van die personeel van die Instituut sal lesings gee in verftegnologie en praktiese klasse sal in die laboratoriums van die Instituut gereël word.

Nasionale Bounavorsingsinstituut

Die Verfeenheid van die Nasionale Bounavorsingsinstituut betaande uit 'n Navorsingsbeampte en assistent, is oorgeplaas na die Verfnywerheidsnavorsingsinstituut waar dit funksioneer onder die leiding van 'n Loods-komitee waarop die Direkteur dien.

In order to ensure that the best possible advice is obtained on the wide range of applied sciences pertaining to the Paint Industry, the Board of Control has agreed, where necessary, to the appointment of a panel of Consultants. Dr. D. A. Sutton of the C.S.I.R. Chemical Research Laboratories, an expert in the organic chemistry of drying oils, has agreed to serve in this capacity and others will be invited as is found necessary.

Testing Work

Apart from research projects, a considerable and increasing volume of testing work is carried out both for consumers and producers and the available equipment is in constant use.

Library Information

The Institute's library of technical and scientific publications is fairly comprehensive. Periodic abstracts are made of all articles likely to be of interest and are issued to members. The volume of technical enquiries received is growing slowly and covers the widest possible field, in some cases with little relation to the paint industry.

In order to improve the services to members, a reflex photographic copying unit has been set up, which enables the Institute, when necessary, to supply copies of documents for retention.

Training Facilities

The Institute is willing to undertake the training of junior staff and is participating in the training scheme sponsored by the Oil and Colour Chemists' Association. Mr. T. G. Moreton, on the staff of the Institute, is to lecture on Paint Technology in 1954 and practical classes will be arranged in the Institute's laboratories.

National Building Research Institute

The Paint Unit of the National Building Research Institute, comprising a Research Officer and Assistant, has been transferred to the Paint Industries' Research Institute, where it functions under the guidance of a Steering Committee, of which the Director is a member.

**SUID-AFRIKAANSE WOLTEKSTIELNAVORSINGS-
INSTITUUT**

Direkteur: MNR. R. C. PALMER.

Die Instituut is op 25 April 1953 as 'n maatskappy geïnkorporeer. Die Instituut is nou 'n selfbesturende liggaam met sy eie Beheerraad. Die huidige inkomste van die Instituut is as volg saamgestel:—

S.A. Wolraad	£5,000
Bokhaar Adviserende Raad	1,000
National Textile Manufacturers Association	500
National Association of Textile Manufacturers	500
S.A. Wool Combers Trade Association ..	500
Ander Industriële bydraes	270
	<hr/>
	£7,770
W.N.N.R. £-vir-£ subsidie	£7,670
	<hr/>
	£15,440

Die totale bogenoemde bydrae is gewaarborg vir vyf jaar. Behalwe die gemelde inkomste het die volgende liggame elk 'n ronde som bygedra tot die kapitaalkoste van apparaat vir die Instituut.

S.A. Wolraad	£5,000
W.N.N.R.	5,000
Bokhaar Adviserende Raad	1,000

Die Instituut huur van Rhodes Universiteit die eertydse Ingenieursgebou, wat 'n goeie moderne gebou is, vir 'n periode van 9 jaar en 11 maande.

Die Instituut se werk val onder drie hoofde:—

- (a) Klein toetse vir die Nywerheid.
- (b) Korttermyn-ondersoek.
- (c) Navorsing.

Onder afdeling (a) doen die Instituut kosteloos vir die ondersteuners van die Instituut toetse soos die tel van „neps,” olie-gehalte van kambande, ens., en ook dié ondersoek van foute, soos bv. die oorsprong van gate of vlekke in materiaal. Tot dusver het die Instituut 82 sulke proewe gedoen, elk waarvan twee uur tot 'n paar dae mag duur.

Onder (b) ondersoek die Instituut spesiale probleme ingestuur deur lede. Hierdie is uitsluitend korttermyn-proewe, en mag 'n paar weke of maande in beslag neem.

Die hoofsaak van die Instituut val onder (c) en behels navorsing met betrekking tot al die stadia van tekstielverwerking, vanaf die baal ru-wol tot die klaargemaakte materiaal. Met 'n beperkte personeel is dit onmoontlik om die hele veld gelyktydig aan te pak. 'n Begin is dus gemaak met enige van die vroeëre stadia van verwerking.

**SOUTH AFRICAN WOOL TEXTILE RESEARCH
INSTITUTE**

Director: MR. R. C. PALMER

The Institute became incorporated as a company on the 25th April, 1953. It is now a self-governing body with its own Board of Control. The present income of the Institute is as follows:—

S.A. Wool Board	£5,000
Mohair Advisory Board	1,000
National Textile Manufacturers Association	500
National Association of Worsted Textile Manufacturers	500
S.A. Wool Combers' Trade Association ..	500
Other Industrial Subscribers	270
	<hr/>
	£7,770
C.S.I.R. £-for-£ subsidy	7,670
	<hr/>
	£15,440

The whole of the above income is from subscriptions guaranteed for five years. In addition to the above, the following have contributed lump sums towards the capital cost of the equipment of the Institute:—

S.A. Wool Board	£5,000
C.S.I.R.	5,000
Mohair Advisory Board	1,000

The Institute has leased from Rhodes University the former Engineering Block, for a period of 9 years 11 months. This is a very suitable modern building.

The Institute's work falls into three categories:—

- (a) Small tests for the industry.
- (b) Short-term investigations.
- (c) Research.

Under heading (a) the Institute carries out, free of charge to those who support the Institute financially, such tests as nep counting, and the determination of grease contents of tops. It also investigates faults, such as finding the origin of holes or stains in a material. Thus far the Institute has carried out 82 such investigations, any one of which takes anything from two hours to two days.

Under (b) the Institute carries out investigations into special problems raised by its members. These are essentially short-term investigations and may take a few weeks or months to solve.

The main work of the Institute comes under heading (c) which embraces research into all stages of textile processing from the bale of wool to the finished cloth. With limited staff it is not possible to undertake research into the whole of this very large field immediately. A start has, therefore, been made on some of the earlier stages of processing.

Die Instituut het 'n vinnige metode vir die bepaling van die oorblywende vetgehalte van gewaste wol ontwikkel, wat groot byval onder fabrikante vind. Werk i.v.m. die vinnige bepaling van die alkali-gehalte van gewaste wol is voltooi en gereed vir publikasie. Die Instituut kry 'n spesiaal vervaardigde kleinskaalse wasmasjien. 'n Spesiale gebou word naby die Instituut opgerig waarin die masjien gehuisves sal word. Hierdie masjien sal dan dien as 'n skakel tussen die kleinskaalse laboratoriumtoetse en die volkskaalse wolwassery. 'n Masjien wat 'n nuwe idee behels vir die neem van onbevooroordeelde veselmonsters van 'n kamband is ontwerp, gebou en getoets met veelbelowende resultate. Heelwat werk is alreeds deur die Instituut gedoen i.v.m. die teorie van sajettuitrekking. Groot skaalse proewe is in fabriek uitgevoer om die teorie op die proef te stel. Hierdie werk het aanleiding gegee tot die skryf van 'n hele paar artikels, waarvan sommige in die pers is. Die teorie het 'n praktiese toepassing in soverre dat dit in sekere gevalle moontlik is om net van die klaargemaakte draad vas te stel watter masjien in die uittrekkingsproses nie goed gewerk het nie. Navorsing na oneweredighede in die karding en spinprosesse, in die klerenwyerheid, het 'n aanvang geneem. 'n Teorie vir die oorsprong van die differensieële friksie-effek van wol, is ontwikkel, en sal eersdaags gepubliseer word. Hierdie teorie gee blykbaar 'n beter verklaring van die eksperimentele gegewens as enige van die teorieë wat reeds opgestel is.

NAVORSINGSEENHEID VIR BITUMINEUSE BINDSTOF

Direkteur: DR. P. R. RIGDEN.

Die Eenheid is in 1950 gestig om navorsing te doen na probleme in verband met die gebruik van Suid-Afrikaanse bindstowwe vir die bolae van paaie en vliegveldde. Die Eenheid word onderhou deur gewaarborgde bydraes deur die verskillende pad-owerhede, bindstof-vervaardigers, die W.N.N.R. en ander. Aktiewe navorsing het in 1951 'n aanvang geneem. Die werk is gelyktydig langs twee rigtings aangepak; eerstens van uit die laboratorium en tweedens van die pad self.

In die laboratorium is die doel om metodes te vind waardeur die duursaamheid van Suid-Afrikaanse bindstowwe (hoë temperatuur koolteer en skalieolie bitumens) verbeter kan word. Dit word gebaseer op studies van die meganika van die agteruitgang van bindstowwe op die paaie. Sorgvuldig beheerde padeksperimente is op groot skaal deur die ingenieurs onderneem om die prestasie van verskillende soorte bindstof te vergelyk en om vas te stel watter gevolge die verskillende tegnieke het op die resultate wat behaal word, bv. in oppervlaks-behandeling, die uitwerking van die tempo van die verspreidings van die bindstof, die grootte en tipe klip wat gebruik word en die hewigheid van die verkeer.

The Institute has developed a rapid method of measuring the residual grease content of scoured wool and this has proved quite popular with manufacturers. Work on a rapid method of determining the alkali content of scoured wool has been completed and is ready for publication. The Institute is acquiring a specially made pilot scale wool washing set, which will be housed in a specially built shed near the Institute. This will be used as a link between laboratory-scale and the full-scale research in wool washing. A machine, new in conception, for taking an unbiased sample of fibres from a top has been designed, made and tested, and promises to work well. A good deal of work has been done by the Institute on the theory of worsted drawing. Large-scale experiments have been carried out in factories to verify the theory. This work has led to the preparation of a number of papers, some of which are in the press. The theory has proved to have a practical application in that it enables one, in certain cases, to locate a badly-working drawing frame from an examination of nothing but the finished yarn. The investigation of irregularities in woollen carding and spinning has been started. A theory of the origin of the differential friction effect of wool, which seems to fit published data better than any theory hitherto produced, has been developed and is being prepared for publication.

BITUMINOUS BINDER RESEARCH UNIT

Director: DR. P. R. RIGDEN

The Unit was set up in 1950 to carry out research into problems associated with the use of South African-produced binders in bituminous surfacings for roads and airfields. The Unit is supported by guaranteed contributions from the various road authorities, the binder producers, the C.S.I.R. and others. Active research was commenced in 1951. Two parallel lines of attack on the problem have been used since this work commenced—firstly in the laboratory, and secondly in the field. In the laboratory the aim is to find methods of improving the durability of the South African-produced binders, the high-temperature coal tars and the shale-oil bitumens, based on studies of the mechanism of deterioration on the road. On the engineering or field side, carefully controlled full-scale road experiments have been laid to compare the performance of different types of binder and to find the influence of the different techniques used on the results obtained, e.g., in surface treatments, the effects of the rate of spread of binder, the size and type of stone and the traffic intensity.

Laboratoriumwerk in verband met Teer en Skalieolie

Gedurende die afgelope jaar het die laboratorium baie aandag daaraan geskenk om metodes te vind om die vlugtigheidseienskappe van Yskorteer te verbeter aangesien dit nou aan die lig gekom het dat indien die vlugtigheid van die plastiserende olies in teer verlaag kan word, dit 'n aansienlike verbetering in die prestasie van hierdie teer op die pad sal meebring. Verskillende metodes is aangewend met inbegrip van spesiale plaasvervangende plastiseermiddels met 'n lae vlugtigheid. Veelbelowende resultate is egter behaal deur die gebruik van spesiale swaar oliefraksies wat deur die Yskorwerke berei is, verbind met 'n ietwat harder basis as wat normaalweg vir die vervaardiging van teer gebruik word. 'n Aantal van hierdie spesiale bindstowwe word deur Yskor gebruik vir 'n padtoets waardeur die lewensduur wat deur hierdie bindstowwe verskaf word, vergelyk word met dié wat met gewone teer en ingevoerde bitumineuse stowwe bereik word.

Werk in verband met die probleem i.s. die bevordering van skalie-olie bitumens is ook voortgesit. In hierdie geval het die werk van die Eenheid daarop gedui dat oksidasie die oorheersende faktor is by die buitensporige hardwording daarvan tydens gebruik. Aandag is ook geskenk aan die soort bestanddeel in bitumen wat vir hierdie reaksie verantwoordelik is. 'n Belowende metode waardeur vatbaarheid vir oksidasie verminder word deur hittebehandeling met swawelsuur blyk nou van weinig waarde te wees aangesien die verbeterde bitumen onbestendig is by die temperature waarby dit gewoonlik opgeberg of gebruik word. Dit lyk asof die enigste oplossing van hierdie probleem lê in die verklaring van die oksidasieproses. Werk langs hierdie rigtings word voortgesit.

Grootskaalse Padeksperimente

Gedurende die afgelope jaar was die belangrikste poging wat die praktiese sy van die werk betref, die uitvoer van 'n omvattende volskaalse padeksperiment wat vroeg in 1953 onderneem is met voorafvermengde bolaagstowwe. 'n Totaal van 220 verskillende samestellings van bolaagstowwe, saamgepers tot 'n dikte van 3-duim is op vier myl van die nuwe pad tussen Pretoria en Kempton Park gelê. Die doel van hierdie proef is om 'n vergelyking te tref tussen die prestasie van Suid-Afrikaanse en ingevoerde bindstowwe in 'n verskeidenheid soorte van voorafvermengde bolae en ook om uit die gesistematiseerde samestellings van veranderlike gegewens te kry wat sal help vir die toekomstige ontwerp van hierdie soort bolaag.

Twee of drie jaar sal waarskynlik verloop alvorens enige bruikbare resultate van hierdie proef verwag kan word maar die sistematiese metode van ontwerp wat gebruik word, behoort 'n mens in staat te stel om nuttige gevolgtrekkings te maak lank voordat die uiteindelige verval van die bolaag plaasvind.

Laboratory Work on Tar and Shale-Oil Bitumen

During the past year much of the effort on the laboratory side has been devoted to finding methods of improving the volatility characteristics of Iscor tars, since the Unit's work has now shown that, if the volatility of the plasticising oils in tar can be reduced, a considerable improvement in performance on the road should be obtained. Various ways of doing this have been tried, including the use of special substitute plasticisers of low volatility. However, very promising results have been found from the use of special heavy oil fractions prepared by the Iscor Works, combined with a somewhat harder base than is normally used for tar production. A number of these special binders are being produced by the works for a road test to compare the life given by these binders with that obtained with normal production tars and with imported bitumens.

Work on the problem of improving the durability of shale-oil bitumen has also been continued. In this case the Unit's work has indicated that oxidation is the predominant factor in causing undue hardening in service, and attention has been given to finding what types of constituent present in the bitumen are responsible for this behaviour. A promising method of reducing oxidation susceptibility, involving heat treatment with sulphuric acid, has now been shown to be of little value as the improved bitumen is not stable at temperatures at which it is commonly stored or used. The only hope of a solution to this problem appears to be in the elucidation of the oxidation mechanism and work on these lines is being continued.

Full-Scale Road Experiments

The main effort during the past year on the practical side has been the laying of a comprehensive full-scale road experiment early in 1953 with premixed surfacing materials. A total of 220 different compositions of wearing course material, compacted to 3-inch thickness, was laid on a four-mile length of the new Pretoria-Kempton Park road. The object of this experiment is to compare the performance of South Africa-produced and imported binders in a variety of types of premix surfacing, and also to obtain from the road, systematic data on the influence of the different composition variables to help in the future design of this type of surfacing.

Two or three years must probably elapse before any useful results can be expected from this experiment, but the systematic method of design employed should enable useful conclusions to be drawn long before the ultimate life of the surfacings is reached.

Mediese Navorsing

Ere-Adviseur: PROF. S. F. OOSTHUIZEN

Komitees

Die Mediese en Tandheelkundige Navorsingskomitee het nog 'n jaar van waardevolle diens aan die W.N.N.R. gelewer waarvoor die Raad hulle baie dank verskuldig is. Prof. J. F. Brock en prof. M. van den Ende het einde 1952 bedank as lede van die komitee en was ingevolge die bepalings van die konstitusie nie herkiesbaar nie. Hulle plekke is ingeneem deur majoor-generaal A. J. Orenstein, Hoof-gesondheidsbeampte, Randmyne Bpk., en prof. J. T. Irving van die Department Fisiologie, Universiteit Kaapstad, onderskeidelik. Dr. G. W. Gale, Dekaan van die Mediese Fakulteit, Universiteit van Natal, het ingestem om op te tree as plaasvervangende lid van die komitee.

Die volgende adviserende onderkomitees het gedurende die jaar vergader en die Raad is dankbaar vir die waardevolle hulp en raad wat van lede van hierdie komitees ontvang is :—

- Onderkomitee vir Amebiase-navorsing.
- Onderkomitee vir Bilharzia-navorsing.
- Onderkomitee vir Kardio-Pulmonale Navorsing.
- Beherende Komitee van die Tandheelkundige Navorsingseenheid.
- Onderkomitee vir Navorsing na Menslike Biochemie.
- Beherende Komitee van die Voedingsnavorsingseenheid.
- Onderkomitee vir Teringnavorsing.

Skakel

Dr. Graham Bull en dr. Robert M. Kark, ere mediese skakelbeamptes van die Raad onderskeidelik in die Verenigde Koninkryk en die Verenigde State het waardevolle hulp aan mediese en tandheelkundige navorsingswerkers in Suid-Afrika geskenk deur hulle verslag aan die W.N.N.R. oor ontwikkelings op die gebied van mediese en tandheelkundige navorsing in Groot Brittanje en Amerika. Die Raad is baie dank aan hulle verskuldig vir hulle diens.

Die skakel met navorsingsinrigtings en werkers in gebiede van Afrika is volgehou. Gedurende Julie 1953, het prof. Oosthuizen, Ere-Adviseur van die W.N.N.R., aangaande Mediese en Tandheelkundige Navorsing, 'n besoek gebring aan Europa, die Verenigde State van Amerika en Jamaica ten einde die jongste ontwikkelings op die gebied van mediese navorsing daar te bestudeer. Die inligting wat hy sodoende ingewin het, is aangestuur na die Raad se mediese navorsingseenhede.

Medical Research

Hon. Adviser: PROF. S. F. OOSTHUIZEN

Committees

The Medical and Dental Research Committee has given the C.S.I.R. another year of valuable service for which the Council is again greatly indebted. Professor J. F. Brock and Professor M. van den Ende relinquished membership of the committee at the end of 1952 and in accordance with the committee's constitution were not eligible for re-election for one year. Their places were taken respectively by Major-General A. J. Orenstein, Chief Health Officer, Rand Mines Ltd., and Professor J. T. Irving of the Department of Physiology, University of Cape Town. Dr. G. W. Gale, Dean of the Medical Faculty, University of Natal, agreed to act as an alternate member of the committee.

The following advisory sub-committees met during the year and the Council is grateful to members of these committees for their valuable help and advice :—

- Amoebiasis Research Sub-committee.
- Bilharzia Research Sub-committee.
- Cardio-Pulmonary Research Sub-committee.
- Controlling Committee of the Dental Research Unit.
- Human Biochemistry Research Sub-committee.
- Controlling Committee of the Nutrition Research Unit.
- Tuberculosis Research Sub-committee.

Liaison

Dr. Graham Bull and Dr. Robert M. Kark, the Council's honorary medical liaison officers in the United Kingdom and the United States respectively, have continued to give valuable help to medical and dental research workers in South Africa by reporting to the C.S.I.R. on developments in the field of medical and dental research in Great Britain and America. The Council is grateful to them for this service.

Liaison has been maintained with research institutions and workers in African territories. During July, 1953, Professor Oosthuizen, Honorary Adviser to the C.S.I.R. on Medical and Dental Research, visited Europe, the United States of America and Jamaica to study the latest medical research developments there. The information gathered by him has been passed to the Council's medical research units.

Administrasie

Gedurende die jaar het prof. J. Barnetson vriendelik toegestem om prof. Oosthuizen by te staan in sy werk as Adviseur van die W.N.N.R. op die gebied van Mediese en Tandheelkundige Navorsing en het baie waardevolle werk in hierdie hoedanigheid verrig.

Sowat £67,000 is gedurende die boekjaar 1953/54 toegeken vir mediese en tandheelkundige navorsing. Ongeveer £14,500 is toegewys aan individuele mediese en tandheelkundige navorsingswerkers by Universiteite, £7,500 aan die Suid-Afrikaanse Instituut vir Mediese Navorsing en sowat £43,000 aan mediese navorsings-eenhede. 'n Geringe som geld is bestee aan reis- en onderhoudskoste deur die adviseurs van die Raad en lede van mediese advieskomitees.

Skenkings

Met dank erken die Raad skenkings ter waarde van £32 8s.—wat ontvang is vir teringnavorsing by die Teringnavorsingseenheid, Durban.

Tandheelkundige Navorsing

Die Universiteit van Witwatersrand en die Raad het toegestem tot die stigting van 'n gesamentlike Tandheelkundige Navorsingseenheid in die Tandheelkundige Skool van die Universiteit. Prof. J. T. Irving is aangestel as direkteur van die eenheid wat vanaf 1 Februarie 1954 in werking sal tree. 'n Gesamentlike komitee is aangestel om die eenheid te beheer.

Bilharzia-navorsing

Die Raad betuig sy dank teenoor die Transvaalse Provinsiale Administrasie vir 'n jaarlikse skenking van £1,500 vir navorsing op die probleme van bilharzia. Die fondse sal aangewend word vir die aanstelling van 'n waterbioloog om in die Bilharzia-Natuurgeskiedenis-eenheid by die Suid-Afrikaanse Instituut vir Mediese Navorsing te werk. Die beampte wat op 2 Januarie 1954 diens aanvaar, sal die bionomie, ekologie en fisiologie van die slakgashere bestudeer.

Spesiale komitee vir die hersiening van mediese eenhede

'n Spesiale Komitee is deur die Raad aangestel om die mediese navorsingseenhede te hersien wat vir die afgelope vyf jaar deur die Raad gesteun is. Die opdrag aan die komitee was soos volg :—

- (1) dat die organisasie en vordering van die bestaande mediese navorsingseenhede aan 'n kritiese ondersoek onderwerp moet word en dat die Raad advies moet ontvang i.s. die wenslikheid om hulle werksaamhede voort te sit, uit te brei of in te kort.
- (2) dat die werksvoorwaardes van die professionele en tegniese personeel van die mediese navorsingseenhede ondersoek word en aanbevelings gemaak

Administration

During the year Professor J. Barnetson kindly agreed to assist Professor Oosthuizen in his work as Adviser to the C.S.I.R. on Medical and Dental Research and has done much valuable work in this capacity.

About £67,000 was allocated for medical and dental research during the financial year 1953/54, some £14,500 being allocated to individual medical and dental research workers at Universities, £7,500 to the South African Institute for Medical Research and about £43,000 to medical research units. A small sum was spent on travelling and subsistence by the Council's advisers and members of medical advisory committees.

Donations

The Council acknowledges with thanks donations amounting to £32 8s. 0d. for tuberculosis research in the Tuberculosis Research Unit in Durban.

Dental Research

The University of the Witwatersrand and the Council agreed to the joint establishment of a Dental Research Unit in the University's Dental School. Professor J. T. Irving was appointed director of the unit, which will function as from the 1st February, 1954. A joint committee has been appointed to control the unit.

Bilharzia Research

The Council thanks the Transvaal Provincial Administration for providing an annual grant of £1,500 for research on the problems of bilharzia. The funds will be used to appoint a water biologist to work in the Bilharzia Natural History Unit at the South African Institute for Medical Research. The officer, who will assume duty on the 2nd January, 1954, will study the bionomics, ecology and physiology of the snail hosts.

Special Committee Which Reviewed Medical Units

A special committee was appointed by Council to review the medical research units which it has supported for the past five years. The terms of reference of the committee were :—

- (i) to examine critically the organization and progress of the existing medical research units, and to advise the Council whether to continue, expand, or restrict their activities ;
- (ii) to examine the terms of employment of the professional and technical staff of the medical research units and to make recommendations

word aangaande onafgebroke diens, die verskaffing van voorsieningsfonds-fasiliteite en toelae betaalbaar aan lede van die personeel ;

- (3) dat verslag gedoen word van enigiets anders wat deur die komitee as wenslik beskou word vir die bevordering van mediese navorsing.

Die volgende lede het op die komitee gedien :—

Dr. P. J. du Toit (*Voorsitter*), Adviseur van die President, W.N.N.R.

Dr. T. B. Davie, Prinsipaal van die Universiteit van Kaapstad.

Majoor-Generaal A. J. Orenstein, Hoof-gesondheidsbeampte, Randmyne Bpk.

Prof. S. F. Oosthuizen, Professor van Radiologie, Universiteit van Pretoria.

Prof. J. Barnetson, Direkteur van die Patologiese Instituut, Universiteit van Pretoria.

Die verslag van die komitee is deur die Raad aanvaar en sal 'n waardevolle gids wees in die voorsiening van toekomstige steun aan mediese en tandheelkundige navorsing in Suid-Afrika. Die Raad betuig sy dank teenoor die lede van die komitee vir die tyd wat hulle daaraan gewy het en vir hulle waardevolle advies.

Mediese navorsingseenhede

Verslae deur die direkteur van die mediese navorsingseenhede verskyn in die volgende afdelings: die bystand van Regerings- en Provinsiale owerhede, die Suid-Afrikaanse Instituut vir Mediese Navorsing en individue wat tot die werk bygedra het, word met dank erken.

AMEBIASENAVORSINGSEENHEID, DURBAN

Hoof van die Eenheid: DR. R. ELSDON-DEW

Huisvesting

Die Eenheid word nog by die Koning Edward VIII-hospitaal gehuisves wat die kliniese materiaal voorsien. Die Afdeling vir Geneeskundige Proewe het 'n saal wat spesiaal vir hulle werk afgesonder is, en die laboratorium is ingeskakel by die Natalse Provinsiale Laboratoriumdiens by die Hospitaal. Daar is noue samewerking tussen die Eenheid en alle afdelings van die laboratorium en die hospitaal.

Geneeskundige Proewe

'n Gestadige stroom publikasies kom van hierdie afdeling en hulle is baie gesog by redakteurs. Die grootste probleem is egter die behartiging van versoeke van vervaardigers en ondersoekers van ander plekke om hulle produkte uit te toets. Dit het so erg geword dat die Eenheid verplig was om enige bykomende proewe te weier tot aan die einde van die jaar.

regarding continuity of service of the staff, the provision of provident fund facilities and the allowances payable to them ;

- (iii) to report on anything else which the committee considered desirable to foster medical research.

The following members served on the committee :—

Dr. P. J. du Toit (*Chairman*), Adviser to the President, C.S.I.R.

Dr. T. B. Davie, Principal of the University of Cape Town.

Maj.-Gen. A. J. Orenstein, Chief Health Officer, Rand Mines Ltd.

Prof. S. F. Oosthuizen, Professor of Radiology, University of Pretoria.

Prof. J. Barnetson, Director, Institute of Pathology, University of Pretoria.

The report of the committee was accepted by the Council and will be a valuable guide to it in providing support in future for medical and dental research in South Africa. The Council thanks the members of the committee for the time they devoted to the work and for their valuable advice.

Medical Research Units

Reports by the directors 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 and individuals, who have co-operated in this work, is gratefully acknowledged.

AMOEBIASIS RESEARCH UNIT, DURBAN

Head of the Unit: DR. R. ELSDON-DEW

Accommodation

The Unit is still housed at King Edward VIII Hospital which supplies the clinical material. The Therapeutic Trials Section has a ward set aside for their work and the laboratory is integrated with the Natal Provincial Laboratory Service laboratory at the Hospital. There is complete liaison with all departments of the laboratory and of the hospital.

Therapeutic Trials

A steady stream of publications comes from this section and these are eagerly sought by editors. The main difficulty is to cope with the requests of manufacturers and experimenters elsewhere for tests on their products: so much so, that the Unit has had to refuse to undertake any additional trials until the end of the year.

Opnames

Gedurende die jaar is 'n opname van die ingewandsfauna van die inwoners van Cato Manor en Chesterville met behulp van die Departement van Stadsgegesondheid voltooi. Die uitwerking van die beter behuising kan waargeneem word in die daling van die voorkoms van Metazoa maar aangesien die Protozoa hulle siklusse in die ingewande voltooi, bly mense wat dit alreeds het, daarmee besmet.

'n Opname van plaaslike waterbronne het 'n aanvang geneem. Die doel hiervan is om die bronne van besmetting te vind. Dit is meer as 'n blote veronderstelling dat besmette water 'n rol speel by die verspreiding van die toestand. Proefstelle het daarop gedui dat 'n bevredigende herwinning van parasiete verwag kan word van die groot monsters wat gebruik word.

Laboratoriumondersoeke

Werk in verband met die bereiding van monobakteriese kulture duur voort. Faktore wat verantwoordelik is vir mislukkings met komplement-bindingsantigene word gesoek.

Pogings om elektrotaksis in die Amoeba te konstateer soos in die geval van die *Balantidium* het misluk. Die situasies is egter nie heeltemal parallel nie aangesien die amoeba 'n kriuper is teenoor die vry-swemmende balantidia.

Studies oor die werking van die oorsaak van die indringende fase van *E. histolytica* duur voort. Amoebae vereis blykbaar sekere fisiese toestande wat moontlik verwant is aan 'n enseemstelsel wat deur die medepligtige bakterieë verskaf word—voordat hulle kan vermeerder of indring. 'n Eksperimentele „polograaf” is gebou om suurstofverbruik te bestudeer as 'n inhoudsopgawe van hierdie toestande. Die verlaagde toestande wat in Amebiese etter heers, word bestudeer.

Algemeen

Die algemene prentjie van Amebiasis begin nou duideliker te word hoewel daar nog baie aan gedoen moet word. Ons huidige ontwerp is soos volg: Amebiasis—d.w.s. besmetting met *Entamoeba histolytica* is wydverspreid en hoewel dit effens meer voorkom in tropiese gebiede is daar tog 'n aansienlike aantal mense in die gematigde gebiede wat daarmee besmet is. Die raming vir Groot-Brittanje is bv. 5 persent—'n syfer wat nie veel verskil van dié vir ons Natalse Naturelle nie. Plaaslik is daar maar 'n geringe verandering in die voorkoms tussen die plattelandse Naturel wat nie dikwels hierdie siekte kry nie en die Durbanse Naturel wat dit in so 'n skielike en akute vorm kry dat dit byna ongeëwenaard is. Indiërs en Blankes in Durban toon nie hierdie akute siekte nie.

Amebiasis is een van die toestande wat dikwels verkeerd diagnoseer word; eerstens vanuit die oogpunt

Surveys

During the year a survey of the intestinal fauna of the inhabitants of Cato Manor and of Chesterville was completed with the assistance of the City Health Department. The effect of better housing was to be seen in the drop in incidence of the Metazoa but, as the Protozoa complete their cycles in the bowel, people already infected remained so.

A survey of local sources of water has been commenced. This aims at finding the sources of infection. There is more than a suggestion that contaminated water plays some part in the dissemination of the condition. Experimental batches have indicated that a satisfactory recovery of parasites may be expected from the large samples being used.

Laboratory Investigations

Work on the preparation of monobacterial cultures continues. Factors responsible for failures with complement fixation antigens are being sought.

Attempts to establish electrotaxis in Amoeba, as was done for *Balantidium*, failed. The position is not quite parallel as amoebae are crawlers as against the free swimming balantidia.

Studies of the mechanism of the cause of the invasive phase of *E. histolytica* continue. Amoebae appear to require certain physical conditions, possibly related to an enzyme system supplied by the associated bacteria, before they can multiply or invade. An experimental “Polarograph” has been constructed to study oxygen consumption as an index to these conditions. The reduced conditions holding in Amoebic pus are being studied.

General

The general picture of Amoebiasis is beginning to appear, though much remains to be done. Our present concept is as follows:—

Amoebiasis, that is infestation with *Entamoeba histolytica*, is world-wide and though the incidence in tropical areas is slightly higher, an appreciable number of people are infected with the parasite even in the temperate zones. The estimate for Great Britain, for example, is 5 per cent.—a figure not differing greatly from that for our natives in Natal. Locally there is but a slight change in the incidence as between the rural Native who does not frequently get the disease and the Durban Native who gets the disease in a form so fulminant and acute as to be almost unparalleled. Indians and Europeans in Durban do not show the acute disease.

Amoebiasis is one of the most frequently misdiagnosed conditions, firstly from the point of the parasite and

van die parasiet en tweedens vanuit die oogpunt van die verantwoordelikheid van die parasiet vir die toestand waarin die pasiënt verkeer. Om hierdie punte verder te verduidelik: in die eerste instansie word die parasiet meer dikwels verkeerd gediagnoseer as enige ander potensiële patoogeen; in die tweede plek is daar maar slegs 'n paar ware tekens van indringing deur Amoebae, —dikdermontsteking, sweer aan die lewer en 'n paar ongewone komplikasies. Die feit dat 'n pasiënt 'n amoeba in sy ingewande het, beteken nog nie dat hy aan 'n siekte ly nie—die amoeba mag slegs as 'n kommensaalorganisme bestaan en weinig kwaad doen. Hieruit moet egter nie afgelei word dat die Amoeba skadeloos is nie. Onder sekere omstandighede dring die Amoeba die weefsels binne en vernietig die ingewande en lewer soos in die geval van ons Naturelle. In die eerste opname wat deur die Eenheid gemaak is was die sterfesyfer onder Naturelle in die hospitaal oor die 10 persent. Met moderne geneeskunde egter is dit nou 1 persent, meestal pasiënte wat in 'n gevorderde stadium van die siekte by die hospitaal aankom. Dit is duidelik dat ons hier te doen het met ware siekte en 'n beter waarderung van die toestand is een van die eerste vereistes.

Waarom kry die stedelike Naturel die siekte terwyl die plattelandse Naturel, die Indiër en die Blanke dit vryspring? Dit is ongetwyfeld 'n kwessie van dieet. Proewe waarby 'n Blanke, Indiër en 'n Naturellediet op rotte toegepas is, het getoon dat hoe fyner die koolhidraat, hoe hoër die voorkoms van siekte onder besmette diere. Die rotte is die gelyke van die Naturelle wat na die stede kom en op die sogenaamde „bolletjie en limonade” dieet bestaan.

E. histolytica is afhanklik van ander organismes vir 'n sekere fase in sy metabolisme—dit kan nie alleen leef nie. Die geskikte bakterieë moet *in vitro* aanwesig wees en dit lyk asof dieselfde vir die ingewande geld. In die lewer egter, blyk dit dat die geskikte omstandighede deur die gasheer verskaf word. Ons ondervinding aangaande die geneeskundige sy bevestig dat verwydering van die bakterieë uit die ingewande, ook die Amoeba verwyder. Aangesien baie verskillende soorte bakterieë die nodige faktore kan verskaf, is dit noodsaaklik om 'n veelsydige antibiotiese middel te gebruik of 'n samestelling van antibakteriese middels om soveel van die spesies as moontlik te verwyder. Dit lyk waarskynlik dat die verandering in dieet 'n verandering van flora meebring—tot soorte wat gunstig is vir die Amoeba.

Erkennings

Die Raad wil graag sy dank betuig teenoor die volgende liggame en persone :—

Die Natalse Provinsiale Administrasie vir huisvesting, personeel, fasiliteite en milde samewerking,

secondly from the point of the responsibility of the parasite for the condition with which the patient presents. To enlarge on these points; firstly, the parasite is more often misdiagnosed than is any other potential pathogen; secondly, there are but few true manifestations of invasion by Amoebae,—colitis, liver abscess and a few rare complications. Because a patient has an amoeba in his bowel does not mean that he has a disease—that amoeba may well be living as a commensal and causing but little harm. It must not, however, be imagined from this that the Amoeba is harmless. Under certain circumstances the Amoeba invades the tissues, destroying the bowel, the liver and the patient, as is evidenced by our Natives. In the first survey carried out by the Unit the death rate in Natives was over 10 per cent. in the hospital. With modern therapy, however, this is now of the order of 1 per cent., mostly patients with the condition in an advanced state on their arrival in hospital. It is apparent that here the true disease has to be dealt with and a better appreciation of the condition is a first requisite.

Why is it that the urban Native gets the disease, where the rural Native, the Indian and the European do not? It is obviously a question of diet. Experiments using a European, an Indian and a Native diet on rats showed that the European carbohydrate favoured the Amoeba, the more refined the carbohydrates the higher the incidence of disease in infected animals. These rats are paralleled by the Native coming to the towns and subsisting on what has been called the “bun and lemonade” diet.

E. histolytica is dependent on other organisms for some phase in its metabolism—it cannot live alone—*in vitro* the appropriate bacteria must be present and it seems that the same applies in the bowel. In the liver, however, the appropriate conditions appear to be supplied by the host. Experience on the therapeutic side confirms that removal of these bacteria from the bowel likewise removes the Amoeba. As many different species of bacteria can supply the necessary factors, it is necessary to use a wide-spectrum antibiotic or a combination of antibacterial agents to remove as many species as possible. It seems probable that the change of diet causes a change of flora to varieties favourable to the Amoeba.

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The Council has to place on record its thanks to the following bodies and individuals :—

The Natal Provincial Administration for accommodation, staff, facilities and unstinted co-operation

Die Departemente van Naturellesake en Gesondheid van die Korporasie van die Stad Durban vir samewerking en fasiliteite,

Die Lede van die Amoebiasenavorsingskomitee wat altyd bereid was om ons met raad en hulp by te staan, en

Die Personeelkomitee van die Koning Edward VIII-hospitaal sonder wie se samewerking die insameling van kliniese materiaal wat ons gebruik, onmoontlik sou gewees het.

BILHARZIA-NATUURGESKIEDENISEENHEID, JOHANNESBURG

Die Hoof van die Eenheid: DR. B. DE MEILLON
Suid-Afrikaanse Instituut vir Mediese Navorsing

Ekperimentele Bilharzia in Laboratoriumdiere

Ape

'n Totaal van 40 is soos volg daarmee besmet vir verskillende doeleindes:—

- (a) Tien is bloedgelaat met tussenpose van veertien dae vir waarnemings i.v.m. die funksie van die lewer, bloedtellings en komplementbinding. Boonop is 'n weeklikse lewerbiopsie op twee ape uitgevoer.
- (b) Agt wat met *mansoni* besmet is, is daaropvolgend blootgestel aan besmetting met *B. bovis*. Eiers van beide soorte is ten slotte herwin van hulle uitwerpsel wat getoon het dat die eerste besmetting geen immuniteit aan die tweede verleen het nie.
- (c) 'n Swanger aap is blootbestel aan besmetting en het drie weke voor die geboorte van die baba begin om eiers af te bring. Die baba is vyf dae na die geboorte oorlede, voordat enige proewe op hom uitgevoer kon word. Die organe van hierdie aap is nog nie histologies ondersoek nie. Die proef sal egter herhaal word.
- (d) 'n Ongespeende baba-aap is blootgestel aan besmetting. Sy komplementbindingstoets het 4 weke later positief geword terwyl eiers 50 dae na besmetting in die ontlasting verskyn het. Elf dae later is hy dood en volwasse wurms is in sy lewer en mesenteriele vate gevind. Hierdie proef toon dat teenstrydig met sommige ander parasitiese siektes, geen passiewe immuniteit van die moeder na die kleintjie oorgedra word nie.
- (e) 'n Aap is op suksesvolle wyse met *B. haematobium* besmet. Eiers het slegs in die ontlasting voorgekom en nie in die urine nie. Die dier het onder narkose beswyk terwyl sistoskopies uitgevoer is. Geen letsels is aan die blaas gevind nie. By die vertering van die inwendige organe is talryke eiers in die dermwand en longe gevind. Hierdie proef toon

The Native Affairs Department and Health Departments of the Corporation of the City of Durban for co-operation and facilities,

The Members of the Amoebiasis Research Committee who have always been prepared to give advice and help when asked, and

The Staff Committee of King Edward VIII Hospital, without whose co-operation it would be impossible to collect the clinical material we use.

BILHARZIA NATURAL HISTORY UNIT, JOHANNESBURG

The Head of the Unit: DR. B. DE MEILLON
South African Institute for Medical Research

Experimental Bilharziasis in Laboratory Animals

Monkeys

A total of 40 have been infected for various purposes as follows:—

- (a) Ten have been bled at fortnightly intervals for observations on liver function, blood count and complement fixation. In addition a weekly liver biopsy was performed on two monkeys.
- (b) Eight infected with *mansoni* were subsequently exposed to infection with *B. bovis*. Ova of both species were eventually recovered from the faeces showing that the first infection conferred no immunity to the second.
- (c) A pregnant monkey was exposed to infection and she began to pass ova three weeks before the birth of the baby. The latter died five days after birth and before any tests could be made on it. The organs of this monkey have not yet been examined histologically. This experiment will be repeated.
- (d) An unweaned baby monkey was exposed to infection. Its complement fixation test became positive 4 weeks later and ova appeared in the stool 50 days after infection. Eleven days later it died and adult worms were found in its liver and mesenteric veins. This experiment shows that unlike some other parasitic diseases no passive immunity is passed from mother to young.
- (e) A monkey was successfully infected with *B. haematobium*. Ova appeared in the stool only and not in the urine. This animal died under anaesthetic while cytoscopy was being performed. No bladder lesions were found. On digestion of the internal organs numerous ova were found in the intestinal wall and the lungs.

dat 'n laboratoriumlyn van die parasiet vir proefdoeleindes onderhou kan word indien nodig. Daar sal onthou word dat muisse tot dusver nutteloos gebyk het vir hierdie doel.

- (f) Agt ape is herhaalde male herbesmet met tussenpose vir waarneming aangaande lewerpatologie.
- (g) Pogings om besmette ape met atebrien of fuodien te genees, het misluk.
- (h) Organe van besmette ape wat beswyk, word gereeld verteer en die neerslae word ondersoek vir bilharzia-eiers. Die verspreiding van die eiers in die inwendige organe van 17 diere tot op datum was soos volg: dermwand 17, long 8, nier 4, milt 2, brein 0.

Muisse

- (a) Pogings om besmette muisse met atebrien te genees of besmetting te voorkom deur die gebruik van atebrien as voorbehoedmiddel het misluk. Die Eenheid is op die oomblik besig om 'n nuwe middel antimoon tri-(n-dodesielmerkaptied) uit te toets wat goedgunstiglik deur die Abbott-laboratoriums verskaf is. Amerika maak aanspraak daarop dat hulle volslae sukses met hierdie middel gehad het in die behandeling van muisse.
- (b) Vir 'n studie van die veranderinge in lewerpatologie by muisse as gevolg van ouderdom of besmetting, is 104 van hulle besmet en word met tussenpose van veertien dae doodgemaak. Hierdie materiaal word gebruik om die studie van veranderinge in die lewer te steun soos openbaar word deur die weeklikse biopsies wat op bobbejane uitgevoer word.

'n Interessante bevinding by een van die muisse was die ontwikkeling van 'n kwaadaardige neoplasma, waarskynlik sarkoom, in die lewer. Die muis was vir drie maande lank besmet. Dit lyk asof daar 'n definitiewe korrelasie tussen die plek van oorsprong van hierdie neoplasma en die bilharzialetsels bestaan.

Marmotjies en Rotte

Ten einde hulle met ape en muisse te vergelyk, is marmotjies en rotte blootgestel aan besmetting. Rotte is skynbaar daarteen bestand. Dit is uiters ongelukkig aangesien die plan was om hierdie diere te gebruik vir 'n studie van die uitwerking van ontoereikende dieet op lewerpatologie. Marmotjies word gereedelik besmet maar toon so 'n geringe reaksie dat hulle nie gebruik word nie.

Bilharzia en sy verhouding tot blaaskanker en lewersirroze by die mens

Hierdie taak is nou voltooi met die medewerking van dr. Higginson van die S.A.I.M.N. en wag op statistiese ontleding.

This experiment shows that a laboratory strain of this parasite can be maintained for experimental purposes if required. It will be remembered that so far mice have been found to be useless for this purpose.

- (f) Eight monkeys have been repeatedly reinfected at intervals for observation on liver pathology.
- (g) Attempts to produce cure in infected monkeys with atebrien or with Fuodin have failed.
- (h) Organs of infected monkeys which die are routinely digested and the deposits examined for bilharzia ova. The distribution to date of the ova in the internal organs in 17 animals was found to be : intestinal wall 17, lung 8, kidney 4, spleen 2, brain 0.

Muisse

- (a) Attempts to produce cures in infected mice with atebrien or to prevent infection by the use of atebrien prophylactically have failed. The Unit is at the moment testing out a new drug, antimony tri-(n-dodecylmercaptide), kindly supplied by Abbot Laboratories. Complete success with this drug in mice has been claimed in America.
- (b) For the purposes of studying the changes in liver pathology which occur in mice with age of infection, 104 of these animals have been infected and are killed off at fortnightly intervals. This material is being used in support of the study of liver changes as revealed by weekly biopsies performed on monkeys.

An interesting finding in one of these mice was the development of a malignant neoplasm, probably sarcomatous, in the liver. The mouse had been infected for three months. There seems to be a definite correlation between the site of origin of this neoplasm with the bilharzial lesions.

Guinea Pigs and Rats

For purposes of comparison with monkeys and mice, guinea pigs and rats have been exposed to infection. Rats appear to be resistant to infection. This is most unfortunate as it was planned to use these animals in a study of the effect of dietary deficiency on liver pathology. Guinea pigs are readily infected but show a negligible reaction and so are not used.

Bilharziasis and Its Relationship to Bladder Cancer and Hepatic Cirrhosis in Man

This work in collaboration with Dr. Higginson of the S.A.I.M.R. is now completed and awaiting statistical analysis.

Lewerfunksie en-patalogie in eksperimenteel-besmette bobbejane

Die voorlopige werk is afgehandel en drs. Bersohn en Lurie van die S.A.I.M.N. het 'n verhandeling vir publikasie opgestel.

Dit is nou al ses maande dat 'n poging aangewend word om die funksie van die lewer met histologiese veranderings te korreleer. Bloed is met gereelde tussenpose van bobbejane geneem deur die hart te prik en deur verwydering van lewerweefsel deur biopsie.

Die werk word voortgesit en uitgebrei aangesien daar gevoel word dat dit 'n fundamentele bydrae tot die verklaring van bilharzia lewer. Wat veral in hierdie studie van belang is, is die kwessie van die uitwerking van herhaalde besmetting op lewerpatalogie sowel as die van bilharzia op 'n lewer wat alreeds beskadig is deur ondervoeding of chemiese middels.

Slakke

Die moeilikhede in verband met die teel van *Physopsis* en die Planorbis-slakke wat vatbaar is vir besmetting met bilharzia, is nog nie opgelos nie. Klein kolonies word aan die lewe gehou maar die toestand is alles behalwe bevredigend en 'n poging word aangewend om oorsese lyne in die hande te kry wat meer geredelik op laboratoriumkultuur sal reageer. Talle male is groot getalle *Planorbis*-slakke geteel net om uit te vind dat hulle immuun teen besmetting is.

Agt-en-sestig versamelings wat sowat 4,000 individuele slakke behoort, is van verskillende plekke ontvang. Die *Physopsis*-spesies wat positief blyk te wees vir *bovis* of *haematobium* is van die Hartebeespoortdam-gebied, Pretoria-Noord, Witkoppen Merebank (Natal), Bremersdorp (Swaziland), Kaapmuiden en Bospoort (W.-Tvl.) ontvang. *Planorbis*-slakke wat positief is vir *mansonii* is afkomstig van Merebank (Natal) en Kaapmuiden. 'n Groot aantal wat van Tzaneen ontvang is, was almal negatief.

Pogings is aangewend om slakke eksperimenteel te besmet. Die interessantste hiervan staan in verband met die *Planorbis*-slakke. Slakke van Kaapmuiden en Hectorspruit is sonder enige moeilikheid besmet maar ver oor die 400 slakke van Tzaneen is verskeie kere blootgestel aan besmetting sonder enige sukses. Die slakke wat by die eerste oogopslag identies geblyk te wees het met die welbekende vektor *B. pfeifferi* is daarna baie noukeurig ondersoek deur mnr. Oliff en sy mening is dat hulle nie tot hierdie spesies behoort nie maar moontlik *Salinarum* is. In die verlede is hierdie slak vermoedelik deur veldwerkers verwar met *B. pfeifferi*. Die implikasies vanuit die oogpunt van praktiese beheer lê voor die hand.

Liver Function and Liver Pathology in Experimentally Infected Monkeys

The preliminary work has been completed and Drs. Bersohn and Lurie of the S.A.I.M.R. have prepared a paper for publication. Over a period of six months now an attempt has been made to correlate liver function with histological changes. Blood was withdrawn at regular intervals from monkeys by heart puncture and liver tissue removal by biopsy. This work is being continued and expanded as it is felt that it forms a fundamental contribution to the understanding of bilharziasis. Of particular interest in this study is the question of the effects of repeated infection on liver pathology as also of bilharziasis on a liver already damaged say by malnutrition or chemical agents.

Snails

The difficulties of breeding *Physopsis* and those Planorbids which are susceptible to infection with bilharziasis have not yet been overcome. Small colonies are kept going, but the position is far from satisfactory, and an attempt is being made to obtain overseas strains which yield more easily to laboratory culture. Time and again large numbers of Planorbids have been reared only to find that they are not susceptible to infection.

Sixty-eight collections numbering some 4,000 individuals of snails have been received from various localities. *Physopsis* species positive for *bovis* or *haematobium* were received from Hartebeespoort Dam area, Pretoria North, Witkoppen, Merebank (Natal), Bremersdorp (Swaziland), Kaapmuiden, Bospoort (W. Transvaal), Planorbids positive for *mansonii* came from Merebank (Natal) and Kaapmuiden. A large number received from Tzaneen were all negative.

A number of attempts to infect snails experimentally were made. The most interesting of these relates to the Planorbids. Snails from Kaapmuiden and Hectorspruit were infected without any difficulty but well over 400 snails from Tzaneen were exposed to infection at various times without success. These snails which at first sight appeared to be identical to the well-known vector *B. pfeifferi* were then examined very closely and the opinion was expressed that they are not this species but possibly *salinarum*. In the past this snail has presumably been confused by field workers with *B. pfeifferi*. The implications from a practical control point of view are obvious.

Narsvoingskemas wat nog geen finaliteit bereik het nie of waarvan die resultate nie publikasie regverdig nie

- (a) *Resultate van geraamde behandeling na verloop van 'n jaar onder Bantoeerkerkers wat met urinêre bilharzia by die W.N.L.A.-hospitaal in Johannesburg besmet is.*

Tot dusver is 51 gevalle met Nilodien alleen of Nilodien plus een of meer van die volgende behandel: Fantorier, Fuodien, Sulfamerasien en Hetrasan. Daar is nie genoeg bewys vir 'n raming van verskillende behandelings nie en daar kan alleen gesê word dat 'n totale hervattingskoers van 15 persent aangeteken is. Dit was na die ondersoek van een klein urinemonstertjie sodat aange- neem kan word dat die ware hervattingskoers nog hoër was.

- (b) *Geneeskundige proewe op laboratoriumdiere.*

Hierdie werk is deur dr. Kisner voltooi maar aangesien dit slegs 'n bevestiging was van resultate wat alreeds gepubliseer is by name Schubert in Amerika, is dit nie op hierdie tydstip vir publi- kasië aanbeveel nie. In kort word aangetoon dat geeneen van die aanvaarde middels teen bil- harzia die genesing van laboratoriumdiere kan teweegbring nie. Dit maak die keuring van genees- middels in die laboratorium baie moeilik. Die tegniek wat in sommige laboratoriums aangewend word naamlik die gebruik van die relatiewe frekwensie van volgroeiende wurms in die lewer en mesenteriese vate as 'n raming van die werking van die geneesmiddel was nie baie lonend in dié geval nie. Dit word gevind dat die getalle wissel by diere wat glad geen behandeling ontvang het nie.

Met dank erken die Eenheid die hulp wat ontvang is van die Plaag-navorsingslaboratorium, die Malaria- navorsingstasie, Tzaneen, dr. Mastbaum van Swaziland en die Direkteur en personeel van die Suid-Afrikaanse Instituut vir Mediese Navorsing.

KARDIO-PULMONALE NAVORSINGSEENHEID JOHANNESBURG

Hoof van die Eenheid: PROF. G. A. ELLIOTT,
Universiteit van die Witwatersrand

Die Eenheid is verantwoordelik vir navorsing op die gebied van hart- en longkwale. Die verbinding van die twee stelsels het nodig geword as gevolg van die noue verband wat daar tussen hulle is in soverre dat longkwale dikwels hartkwale meebring terwyl die hoofverskynsels van hartkwaal dikwels te wyte is aan longaandoenings. In hierdie verband dien longsilkose as 'n uitstekende voorbeeld. As ons ernstigste nywerheidskwaal, sal dit

Research Projects which have not Reached Finality or on which the Results do not Merit Publication

- (a) *Results of treatment assessed after the lapse of one year in Bantu labourers infected with urinary bilharziasis at the W.N.L.A. Hospital, Johannesburg.*

So far 51 subjects have been treated with Nilodin alone or Nilodin plus one or more of the following: Fantorin, Fuodin, Sulphamerazine and Hetrazan. There is not enough evidence for an assessment of these various treatments and it can only be said that an overall relapse rate of 15 per cent. was noted. This was after the examination of a single small specimen of urine so that it may be taken that the true relapse rate was higher.

- (b) *Therapeutic Tests in Laboratory Animals*

Dr. Kisner had completed this work but as the only outcome of it was to confirm results already published, notably by Schubert in America, it was not recommended for publication at this juncture. Briefly it was shown that none of the accepted antibilharzial drugs could bring about cure in laboratory animals. This makes the screening of drugs in the laboratory a very difficult task. The technique employed in some labora- tories of using the relative frequency of adult worms in the liver and mesenteric veins as an assessment of drug activity has not been very profitable in our hands. It was found that these numbers vary in animals not receiving any treatment at all.

The Unit gratefully acknowledges the help received from the Plague Research Laboratory, the Malaria Research Station, Tzaneen, Dr. Mastbaum of Swaziland and the Director and Staff of the S.A. Institute for Medical Research.

CARDIO-PULMONARY RESEARCH UNIT, JOHANNESBURG

Head of the Unit: PROF. G. A. ELLIOTT,
University of the Witwatersrand

The Unit is responsible for research into diseases of the heart and the lung. The association of these two systems has become necessary because of their close association in that diseases of the lung commonly cause heart involvement, while the major manifestations of heart disease are often due to disturbances of the lung. In this respect silicosis of the lung serves as an excellent example. This, our most important industrial

aanvanklik steurings in die longfunksie veroorsaak en later, wanneer die vaskulêre bed van die long genoegsaam verminder is, sal dit 'n verhoogde druk in die longslagare veroorsaak sowel as vergroting en swigting van die regterkamer van die hart. Navorsing is egter nie beperk tot kwale waarby die hart en long saam betrokke is nie maar ook tot gevalle waar hulle afsonderlik aangetas is.

Kroonslagaarmoelikheid

Suid-Afrika bied 'n ongeëwenaarde geleentheid vir die studie van kroonslagaarmoelikheid. Dit blyk dat hierdie kwaal selde by die Bantoe voorkom terwyl die Blankebevolking net soos die ander Westerse Volke algemeen daaraan ly.

Die faktore wat by hierdie verskil tussen die rasse-groepe betrokke is, was die onderwerp van navorsing deur die Kardio-Pulmonale Eenheid. Ontleedkundige studies het 'n verskil in die kroonslagare van die Bantoe getoon wat hulle bestandheid teen die siekte gedeeltelik mag verklaar. Die verskil lê in 'n addisionele vertakking van die linker-kroonslagaar. Hoewel dit 'n interessante bevinding is, kan dit egter nie die enigste faktor wees wat hierby betrokke is nie.

'n Voorlopige opname van die bloedcholesterol het aangetoon dat dit oor die algemeen laer is by die Bantoe as by die Blanke. (Ongepubliseerd 1948.) Die stof is 'n gerieflike indeks van die peil van bloedlipiedes in die liggaam en laasgenoemde staan in noue verbinding met aandoenings wat agteruitgang van die kroonslagare meebring.

Die navorsing sal voortgaan met 'n studie van ander verskille tussen hierdie twee groepe, en sal sosiale, dieetkundige en anatomiese ondersoek insluit.

Drukverhoging

Terwyl drukverhoging netso algemeen indien nie meer algemeen onder die Bantoe as onder die Blankes is nie, lyk dit nie asof dit enige skade aan die kroonslagare van die Bantoe veroorsaak soos in die geval van Blankes nie. In hierdie opsig mag 'n studie van drukverhoging by die twee groepe lei tot die vasstelling van verskille wat belangrik sal wees vir 'n beter begrip van hierdie toestand. Van groot betekenis in die behandeling van drukverhoging, is die invoer van middels wat die bloeddruk verlaag of veronderstel is om die bloeddruk te verlaag. 'n Aantal van die middels is deur die eenheid beoordeel en hoewel die aanspraak dat hulle die bloeddruk verlaag nog nie in die meeste gevalle bevestig is nie, bestaan daar 'n moontlikheid dat sommige van hulle die verhoogde bloeddruk kan verminder. Navorsing na die geneeskundige waarde van die middels duur voort.

Oorgeërfde Hartkwaal

Die chirurgiese genesing of verligting van oorgeërfde hartkwaal het 'n herwaardering van diagnostiese maatstawwe vereis. Dit is op stelselmatige wyse deur die Kardio-Pulmonale Eenheid aangedurf.

disease, will initially cause disturbances of the lung function and later, when the vascular bed of the lung has been sufficiently reduced, it will cause increased pressure in the pulmonary arteries and enlargement and failure of the right ventricle of the heart. The research, however, is not restricted to diseases in which the heart and lung are involved together but also to conditions where they are separately affected.

Coronary Artery Disease

South Africa offers an unrivalled opportunity to study coronary artery disease. The Bantu have been shown to have very little coronary artery disease, while the European population in common with other Western peoples are commonly affected by this disease.

The factors involved in this difference between the racial groups has been the subject of investigation in the Cardio-Pulmonary Unit. Anatomical studies have shown a difference in the coronary arteries of the Bantu which may account for part of their immunity to this disease. This difference consists of an additional branch of the left coronary artery. While this is an interesting finding, it cannot be held to be the only factor involved.

A preliminary survey of the blood cholesterol has shown this to be on the average lower in the Bantu than the European (unpublished, 1948). This substance is a convenient index of the level of blood lipids in the body and the latter substances are intimately associated with degenerative diseases of the coronary arteries.

Hypertension

While hypertension is as common, if not more common, in the Bantu than in the European, it does not appear to produce damage to the coronary arteries in the Bantu as it does in the European. In this respect the study of hypertension in the two groups may lead to the establishment of differences which would be important in the understanding of this condition.

A significant advance in the treatment of hypertension has been the introduction of drugs which lower or are reputed to lower the blood pressure. A number of these have been assessed in the unit and while the claims to lower the blood pressure have not been substantiated for the majority of these, there is promise that some may reduce the raised blood pressure. Research in the therapeutic value of these drugs is continuing.

Congenital Heart Disease

The surgical cure or relief of the disability of congenital heart disease has necessitated the re-evaluation of diagnostic criteria. This has been systematically attempted by the Cardio-pulmonary Unit.

Hoewel bostaande studie uitsluitend diagnosties is, bied dit die geleentheid om die gevolge van verlaagde of verhoogde druk van die bloedvloeï in die pulmonale bloedsomloop te bestudeer asook die uitwerking wat hierdie versteurde toestande het op longvate en longfunksie. Deur middel van kliniese en fisiologiese studies was dit moontlik om spesifieke bydraes te lewer tot 'n beter begrip van sianotiese hartkwaal, Ebstein se abnormaleiteit van die driepuntklep en 'n *Ope Ductus arteriosus*.

Mitraal stenose

Verligting van mitraal stenose kan teenswoordig langs chirurgiese weë teweeggebring word maar die operasie is alleen suksesvol in die geval van 'n pasiënt met betreklike ernstige stenose. Metodes vir die keuring van pasiënte wat stenose in hierdie graad het, is bestudeer en waarnemings is op 'n groot reeks van sulke pasiënte gedoen wat aan operasies onderwerp is. Dit sal ongetwyfeld lei tot 'n verbetering in diagnostiese noukeurigheid. 'n Ballistokardiografiese studie lyk ook belowend t.o.v. die keuring van pasiënte vir operasie.

Een van die opvallendste gevolge van mitraal stenose is 'n verhoging in die druk van die longslagaar. 'n Reeks proewe wat deur die Kardio-pulmonale Eenheid uitgevoer is, toon dat die toediening van suurstof 'n verlaging van hierdie druk veroorsaak. Hoewel hierdie vermindering in druk nie volgehou kan word na die verwydering van die suurstof nie en die vermindering nie altyd die normale bereik nie, is dit nogtans 'n belangrike ontdekking vir 'n beter begrip van die beheer oor druk en bloedvloeï in die longe.

Elektrokardiografie

Met die oog op die vasstelling van die diagnostiese kenmerke van verskillende hartabnormaliteite is 'n studie gemaak van die elektrokardiogram. Dit was moontlik om 'n beskrywing te gee van patrone in ooreenstemming met vergroting en uitsetting sowel as wegkwyning van die regterkamer van die hart. Werk wat ten tye van die verslag aan die gang was, het die diagnose van die vergroting van die linker- en regtervoorkamer van die hart aansienlik vergemaklik.

Die grootste waarde van bostaande werk sal gevind word in die berekening van die graad waarin die hart en long versteur word sonder om gebruik te maak van meer ingewikkelde prosedure soos kardiaale kateterisasie.

Ballistokardiografie

Gedurende 'n tydperk van 7 jaar is studies gemaak van normale persone en diene wat aan hart- en longkwale ly. Die verskillende buigings van die ballistokardiogram is in verband gebring met gegewens van die bloedsomloop en dit is moontlik om die verstourings

While the above study is essentially diagnostic, it offers opportunity to study the effects of reduced or increased pressure of blood flow in the pulmonary circulation and the effects these disturbed conditions have on the pulmonary vessels and lung function. It has been possible by means of clinical and physiological study to make specific contributions towards the better understanding of cyanotic heart disease, Ebstein's anomaly of the tricuspid valve and Patent Ductus Arteriosus.

Mitral Stenosis

Mitral stenosis can now be alleviated by surgical means, but the operation is only successful in patients with relatively severe stenosis. Methods for selecting patients with this degree of stenosis have been studied and observations have been made on a large series of such patients subjected to surgery which will result in an improvement in diagnostic accuracy. A ballistocardiographic study of normal subjects and those with mitral stenosis also gives promise of aiding in the selection of patients for operation.

One of the most pronounced effects of mitral stenosis is an elevation of the pulmonary artery pressure. A series of experiments conducted by the Cardio-pulmonary Unit has shown that the administration of oxygen causes a lowering of this pressure. While this diminution in pressure is not sustained after the withdrawal of oxygen and the reduction does not always reach normal limits, it is an important finding in the understanding of the control of pressure and flow of blood in the lungs.

Electrocardiography

The electrocardiogram has been studied with a view to ascertaining the diagnostic features of various heart anomalies. It has been possible to describe patterns consistent with right ventricular hypertrophy and dilation and right ventricular atrophy. Work in progress during the time of this report has facilitated diagnosis of left and right auricular enlargement.

The above work will find its chief value in assessing the degree of disturbance of the heart and lung without recourse to more involved procedures such as cardiac catheterisation.

Ballistocardiography

During a period of 7 years studies have been made on normal subjects and those with diseases of the heart and lung. The various deflections of the ballistocardiogram have been related to circulatory events and it is

in die ballistokardiogram met die gewysigde bloedsomloop wat deur hart- en longkwale meegebring word, te korreleer.

Longfunksietoetse tydens Emfiseem

Diagnose.—Die studie van kroniese bronchitis en sy hoofkomplikasie, emfiseem, is voortgesit in die respiratoriese laboratorium. Hierdie twee toestande is teenwoordig een van die hooforsake van onbekwaamheid en is nog nie wesenlik onder beheer van die moderne geneeskunde nie. Daar is bereken dat hierdie siektes in Brittanje jaarliks 30,000 lewens eis en 'n verlies van 16½ miljoen werksdae per jaar meebring. Werk in die Kardio-pulmonale Eenheid is in die eerste instansie gemik op 'n verbetering van die diagnostiese noukeurigheid van longfunksietoetse. Om in staat te wees om die aanwesigheid van emfiseem in 'n twyfelagtige geval vas te stel en om verder te kan bereken hoe ernstig dit is en die mate waarin die longfunksie versteur is, is ongetwyfeld 'n doelwit van die grootste kliniese en industriële belang. Werk in verband met die wysiging van 'n toets oor die gelykmatige verspreiding van lug in die longe is voltooi en hou groot moontlikhede in vir groter noukeurigheid.

Die long is 'n ingewikkelde orgaan en siektes kan sy funksie op talle maniere versteur. 'n Reeks toetse wat daarop gemik is om verskillende aspekte van longfunksie te bestudeer, word gereeld in die eenheid uitgevoer. Die feit dat die uitvoering van die toetse twee uur in beslag neem en 'n verdere vier tot ses uur om uit te werk en te waardeer, is 'n aanduiding van hulle huidige ingewikkeldheid. Een van die hoofskemas gedurende die afgelope jaar was om 'n afdoende aantal toetse op normale persone uit te voer ten einde normale waardes aan albei geslagte van verskillende ouderdomsgroepe te verskaf wat statisties geldig is. Die werk duur nog voort.

Deur aanhoudende vergelyking van toetsresultate en 'n berekening van hulle relatiewe waardes, word gehoop om in staat te wees om betreklik eenvoudige funksietoetse op te stel vir gebruik in nywerhede soos die Mynbedryf waar 'n bepaalde ongeskiktheidspatroon ver wag kan word. Met hierdie doel voor oë is silikosegevalle en slagoffers van ondergrondse gasvergiftiging deur die eenheid bestudeer. Die studies lewer resultate wat in die toekoms van groot waarde vir die mynbedryf behoort te wees.

Oorweging van Behandeling

Emfiseem is besonder hardnekkig t.o.v. alle vorms van behandeling. Twee pogings om hierdie toestand te verlig het gedurende die afgelope paar jaar baie aandag geniet en verslae oor hulle heilsame uitwerking is gepubliseer. Dit bestaan uit pogings om die lugtoevoerende kapasiteit van die longe te verhoog deur asem-

possible to correlate the disturbances in the ballistocardiogram with the altered circulation produced by diseases of the heart and lung.

Lung Function Tests in Emphysema

Diagnosis.—In the respiratory laboratory, the study of chronic bronchitis and its major complications emphysema has continued. These two conditions are a major cause of disability today and have not been substantially controlled by modern medicine. It has been estimated that in Britain they are the cause of 30,000 deaths annually and a loss of 16½ million work days per year. Work in the cardio-respiratory unit has been directed in the first place towards improvement in the diagnostic accuracy of lung function tests. To be able to establish the presence of emphysema when in doubt, and further, to assess its severity and the extent to which lung function is disturbed, is obviously an objective of the greatest clinical and industrial importance. Work has been completed on a modification of a test of the evenness of distribution of air in the lungs which promises to result in greatly improved accuracy.

The lung is a complex organ and disease may disturb its function in numerous ways. In the unit a battery of tests designed to assess different aspects of lung function is routinely carried out. The fact that these tests take two hours to perform and four to six hours to work out and evaluate is an index of their present complexity. One of the major projects for the past year has been to perform an adequate number of tests on normal subjects to provide statistically valid normal values for both sexes of various age groups. This work is still proceeding.

By continual comparison of test results and assessment of their relative value, it is hoped to be able to design relatively simple function tests for use in industries such as the Mining Industry where a particular pattern of disability is to be expected. With this in mind silicotic subjects and victims of underground gassing accidents have been studied in the Unit. These studies are giving results which should prove of great value to the mining industry in the future.

Assessment of Treatment.—Emphysema is notoriously refractory to all forms of treatment. Two attempts to alleviate this condition have received much attention of recent years and reports have been published of their beneficial effects. These consist of attempts to increase the ventilatory capacity of the lungs by specially designed breathing exercises or by elevation of the diaphragm by repeated introduction of air into the abdominal cavity (pneumoperitoneum). It is difficult to judge the actual amount of improvement produced by any measure in these subjects, as they are usually extremely breathless and tend to view any active efforts to relieve their condition optimistically and to report favourably

halingsoefeninge wat spesiaal vir die doel ontwerp is of deur opheffing van die diafragma deur herhaalde inname van lug in die buikholte (pneumoperitoneum). Dit is moeilik om die werklike hoeveelheid verbetering wat deur enige maatreël by hierdie persone teweeggebring word te bereken aangesien hulle gewoonlik baie kortasem is en geneig is om baie optimisties te wees oor enige aktiewe pogings om hulle toestand te verlig en gevolglik 'n baie gunstige verslag lewer van die resultate. Albei hierdie vorms van behandeling is besonder tydrowend en daar is dus gemeen dat dit wenslik sou wees om gebruik te maak van objektiewe toetse van longfunksie om so noukeurig as moontlik te bereken of daar werklik 'n merkbare fisiologiese verbetering plaasgevind het as gevolg van hierdie vorms van behandeling. Verslag is gedoen van die resultate van twee sulke proewe waartydens funksietoetse op twee reekse gevalle voor en na behandeling uitgevoer is. Dit is uiters teleurstellend om te meld dat geen meetbare verbetering van enige betekenis by een van die vorms van behandeling waargeneem is nie.

Longfunksietoetse by Bronchiëktasie

'n Opname van bronchiëktasie-gevalle was gedurende die afgelope drie jaar aan die gang en nader nou voltooiing. Pasiënte word voor en na die verwydering van aangetaste longdele ondersoek. Dit lyk asof daar 'n moontlikheid bestaan om die resultate van die toets wat 'n beskrywing gee van die verspreiding van lug in die longe volgens 'n spesiale metode grafies voor te stel sodat dit moontlik sal wees om te onderskei tussen gelokaliseerde aangetaste dele van 'n gesonde long en 'n verspreide verstoring soos in die geval van Emfiseem. Dit het alreeds van groot waarde geblyk te wees in die keuring van gevalle vir snykunde.

Ander Diagnostiese Gebruike van Funksietoetse

Wanneer die tyd dit toelaat, word die fasiliteite van die eenheid beskikbaar gestel aan die mediese professie vir die oplossing van verskillende diagnostiese probleme. Voorbeelde hiervan is die differensiering tussen die toestand van primêre polisitemie en sekondêre polisitemie as gevolg van longkwaal, die diagnose van sulke toestande as verspreide interstisiële longfibrose en die berekening van longreserwe by persone van wie die verwydering van 'n long of dele daarvan oorweeg word. Hoewel dit nie in die eerste instansie 'n navorsingswerkzaamheid is nie, is hierdie studies van groot waarde vir die pasiënte en dokters wat daarby betrokke is en daar is tans nog geen ander organisasie wat in staat is om hulle uit te voer nie.

Oksihemoglobien-dissosiasiekurwes en Sekelselbloedarmoede

Daar is onlangs verslag gedoen van werk wat daarop dui dat 'n abnormale hemoglobien aanwesig is in persone

on the results. Both these forms of treatment are most time consuming and it was, therefore, thought desirable to use objective tests of lung function to assess as accurately as possible whether measurable physiological improvement actually took place as a result of these forms of treatment. The results of two such experiments in which function tests were carried out in two series of cases before and after treatment have been reported. It is disappointing to record that significant measurable improvement was not observed as a result of either form of treatment.

Lung Function Tests in Bronchiectasis

A survey of cases of bronchiectasis has been in progress over the past three years and is now reaching completion. Patients are studied before and after the surgical removal of affected areas of lung. It seems probable that, by a special method of graphing the results of the test which describes the distribution of air in the lungs, it will be possible to distinguish between areas of localised disease in a healthy lung and a diffuse disturbance such as is found in emphysema. This has already proved of value in selecting cases for surgery.

Other Diagnostic Uses of Function Tests

When time allows, the facilities of the Unit are available to the medical profession in solving various diagnostic problems. Examples are the differentiation of the condition of primary polycythaemia from secondary polycythaemia resulting from lung disease, the diagnosis of such conditions as diffuse interstitial pulmonary fibrosis and the assessment of pulmonary reserve in subject in whom removal of a lung or parts of a lung are contemplated. Although not primarily a research activity these studies are of great value to the patients and physicians concerned and there is as yet no other organisation capable of carrying them out.

Oxyhaemoglobin Dissociation Curves in Sickle Cell Anaemia

Work has recently been reported which indicates that an abnormal haemoglobin is present in the subjects of

wat aan sekelselbloedarmoede ly en draers van die sekelselkenmerke. Werk wat deur die Eenheid gedoen is het bewys gelewer dat die bloed van hierdie persone van normale bloed verskil t.o.v. sy suurstofbindende hoedanigheid. Studies duur voort in 'n poging om vas te stel of hierdie verskil 'n kenmerk is van die suiwer hemoglobienoplossings en of dit te wyte is aan 'n ander faktor wat in gesonde bloed aanwesig is.

NAVORSINGSEENHEID VIR KLINIESE VOEDING, KAAPSTAD

Hoof van die Eenheid: PROF. J. F. BROCK,
Universiteit van Kaapstad

Titel

Die titel van hierdie Eenheid wat voorheen bekend gestaan het as die Navorsingseenheid vir Sosiale Medisyne, is deur die Mediese en Tandheelkundige Navorsingskomitee aanvaar op aanbeveling van sy Onderkomitee in sake Sosiale Medisyne. Dit is egter beklemtoon dat die verandering in naam nie 'n verandering in die „sosiale” benadering van die probleme wat ondersoek word sal meebring nie.

Doelwit

Die program van die Eenheid is nog altyd „die benutting op enige moontlike manier van die unieke, natuurlike proefneming wat in die Kaapse Skiereiland bestaan vir 'n rasse-vergelyking van die siekte- en sterftesyer, veral tussen die Kaapse Kleurlinge en die Blankebevolking van die Kaapse Skiereiland.” Daar word aangeneem dat voedingsverskille van die aller-grootste belang is en hulle vorm dan ook die hoofonderwerpe van die studie hoewel hulle steeds in hulle regte perspektief gesien word teenoor ander genetiese en omgewingsfaktore. Namate die geleentheid hom voordoen word die primêre vergelyking van die Kaapse Kleurlinge en die Blankes uitgebrei om vergelykings met Bantoe, Boesman en ander groepe in te sluit.

Huisvesting

Die werk wat deur die personeel van die Eenheid in die Groote Schuur-hospitaal gedoen is, is met die medewerking van die Hospitaalowerheid na 'n uitstekende laboratorium binne die grense van die hospitaal verskuif. 'n Nuwe laboratorium is ook in die Mediese Skool geopen deur bemiddeling van die Universiteitsraad.

Die gebrek aan 'n behoorlike Metabolisme-saal is 'n groot struikelblok in baie aspekte van die werk wat deur die Eenheid gedoen word en bly 'n ernstige bottleneck in die logiese uitbreiding van die navorsingsprogram. Die verskaffing van so 'n saal is deur die Gemeenskaplike Hospitaaldiens aanbeveel maar die voorrang van ander geboue veroorsaak blykbaar aansienlike vertraging.

sickle cell anaemia and carriers of the sickle cell trait. Work in the Unit has demonstrated that blood from these subjects differs from normal blood in its oxygen binding capacity. Studies are continuing in attempts to find out whether this difference is a property of the pure haemoglobin solutions or whether it is due to some other factor present in whole blood.

CLINICAL NUTRITION RESEARCH UNIT, CAPE TOWN

Head of the Unit: PROF. J. F. BROCK,
University of Cape Town

Title

The title of this Unit, previously known as the Social Medicine Research Unit, was accepted by the Medical and Dental Research Committee on the recommendation of its Subcommittee on Social Medicine, but it was emphasised that the change in name should not involve a change in the “social” approach to the problems under investigation.

Objectives

The programme of the Unit continues to the “The exploitation by whatever means possible, of the unique natural experiment existing in the Cape Peninsula for inter-racial comparison of morbidity and mortality, particularly as between the Cape Coloured people and the Europeans of the Cape Peninsula.” It is believed that differences in nutrition are of very great importance and these constitute the major subjects of study, although they continue to be held in their proper perspective against other environmental and genetic factors. As opportunity occurs the primary comparison of Cape Coloured and European people is extended to include comparison with Bantu, Bushmen and other groups.

Accommodation

The work of the Unit's staff in the Groote Schuur Hospital has been rehoused by the co-operation of the Hospital Authority in an excellent laboratory within the precincts of the Hospital. A new laboratory has also been opened up in the Medical School by arrangement with the University Council.

The lack of a proper Metabolism Ward is a very great handicap to the Unit in many aspects of its work and remains a serious bottleneck in the logical expansion of the research programme. Its provision has been recommended by the Joint Hospital Service, but building priorities apparently necessitate considerable further delay.

Aanraking en Samewerking

Die samewerking van ander persone en departemente binne die Hospitaal en Universiteit wat in die laaste jaarverslag vermeld is, is behou en uitgebrei en was besonder bevredigend.

Sekere Aspekte van die Werkzaamhede van die Eenheid

Die besoek van die Direkteur van die Eenheid aan die Verenigde State het 'n skerp prikkel verskaf aan die werkzaamhede van die Eenheid op die volgende wyse:—

- (1) Nuwe navorsingsmetodes is bestudeer waarvan sommige toepaslik is op die werkzaamhede van die Eenheid.
- (2) Die verreikende invloed van kroniese ondervoeding en die unieke geleenthede vir vergelykende rassestudie in Kaapstad is deur baie vooraanstaande navorsingswerkers op die gebied van voeding bevestig.

Die studie van elektrolietverskuiwings, veral natrium en kalium, en van die vogbalans in gevalle van nier siekte en sekere ongesteldhede te wyte aan ondervoeding, veral Bantoe pellagra, Bantoeskeurbuik, gehoormoeilikhede en edeem is voortgesit. Deur die bevindings met normale kontroles te vergelyk word gehoop om lig te werp op die onderskeie aandeel van nierhemodinamika, nierbuisfunksie en buitensiersfaktore in die opvallende elektroliet- en vogveranderinge wat sigbaar is. Die werk is grootliks bespoedig deur 'n vlamfotometer wat deur die Personeelnavorsingsfonds van die Universiteit verskaf is.

Deur die welwillendheid van die Hoof van die Departement Kindergeneeskunde is parallelle studies voortgesit van kinders wat weens ondervoeding aan edeem of kwashiorkor ly.

Dit is reeds duidelik dat tropiese parasitisme en ondervoeding verantwoordelik is vir die opvallende afwyking van serumproteïene onder die Bantoe- en Negerbevolkings van Afrika sowel as onder die Boesmans soos voorspel is en dat die onderskeidelike gevolge van tropiese parasitisme en ondervoeding in 'n sekere mate geskei kan word deur 'n onderlinge rassevergeelyking.

'n Studie is gemaak van die omvang en gevolge van bloedvergiftiging en stuipe tydens swangerskap onder die Kaapse Kleurlingbevolking in vergelyking met die Blankes. 'n Interessante feit wat hieruit voortgespruit het was dat die oënskynlike groot omvang van bloedvergiftiging tydens swangerskap onder die Kaapse Kleurlingbevolking uitsluitlik te wyte is aan die Maleiergroep binne die breër groep Kaapse Kleurlinge en dat hierdie verskynsel onder laasgenoemde groep afgesien van die Maleiers nie 'n veel groter omvang het as onder die Blankes nie. Die rede vir die groot omvang van die verskynsel onder die Maleierbevolking, is ondersoek deur 'n vergelykende dieetopname van al die bevolkings. Daar was weinig verskil in die inname van die stapel-

Contact and Co-operation

The co-operation of other individuals and departments within the Hospital and the University, which is recorded in the last annual report, has been developed and maintained and has been most gratifying.

Certain Aspects of the Activities of the Unit

The visit of the Director of the Unit to the United States has provided great stimulus to the activities of the Unit in the following ways:—

- (1) New research methods have been studied some of which are applicable to the activities of the Unit.
- (2) The far-reaching importance of chronic malnutrition and the unique opportunities existing in Cape Town in the comparative racial study have been confirmed from many prominent research workers in nutrition.

The study of electrolyte shifts, especially sodium and potassium, and of fluid balance in cases of nephrosis and in certain nutritional disorders, especially Bantu pellagra, Bantu scurvy and "nutritional" heart disorder and oedema has been continued. By comparing findings with normal controls it is hoped to throw some light on the respective roles of renal haemodynamics, renal tubular function and extra-renal factors in the marked electrolyte and fluid changes which are apparent. This work has been greatly accelerated by the provision of a flame photometer through the Staff Research Fund of the University.

With the courtesy of the Head of the Department of Paediatrics, parallel studies in infants suffering from nutritional oedema or kwashiorkor have been pursued.

It is already clear that, as predicted, both tropical parasitism and malnutrition are responsible for the marked deviation of serum proteins in the Bantu and Negro peoples of Africa as well as in Bushmen, and that the respective effects of tropical parasitism and of malnutrition can be to some extent separated by inter-racial comparison.

A study has been made of the incidence and effects of pregnancy toxæmia and eclampsia in the Cape Coloured people, compared with Europeans. The interesting fact has already emerged, that the apparent high incidence of pregnancy toxæmia in the Cape Coloured people is due entirely to the Malay group within the broader group of Cape Coloured people and that the Cape Coloured people, apart from the Malays, have an incidence not significantly higher than that of Europeans. The reasons for the high incidence in the Malay group have been sought through a comparative dietary survey of the populations. Little difference has been brought to light in the dietary intake of the main nutrients, in these two groups with the exception of fats. Both qualitative and quantitative

voedsels tussen hierdie twee groepe, met uitsondering van vette. Sowel kwalitatiewe as kwantitatiewe verskille in vetinname is erken maar daar is op die oomblik nog geen aanduiding dat hierdie verskille 'n etiologie rol speel by bloedvergiftiging en stuipe tydens swangerskap nie.

Die Departement van Sosiale Wetenskap het sy studie van die dieetspatroon van die hoof rassegroepe in die Kaapse Skiereiland voortgesit in medewerking met die Eenheid. Daar word gehoop dat volledige en vergelykende gegewens teen die einde van 1953 beskikbaar sal wees vir minderbevoorregte Blankes, Maleiers, ander Kaapse Kleurlinge en stedelike Naturelle. Hierdie agtergrondkennis van vergelykende dieetsinname op 'n wetenskaplike-kritiese grondslag, sal van onskatbare waarde wees.

GESINSGESONDHEIDNAVORSINGSEENHEID, DURBAN

Hoof van die Eenheid: DR. S. L. KARK,
Instituut vir Gesins- en Gemeenskapsgesondheid

Dr. S. L. Kark het in Mei 1953 na Israel vertrek waarna dr. Chesler die Waarnemende Hoof van die Eenheid geword het.

Soos reeds in vorige verslae vermeld, is 'n aantal studies verwant aan dié van die Navorsingseenheid deur personeellede van die Instituut vir Gesins- en Gemeenskapsgesondheid en sy aansluitende Gesondheidsentrums ontwikkel. Hierdie studies is voortgesit en in sommige gevalle uitgebrei deur drs. Lapping, Phillips, Chesler, Gampel en Abramson van die Instituut vir Gesins- en Gemeenskapsgesondheid en drs. Cassel, Slome en Abrams van die Pholela Gesondheidsentrum.

Familiestruktuur en Sy betrekking op die Grootmaak van Kinders

'n Aanvang is gemaak met 'n sosio-antropologiese studie van 'n Indiërgemeenskap. Noodsaaklike gegewens in verband met familie-organisasie, die grootmaak van kinders en ekonomiese status en hulle betrekking op die groei en ontwikkeling van die kind word ingesamel. Die opvattinge van Hindoes i.s. siekte en die tradisionele behandeling daarvan word ook ondersoek.

Studie oor die Ontwikkeling van Moeder en Kind

Voedingstoestand van die Moeder met Betrekking tot die Groei en Ontwikkeling van die Baba.—Hierdie werk is voortgesit. Aan die einde van Junie 1953, was daar 268 moeders in hierdie studie; die „proef”-groepe het afgeroomde poeiermelk en vitamienolie ontvang terwyl die moeders in die „kontrole”-groepe nie hierdie aanvullings ontvang het nie. Die moeders se voeding is breedvoerig ondersoek en hulle babas is dopgehou

differences in fat intake have been recognised, but there is at present no clue as to whether these differences play an aetiological role in relation to pregnancy toxæmia and eclampsia.

The Department of Social Science has continued in co-operation with the Unit to study the dietary pattern of the main racial groups in the Cape Peninsula. It is hoped that by the end of 1953 full and comparative data will be available for poor Europeans, Malays, other Cape Coloured people and urban Native people. This background knowledge of comparative dietary intakes on a scientifically critical basis will be of immense value.

FAMILY HEALTH RESEARCH UNIT, DURBAN

Head of the Unit: DR. S. L. KARK,
Institute of Family and Community Health

Dr. S. L. Kark left for Israel in May, 1953, and Dr. Chesler then became Acting Head of the Unit.

As mentioned in previous reports a number of studies related to those of the Research Unit have been developed by members of the staff of the Institute of Family and Community Health and its associated Health Centres. These studies have been continued and in some instances expanded by Drs. Lapping, Phillips, Chesler, Gampel and Abramson of the Institute, and Drs. Cassel, Slome and Abrams of the Pholela Health Centre.

Family Structure and Its Bearing on Child Bearing

A socioanthropological study of an Indian community has been commenced. Essential data are being collected on family organisation, child rearing and economic status as these relate to child growth and development. Hindu concepts of disease and traditional treatment are also being investigated.

Mother and Child Development Study

Maternal Nutrition in Relation to Growth and Development of the Infant.—This work has been continued. By the end of June, 1953, there were 268 mothers in the study; the “experimental” groups received dried skim milk and vitamin oil while mothers in the ‘control’ group did not receive the supplements. The mothers received detailed nutritional examinations and their babies were followed with respect to nutrition,

met betrekking tot voeding, groei en status van ontwikkeling. Die studie word voortgesit onder Indiërmoeders by Merebank en Naturellemoeders in een deel van die Lamontlokasie. Daarby word dieëtopnames met betrekking tot gehalte en hoeveelheid uitgevoer in sekere Indiërhuise met besondere verwysing na die voedselverbruik van die swanger vrou.

'n Vergelykende studie van die ondervindings, houdings, kennis en gedrag van moeders.—Hierdie studie word in drie verskillende gemeenskappe aangepak en sal in verband gebring word met die studie van die gezondheid en behoud van babas wat hier onder genoem word.

Die Baba

Studies aangaande gewig by geboorte en groei gedurende die eerste lewensjaar vir babas van verskillende rassegroepe in Suid-Afrika is voortgesit.

Drie verslae oor die werk in verband met gewig by geboorte is in die *British Journal of Social Medicine* gepubliseer en in die tydperk onder bespreking is twee addisionele verslae gepubliseer. 'n Lys van hierdie verslae verskyn in die byvoegsel.

Ondersoek na die gewigte van Blanke, Kleurling- en Bantoebabas gedurende die eerste 10 lewensdae is voortgesit waar gebruik gemaak is van die fasiliteite en verslae wat deur die Addingtonhospitaal en die McCord Zoeloehospitaal in Durban verskaf is.

Die eerste verslag van hierdie ondersoek, „Gewigte van Bantoebabas gedurende die eerste 10 lewensdae,” wag op publikasie. Gegewens is ingesamel vir die studie oor die groei van Blanke-, Bantoe-, Kleurling- en Indiërbabas gedurende 2-52 weke en 'n ontleding van die materiaal word gemaak.

Dr. Cassel van Pholela wat sy ondersoek oor die fisiologiese gewigsafname onder pasgeborenes by Pholela voltooi het alvorens hy na die V.S.A. vertrek het vir 'n tydperk van studie, is besig om sy werk persklaar te maak.

Die studie van die natuurlike ontwikkelingsgeskiedenis van aansteeking tydens die kleinkinderdae en jeug is voortgesit. Een groep babas is nou vir 4 jaar lank waargeneem.

Daar is 'n begin gemaak met 'n studie oor die gezondheid en behoud van babas. Dit is 'n vergelykende studie van 3 Naturelle- en 2 Indiërgemeenskappe wat deur die Instituut vir Gesins- en Gemeenskapsgesondheid bedien is met spesiale verwysing na :—

1. Vergelyking van sterftesyfers.
2. Gewigsgroei.
3. Aansteeking—blootstelling en voorkoms.
4. Moederlike sorg.
5. Sosiale en fisiologiese aanpassing.

Studies oor die grootmaak van babas met spesiale verwysing na babavoeding is voorgesit by Pholela, Lamontville en Merebank. Lede van die Sielkunde-

growth and developmental status. This study is being continued among Indian mothers at Merebank and Bantu mothers in one section of the Lamont Location. In addition, quantitative and qualitative diet surveys are being carried out in certain of the Indian homes with particular reference to the food consumption of the pregnant woman.

A comparative Study of Maternal Experiences, Attitudes, Knowledge and Behaviour.—This is being undertaken in three different communities and will be related to the study of infant health and survival mentioned below.

The Infant

Studies on birth weight and growth in the first year of life for babies of different racial groups in South Africa have been continued.

Three reports of the work on birth weights have been published in the *British Journal of Social Medicine* and, in the period under review, two additional reports were published. These are listed in the appendix.

Investigation into weights of European, Coloured and Bantu babies in the first 10 days of life was continued, using the facilities and records provided by the Addington Hospital and McCord's Zulu Hospital in Durban.

The first report of this investigation, “Weights of Bantu babies in the first 10 days of life,” is awaiting publication.

Data have been collected for the study on growth from 2-52 weeks in European, Bantu, Coloured and Indian babies and an analysis of the material is being made.

Dr. Cassel of Pholela, who completed his investigation on physiological loss of weight in the newborn at Pholela before he left for a period of study in the U.S.A., is preparing his work for publication.

The study of the natural history of the development of infections in infancy and childhood has been continued. One group of infants has now been followed for 4 years.

A study into infant health and survival was commenced. This is a comparative study of three African and two Indian communities served by the Institute of Family and Community Health with particular reference to :—

1. Mortality rates comparison.
2. Weight growth.
3. Infection—exposure and occurrence.
4. Maternal care.
5. Social and Physiological adjustment.

Studies of infant rearing with particular reference to infant feeding were continued at Pholela, Lamontville and Merebank. Members of the University of Natal's Department of Psychology conducted a study of weaning

departement van die Universiteit van Natal het 'n studie uitgevoer in verband met die speen van Naturellebabas by Pholela. Hierdie studie is voltooi en wag op publikasie. 'n Ondersoek na die omvang van borsvoeding by ontslag van Blanke-, Kleurling-, Bantoe- en Indiër-babas uit die hospitaal is voltooi en die stof word ontleed met die oog op publikasie.

As agtergrondmateriaal vir studies oor die groei van babas, is die omvang van buite-egtelikheid en die omvang van veelvoudige geboortes in Durban vir die vier rassegroepe ondersoek en ontleed.

Dr. C. Slome en dr. B. Abrams (Mediese Beampte en Tandarts by die Pholela Gesondheidsentrum) het hulle studies oor Tanddeurbraak onder Naturellebabas by Pholela voortgesit.

Kinders van Skoolgaande Ouderdom

Studies oor die groei en ontwikkeling van kinders in verskillende gemeenskappe is voortgesit.

Meisies.—Ten einde die groeitempo en voedings-toestand in verband te bring met puberteit, gaan 'n deel van die studie oor die ouderdom wanneer die maand-stondes 'n aanvang neem, waarvoor gegewens rakende al vier rassegroepe, ingesamel is.

'n Lid van die Eenheid het kliniese somatometriese en fotografiese ondersoeke op 'n groep meisies van Lamontville-skool uitgevoer wat nou vier jaarlikse ondersoeke ondergaan het. Hierdie ondersoeke is uitgebrei tot 'n groep skoolmeisies van Merebank en gereelde somatometriese metings word in hierdie groep gemaak.

Seuns.—Die puberteitstudies oor seuns waarvan in die laaste verslag melding gemaak is, is voortgesit en uitgebrei om Indiërseuns in te sluit.

Die voedingsproef onder Bantoe-meidjies en -jongens wat deur die Instituut uitgevoer is op aandrang van S.A.N.T.A. en die Durbanse „Voed die Kinders Fonds” is voltooi en 'n voorlopige verslag is aan die betrokke organisasies voorgelê.

Die Gesondheid van die Werker

Studies is gemaak van die epidemiologie van afwesigheid en ondersoek is ingestel na tipes en koste verbonde aan gesondheidsdienste wat die geskikste is vir Suid-Afrikaanse Nywerhede. Boonop is daar 'n aanvang gemaak met die ondersoek van gesondheidsprobleme waardeur die „witboordjie”-werkers geraak word.

Die verslag van Senior Gesondheidsinspekteur F. Bayer oor die besmetting van slakke met bilharzia in 'n dam wat teruggevoer is na besoedeling deur rioolwater wag tans op publikasie. Stof word ingesamel vir 'n verslag oor waarneming van parasitisme by varswater-slakke met spesiale verwysing na bilharzia.

of Native infants at Pholela. This study is completed and awaiting publication.

An investigation into the incidence of breast feeding on discharge from hospital of European, Coloured, Bantu and Indian babies has been completed and the material is being analysed with a view to publication.

As background material for studies on infant growth the incidence of illegitimacy and the incidence of multiple births for the four racial groups in Durban has been investigated and analysed.

Dr. C. Slome and Dr. B. A. Abrams (Medical Officer and Dentist at Pholela Health Centre) continued with their studies on tooth eruption in native babies at Pholela.

Children of Pre-school and School Age

Studies on growth and development in different communities have been continued.

Girls.—In order to relate the rate of growth and state of nutrition to puberty, part of the study concerns menarche age, for which data concerning the four racial groups have been collected.

A member of the Unit has made clinical, somatometric and photographic examinations of a group of Lamontville school girls who have now had four annual examinations. These examinations were extended to a group of Merebank school girls and regular somatometric measurements are done in this group.

Boys.—The puberty study on boys mentioned in the last report was continued and has been extended to include Indian boys.

The feeding experiment among Bantu girls and boys which the South African National Tuberculosis Association and the Durban “Feed the Children Fund” asked the Institute to conduct was concluded, and a preliminary report has been submitted to the organizations concerned.

The Health of the Worker

Studies have been made of the epidemiology of absenteeism and investigations of types and costs of health services best suited to South African Industry. In addition a start has been made into the examination of the health problems affecting “white collar” workers.

Awaiting publication is a report by Senior Health Inspector F. Bayer on bilharzial infection of snails in a dam traced to pollution with sewage. Material is being collected for report on parasitism in fresh-water snails, with special reference to bilharzia.

Naslaanbiblioteek

'n Belangrike aspek van die werk van die Navorsings-eenheid vir Gesinsgesondheid wat uitgevoer word, is die bou van 'n inhoudsopgawe-biblioteek met spesiale verwysing na die groei en ontwikkeling van kinders.

NAVORSINGSEENHEID VIR MENSLIKE BIOCHEMIE, JOHANNESBURG

Hoof van die Eenheid: DR. A. R. P. WALKER,
Suid-Afrikaanse Instituut vir Mediese Navorsing

Ondersoeke na die Kalsiummetabolisme van die Suid-Afrikaanse Bantoebevolking

Ondersoeke in verband met die kalsiummetabolisme van die Bantoe wat enkele jare gelede 'n aanvang geneem het, is aangespoor deur die feit dat hierdie mense op 'n kalsium-inname bestaan wat baie laer is as dié van die Blankes en veel laer as die hoeveelhede wat deur oorsese gesaghebbende liggame aanbeveel word. Ondersoeke wat alreeds uitgevoer of nog aan die gang is, sluit in balanswaarnemings (studies oor inname, opbrengs en behoud), serum-kalsiumpeile, samestelling van moedersmelk en been, radiologiese studies, geneigtheid om bene te breek en die koers waarmee aanwas in lengte plaasvind. 'n Belangrike aspek wat nog ondersoek moet word is die bepaling van die kalsiumgehalte in die hele liggaam van Bantoes en Blankes. Desnieteenstaande dui navorsingswerk wat tot dusver gedoen is, daarop dat simptome wat spesifiek toe te skrywe is aan 'n lae kalsium-inname, nie sigbaar is by hierdie mense nie. Ons kan miskien net byvoeg dat 'n aantal groepe werkers sowel in die Verenigde State as in Brittanje meer en meer skepties staan teenoor die hoë standaard van die kalsium-inname wat tans deur ortodokse voedselkundiges gesteun word.

Ondersoeke na die Ystermetabolisme van die Suid-Afrikaanse Bantoebevolking

Navorsing op hierdie gebied spruit oorspronklik uit die waarneming van oorlede prof. Strachan (later deur prof. Gillman en ander werkers bevestig), dat die ingewande van volwasse Bantoes dikwels buitengewoon groot hoeveelhede yster bevat. Voortkomend uit studies wat aanvanklik gemaak is, is voorgestel dat die verskynsel moontlik te wyte kan wees aan 'n mondelinge „oormaat” yster aangesien die inname van buitengewoon groot hoeveelhede, afkomstig van die gebruik van yster eetgerei, algemeen is.

Studies wat tans nog aan die gang is dui daarop dat die voorkoms, ouderdom en geslag wat aangetas word, die verspreiding van die element en ander kenmerke almal van so 'n aard is dat verwag kan word dat hulle die gevolg is van mondelinge „oormaat” yster. Dit

Reference Library

An important aspect of the work of the Family Health Research Unit is the building up of an index library with special reference to child growth and development.

HUMAN BIOCHEMISTRY RESEARCH UNIT, JOHANNESBURG

Head of the Unit: DR. A. R. P. WALKER,
South African Institute for Medical Research

Investigations on the Calcium Metabolism of the South African Bantu

The investigations on the calcium metabolism of the Bantu, which began several years ago, were prompted by the fact that these people subsist on a calcium intake much lower than that of Europeans, and far lower than the allowances recommended by overseas authoritative bodies. Studies already carried out and those now completed or in progress include balance observations (intake, output and retention studies), serum calcium levels, composition of breast milk and of bone, radiological studies, proneness to fracture bones, and rate of attainment of height. An important aspect yet to be investigated is determination of percentage of calcium in total bodies of Bantu and European subjects. Nevertheless, research work thus far undertaken indicates that stigmata specifically attributable to a low calcium intake are not apparent in these people. It may be added that a number of groups of workers, both in the United States and Britain, are becoming increasingly sceptical of the high standard for calcium intake now favoured by orthodox nutritionists.

Investigations on the Iron Metabolism of the South African Bantu

Research work in this field arose originally from the observation of the late Professor Strachan (confirmed later by Professor Gillman and other workers) that the viscera of adult Bantu frequently contain abnormally large amounts of iron. Arising from initial studies, it was suggested that the phenomenon may possibly be due to oral iron “overload,” since the ingestion of excessive amounts of the element, derived mainly from the uptake from iron food utensils, is common.

Studies undertaken up to the present indicate that the incidence, age and sex affected, the distribution of the element, and other characteristics, are all such as might be expected to arise from oral iron “overload.”

is belangrik om daarop te let dat daar geen bewys hestaan dat „oormaat” yster nadelig is vir die gesondheid nie.

Metabolismestudies aan die Baragwanath-hospitaal vir nie-Blankes

Balanswaarnemings.—In medewerking met die Senior Kindergeneeskundige van die Hospitaal, dr. E. Kahn is balanswaarnemings gedoen op 'n reeks Bantoebabas wat aan gevorderde ondervoeding (Kwashiorkor) ly, 'n algemene verskynsel wat verantwoordelik is vir 'n besonder hoë sterftesyfer onder lyers wat geen behandeling ontvang nie. Melding kan gemaak word van enkele voorlopige waarnemings. Die hoofkenmerk van babas wat tot die hospitaal toegelaat word, is gebrekkige absorbering in die spysverteringskanaal. Van die totale uitskeidings (van niere en derms) word tweederdes van die water, vier-vyftes van die totale vaste stowwe en ongeveer die helfte van die stikstof en natrium, in die diaree-ontlastings uitgewerp. Na gedeeltelike herstel, en deur die gebruik van 'n aangesuurde afgeroomde melkpreparaat, is daar 'n skielike verskuiwing in die uitskeidingskanaal van al hierdie stowwe van ontlasting tot uriene wat dui op verbeterde absorbering en metabolisme. Teenstrydig met die algemene verwagting, bly die nierfunksie bevredigend in sover as wat dit deur die soortelike gewig van uriene weerspieël word, self in gevorderde gevalle van ondervoeding. By sommige babas egter, is die verliese aan vloeistof so groot dat urienvermindering intree ten spyte van bevredigende vloeistofinname. Verdere werk duur voort.

Gebrek aan sweet in ondervoede Bantoebabas wat aan edeem ly.—Aangesien dit 'n bekende feit is dat somerhitte en vogtigheid die portret van ondervoeding baie vererger, is etlike ondervoede Bantoebabas met edeem sowel as kontrolegevalle gedurende die winter blootgestel aan somerhitte in 'n geventileerde metaboliese saal. Daar is gevind dat :—

1. Ondervoede babas wat aan edeem ly, sweet baie min, boonop ontstaan daar 'n styging in liggaamstemperatuur.
2. Na 'n behandeling van etlike dae of weke met 'n aangesuurde melkpreparaat totdat edeem nie langer aanwesig is nie, sweet die babas wat daarvan herstel het vrylik, soos die kontroles, en albei groepe toon 'n baie klein styging in temperatuur. Bewys is gelewer dat die onreëlmatigheid in sweetreaksie te wyte is aan swak oppervlaksbloedsomloop.

Die openbaring van hierdie verskynsel in verhouding tot die aanval van „Somardiaree” by ondervoede Bantoebabas wat volg op 'n seisoenstyging in atmosferiese temperatuur, word verder ondersoek.

It is important to note that there appears to be no evidence that iron “overload” *per se* is detrimental to well-being.

Metabolism Studies at Baragwanath non-European Hospital

Balance Observations.—In collaboration with the Senior Paediatrician of the Hospital, Dr. E. Kahn, balance observations have been carried out on a series of Bantu infants suffering from advanced malnutrition (kwashiorkor), a common condition responsible for a very high mortality in untreated sufferers. Certain tentative observations may be mentioned. The chief characteristic of infants on admission to hospital is defective absorption in the gastro-intestinal tract. Of the total excreta from kidneys and bowel, two-thirds of the water, four-fifths of the total solids, and about half of the nitrogen and sodium, are voided in the diarrhoeal stools. After partial recovery, using an acidified skimmed milk preparation, there is a dramatic shift in the pathway of excretion of all these substances from stool to urine, indicative of improved absorption and metabolism. Contrary to expectation, renal function, in so far as it is reflected by specific gravity of urine, remains satisfactory, even in advanced cases of malnutrition. However, in some infants, losses of fluids are so large that anuria occurs in spite of satisfactory fluid intake.

Further work is proceeding.

Lack of Sweating in Malnourished Bantu Infants with Oedema.—Since it is known that summer heat and humidity severely aggravate a malnutritional picture, certain malnourished Bantu infants with oedema, also controls, were subjected in winter to summer stress in an air-conditioned metabolic ward. It has been found that :—

- 1 Malnourished infants with oedema perspire very little; moreover, a rise in body temperature occurs.
- 2 After several days or weeks of treatment with acidified milk preparation, by which time oedema is no longer present, recovered infants perspire freely, comparable to controls, both groups showing very little rise in temperature. Evidence suggests that the disorder in sweat response is due to poor peripheral circulation.

The relevance of this phenomenon in relation to the onset of “Summer Diarrhoea” in poorly nourished Bantu infants following seasonal rise in atmospheric temperature, is being further investigated.

periodes versamel en die verlies aan aktiewe yster (en daaropvolgende bloedverlies) bepaal. Ten slotte word die pasiënt ontworm, die wurms word getel en die bloedverlies per wurm per dag bereken. Na talyke moeilikhede van organisasie en laboratorium-tegniek, is die eerste pasiënt met sukses ondersoek. Dit sal egter voorbarig wees om die resultate te bespreek alvorens 'n verdere aantal persone nie ook ondersoek is nie.

Nikotiensuurkonsentrasie in die melk van Bantoemoeders

'n Dieët wat ontbreek aan nikotiensuur word gewoonlik beskou as 'n oorsakende faktor in die ontwikkeling van pellagra, 'n siekte te wyte aan ondervoeding wat algemeen voorkom onder die Bantoes en ander mielie-etende volke. Hierdie toestand is enigszins verwarrend aangesien die Bantodieët, veral wanneer dit groot hoeveelhede gegiste graanpreparate insluit sodanig is dat dit 'n bevredigende vitamieninname behoort te gee. Amerikaanse werkers het egter onlangs aangetoon dat baie van die nikotiensuur in mielies aanwesig is in „gebonde” vorm en minder toeganklik is vir metabolisme as dié in koring.

'n Moontlike gevolg is dat Bantoemoeders 'n lae vitamienkonsentrasie in hulle melk mag toon afgesien van 'n bevredigende nikotiensuurinname. In medewerking met mediese beamptes by sekere hospitale en klinieke sowel as met die Buro vir Standaarde wat die vitamienbepalings onderneem het, het die ondersoek die volgende aan die lig gebring:—

- (a) Die konsentrasie van nikotiensuur in die melk van Bantoemoeders is veel minder ('n gemiddelde van minder as die helfte) as die by Blanke moeders, ten spyte van 'n bevredigende vitamieninname.
- (b) Die gemiddelde waarde vir Indiër- en Kleurlingmoeders wat laat drink en 'n laer mielie-inname het, is hoër as dié van die Bantoemoeders hoewel nog veel minder as die van Blanke moeders.
- (c) 'n Klein aantal Bantoe- en Indiërmoeders op 'n Blanke dieet wat baie min mielies bevat, het 'n gemiddelde waarde gehad soortgelyk aan dié vir Blanke moeders.

Die rede vir die lae konsentrasie nikotiensuur in die melk van Bantoemoeders is nie duidelik nie: die verskynsel kan beskou word as 'n faset van die algemene metaboliese portret wat afgedruk word deur 'n mielie-ryke dieet. Die lae waarde is egter van twyfelagtige betekenis; eerstens aangesien geen simptome van ondervoeding (insluitende pellagra) wat van toepassing is op Bantoebabas wat uitsluitlik aan die bors gevoed is, waargeneem is nie en tweedens omdat die nikotiensuurinname by babas wat met sukses op koemelk gevoer is, nog minder is as die van Bantoebabas wat aan die bors gevoed is. Verdere werk duur voort.

calculated. After overcoming numerous difficulties of organisation and laboratory technique, the first subject has been successfully examined, but it would be premature to discuss results before further infested persons have been investigated.

Nicotinic Acid Concentration in Bantu Breast Milk

A diet deficient in nicotinic acid is usually regarded as a causative factor in the development of pellagra, a nutritional disease common among the Bantu and other maize eating people. That this should be so has been puzzling, for the Bantu diet, particularly when it includes large amounts of fermented cereal preparations, is such as to afford a fairly satisfactory intake of the vitamin. However, American workers have recently shown that much of the nicotinic acid in maize is present in “bound” form, and less available for metabolism than that present in wheat. A possible consequence may well be that even with satisfactory nicotinic acid intake, Bantu mothers will show a low concentration of the vitamin in their breast milk. In collaboration with medical officers to certain hospitals and clinics, and also with the Bureau of Standards who undertook the vitamin determinations, investigation has revealed that:—

- (a) The concentration of nicotinic acid in Bantu breast milk is much less (an average of less than half) than that for European mothers, despite a satisfactory intake of the vitamin.
- (b) The average value for Indian and Coloured lactating mothers, with lower maize intake, is higher than that of the Bantu mothers, though still much less than that of European mothers.
- (c) A small number of Bantu and Indian mothers on a Europeanised diet containing little maize had an average value similar to that of European mothers.

The reason for the low concentration of nicotinic acid in Bantu breast milk is not clear: the phenomenon may be regarded as a facet of the general metabolic picture imposed by a diet rich in maize. However, the low value is of questionable nutritional significance; firstly, since no relevant nutritional stigmata, including pellagra, have been observed in exclusively breast fed Bantu infants; and secondly, because the nicotinic acid intake by babies successfully fed on a cow's milk diet is still less than that of breast fed Bantu babies. Further work is being carried out.

Biochemie van Gynaecomastia

Gynaecomastia of vergroting van die manlike bors wat algemeen onder die Bantoes voorkom, word dikwels beskou as 'n bewys van die mislukking van die lewer om hormone wat voortgebring word deur die teelkliere en byniere, buite werking te stel. 'n Paar opvallende gevalle onder mynwerkers wat deur die Hoofkantoor van die Witwatersrandse Naturellearbeidsvereniging in Johannesburg gegaan het, is ondersoek met betrekking tot hulle kliniese geskiedenis, bloed-biochemie, urien-ontlading en hematologie. Die aantal persone wat tot dusver ondersoek is, is te min om tot gevolgtrekkings te kom aangaande die oorsaak of betekenis van hierdie interessante verskynsel.

GEMEENSKAPLIKE VOEDINGSNAVORSINGS-EENHEID VAN DIE W.N.N.R. EN DIE UNIVERSITEIT VAN DIE WITWATERSRAND

Hoof van die Eenheid: PROF. J. GILLMAN,
Universiteit van die Witwatersrand

Die hoofdoel van die Eenheid was vanjaar die versameling van alle inligting betreffende die voedingswaarde van mielies in verskillende vorms wat ingewin is deur proewe wat tydens die afgelope vyf jaar uitgevoer is. Die verslag van hierdie werk behoort teen die einde van 1953 gepubliseer te word.

Die langtermynproewe wat bedoel is om die uitwerking van mielies op die lewensgang van die mens toe te lig, sal teen die einde van 1954 voltooi word. Met die bykomende inligting wat beskikbaar gestel sal word as gevolg van die program van medewerking met dr. Loustalot van Basle en dr. Saxen van Helsinki, behoort daar nuttige wenke te wees met betrekking tot die relatiewe belangrikheid van klimaats- en genetiese faktore in die wysiging van die gevolge van sy dieet op die lewensgang van die knaagdier.

Dierevoeding

Die ontleding van proewe i.v.m. die voeding van rotte het tot dusver die volgende aan die lig gebring:—

1. Wanneer mielies die hoofbron van koolhidraat in 'n dieet uitmaak, moet 'n minimum van 2 persent proteïen bygevoeg word ten einde afdoende groei en behoud te verseker.
2. Die proteïen in mielies, saam met dié afkomstig van enige ander bron, kan nie met sukses gebruik word in die afwesigheid van die bykomende vitamien A en D en 'n gebalanseerde soutmengsel nie.
3. Sojaboontjies, as 'n bykomende bron van proteïen in 'n mieliedieet is uiters onbevredigend in die afwesigheid van bykomende soute en vitamien A

Biochemistry of Gynaecomastia

Gynaecomastia or enlargement of the male breast, not uncommonly observed in the Bantu, is often regarded as evidence of the failure of the liver to inactivate hormones produced by the gonads and adrenals. A few well marked cases in mine-workers, passing through the Witwatersrand Native Labour Association Headquarters in Johannesburg, have been investigated with regard to their clinical history, blood biochemistry, urine analysis, and haematology. The number of subjects examined thus far is insufficient to allow conclusions to be drawn either on the aetiology or the significance of this interesting phenomenon.

JOINT C.S.I.R./WITWATERSRAND UNIVERSITY NUTRITION RESEARCH UNIT

Head of the Unit: PROF. J. GILLMAN,
University of the Witwatersrand

This year, the main effort of the Unit has been directed towards assembling all the information concerning the nutritional value of maize, in a variety of settings, accumulated from experiments conducted over the last five years. The report of this work should be published by the end of 1953.

The long-term experiments designed to elucidate the effect of maize on the life track will be completed towards the end of 1954. With the additional information which will become available as a result of the collaborative programme with Dr. Loustalot of Basle and Dr. Saxen of Helsinki some useful leads should be obtained as to the relative importance of climate and genetic factors in modifying the effects of diet on the life track of the rodent.

Animal Nutrition

The analysis of rat nutritional experiments thus far reveals that:—

1. When maize constitutes the main source of carbohydrate in a diet, a minimum level of 2 per cent. added protein is essential for adequate growth and survival.
2. The protein in maize, together with that derived from any other source, cannot be effectively utilised in the absence of additional vitamins A and D and a balanced salt mixture.
3. Soya bean, as a source of additional protein in a maize diet, is very unsatisfactory in the absence of additional salts, and vitamins A and D. Even

—en D. Selfs wanneer 'n geskikte soutmengsel en vitamien A en D in die dieet ingesluit word, kan ernstige beskadiging aan die niere en agteruitgang van die hartbloedvatstelsel verwag word.

4. Hoe waardevol afgeroomde poeiermelk ook al mag wees as aanvulling by die diëte van diere tydens korttermynproewe, sal die niere en lewer onder andere, patologiese veranderinge van 'n wisselende graad toon behalwe as dit met 'n konsentrasie van 20 persent in die dieet voorsien word.
5. Dit moet beklemtoon word dat mielies in verskillende vorms, selfs wanneer dit aangevul word deur poeiermelk (onder 10 persent), sojaboontjies of kaseïen vernietigende gevolge op die geraamte het. In hierdie verband het die Eenheid die aandag gevestig op die besonder hoë voorkoms van rachitis onder Naturellekinders onder die ouderdom van drie jaar. Laasgenoemde waarneming is daarna klinies en radiologies aan die Coronation-hospitaal bevestig.
6. Groei alleen is geensins 'n geskikte aanduiding van die doeltreffendheid vir 'n diëet nie. In 'n sekere voedingsverband, mag die diere afdoende groei en terselfdertyd wydverspreide patologiese veranderinge in die inwendige organe, spiere en geraamte tydens die proses ontwikkel. So lank as mielies die stapelvoedsel van die ekonomies-lae groepe uitmaak, is die uitskakeling van siektes te wyte aan ondervoeding onuitvoerbaar afgesien van die feit dat dit 'n besonder duur onderneming sal wees.

Lewerkarsinoom

Die onderlinge verhouding tussen diëet, beskadiging van die lewer en lewercancer is gedurende 1953 met groot ywer ondersoek. Die volgende is vasgestel deur die navorsing van die Eenheid :—

1. 'n Diëet wat in alle opsigte gebalanseerd is, behalwe dat dit ontbreek aan vette en die vet-oplosbare vitamien (A en D), is in staat om oormatige groei van die galbuis in die lewer te bevorder en kan in sommige gevalle die vergroting van die gewone galbuis veroorsaak.
2. Oormatige groei van die galbuis kan voorkom en genees word deur,
 - (a) die byvoeging van beesvet wat nie bewysbare vitamien A bevat nie, en
 - (b) die toediening van tioürasil of tioüream.

Daar word in laasgenoemde geval gesuggereer dat ensiemstelsels wat gedeeltelike of heeltemal verstop is deur tioürasil of tioüream noodsaaklik is vir die bevordering van oormatige groei van die galbuis. Wanneer tioüream vir 'n lang tyd aan rotte op 'n gebalanseerde rantsoen gegee

when a suitable salt mixture and vitamins A and D are included in the diet, profound kidney damage and cardio-vascular degeneration are still to be expected.

4. However valuable skimmed milk powder may be in supplementing the diets of animals in short range experiments, unless supplied at a concentration of 20 per cent. in the diet, the kidney and the liver, amongst other organs, will show pathological changes of a varying degree of severity.
5. It is to be emphasized that maize, in a variety of different settings, even when supplemented with milk powder (below 10 per cent.) or soya bean or casein produces devastating effects on the skeleton. In this connection the Unit has drawn attention to the very high incidence (over 50 per cent.) of rickets in Bantu children under the age of three years. The latter observation was subsequently confirmed clinically and radiologically at Coronation Hospital.
6. Growth alone is by no means a suitable indicator for assessing the efficiency of a diet. In some nutritional contexts, the animals may grow efficiently and in the process develop widespread pathological changes in the internal organs, in the muscles and in the skeleton. As long as maize constitutes the main food of the low economic groups, the elimination of nutritional disease is impracticable and would be an extremely costly undertaking.

Carcinoma of the Liver

The inter-relationship of diet, liver injury and cancer of the liver has been pursued with great intensity during 1953. The Unit's investigations have established that :—

1. A diet balanced in all respects, except that it lacks fats and the fat-soluble vitamins (A and D), is capable of promoting marked intrahepatic bile duct hyperplasia and, on occasion, enlargement of the common bile duct.
2. Hyperplasia of the bile ducts can be prevented and cured—
 - (a) by the addition of beef fat, which does not contain demonstrable vitamin A, and
 - (b) by the administration of thiouracil or thiourea, suggesting in the latter instance that enzyme systems, partially or completely blocked by thiouracil or thiourea are essential for promoting bile duct hyperplasia. Prolonged feeding of thiourea to rats on a balanced ration promotes the development of a fatty liver, marked dilatation of the intrahepatic bile ducts and an overgrowth of fibrous tissue which is confined to the

word, bevorder dit die ontwikkeling van 'n vet-lewer, veroorsaak opvallende swelling van die galbuise in die lewer en die groei van veselagtige weefsel wat beperk is tot die hiperplastiese en vergrote buise. By die mens word 'n soortgelyke sistiese verandering in die galbuise binne die lewer beskou as van onbekende oorsaak of van erflike oorsprong. Hierdie proewe bring aan die lig dat die sistiese galbuise gladnie van erflike oorsprong hoef te wees nie maar deur voeding veroorsaak word by volwasse rotte.

3. Die inplanting van estrogeenkoeëltjies in rotte wat op 'n vetvrye dieët is, vererger die oormatige groei van die galbuise en prikkel die lewerselle tot sulke veelvormige reaksies dat laasgenoemde ooreenkom met die voorkankertoestand wat beskryf word by rotte wat op 'n dieët van bottergeel is. Manlike rotte word baie ernstiger hierdeur aangetas as vroulike rotte. Hierdie seksuele verskil in reaksievermoë is van besondere belang in die lig van waarneming wat deur dr. Davies in Oeganda gemaak is nl. dat die voorkoms van lewerkarsinoom by die Naturel twintig maal hoër is by mans as by vrouens. Die bewys dat deur eksperimente met rotte gelewer is dui daarop dat buislose sowel as voedingsfaktore op die spel is by die produksie van lewerkarsinoom. 'n Toevallige waarneming is dat thiourea chromatoliese kerns kan voortbring wat soortgelyk is aan dié wat in die lewers van mense wat aan suikersiekte ly, gevind word selfs al word dit beheer deur insulien.

Die Makromolekulêre Simptogroep

Verskeie studies is gedurende 1952-1953 voltooi.

1. 'n Korrelasie tussen die struktuur van kleurstof en sy vermoë om retikulosis te veroorsaak.
2. 'n Spektrometriese studie van die bindende vermoë van plasmaproteïen-kleurstofkomplekse in verskillende diere om vas te stel of dit enige aanduiding kan gee waarom retikulosis reeds vroeg ontwikkel by sommige soorte terwyl ander daarteen bestand is.
3. Die hemolitiese uitwerking van dekstrien, tripanblou en saponien.
4. Die ontstaan van gesigsgebreke wat proefondervindelik veroorsaak is in rotte wat met tripanblou behandel is.

Eksperimentele Fisiologie en Metabolisme van die Bobbejaan

Die groei en ontwikkeling van die bobbejaan en die uitslag van die maandstondsiklus en van swangerskap onder bekende dieettoestande is versigtig gestandaardiseer na byna twintig jaar se arbeid. Die vervolmaking van

hyperplastic and dilated ducts. In man, similar cystic change in the intrahepatic bile ducts is regarded either as having an unknown etiology or as having a congenital origin. These experiments disclose that the cystic bile ducts need not be of congenital origin but can be produced nutritionally in adult rats.

3. The implantation of pellets of oestrogen into rats on a fat-free diet so intensifies the bile duct hyperplasia and stimulates such marked pleiomorphic reactions in the liver cells that the reaction resembles the pre-cancerous state described in butter-yellow fed rats. Male rats are much more seriously affected than female rats. This sexual difference in reactivity is of particular interest in view of the observations made by Dr. Davies in Uganda that the incidence of carcinoma of the liver in the African is twenty times greater in males than in females. The evidence from experiments in rats more than indicates that both nutritional and endocrine factors are at play in the production of hepatic carcinoma. A coincidental observation is that thiourea can produce chromatolytic nuclei similar to those described in the livers of human diabetics, even when controlled by insulin.

The Macromolecular Syndrome

Several studies have been completed during 1952-1953.

1. A correlation between dye structure and the capacity of the dye to produce reticulosis.
2. A spectrophotometric study of the binding capacities of plasma protein-dye complexes in different animals to determine whether this can give any indication as to why some species develop reticulosis early whereas others are immune.
3. The haemolytic effects of dextran, trypan blue and saponin.
4. The pathogenesis of eye defects produced experimentally in trypan-blue treated rats.

Experimental Physiology and Metabolism of the Baboon

The growth and development of the baboon and the events of the menstrual cycle and of pregnancy under known conditions of diet have been carefully standardised after almost twenty years of work. The perfection

tegnieke vir die verwydering van die bynier, skildklier en harsingslymklier (laasgenoemde met die bekwame bystand van dr. E. Epstein) het voorlopige ramings van die uitwerking van sulke veranderings van buislose kliere op die groei en reprodktiewe siklus in mannetjie- en wyfiebobbejane, moontlik gemaak. Die weg is nou geopen vir verdere uitbreiding van hierdie navorsing tot die metaboliese peil met besondere verwysing na die metabolisme van proteïene, koolhidrate, water elektroliete, lipiede en jodium.

Proteïenmetabolisme.—Gedurende die afgelope twee jaar is 'n groot aantal gegewens ingesamel aangaande die faktore wat die plasmaproteïene in wyfiebobbejane reël gedurende die maandstondsiklus en swangerskap by diere waarvan die skildklier en harsingaanhangsel verwyder is, by mannetjie- en wyfiebobbejane wat gekastreer is en by diere onder proefbehandeling, en word nou in monografiese vorm verwerk. Wanneer dit gepubliseer word, sal hierdie monografie 'n fundamentele bydrae lewer tot die verklaring van proteïenmetabolisme.

Jodium- en Lipiedmetabolisme.—'n Omvattende ontleding is gemaak van die jodium- en lipiedmetabolisme gedurende die maandstondsiklus en swangerskap by die bobbejaan. Proefresultate word nou versamel vir publikasie. Gedurende hierdie ondersoek, is distilleertegniese vir die groot hoeveelheid van proteïengebonde jodium krities ontleed en baie moeilikhede wat die roetineskatting van proteïengebonde jodium gestrem het, is opgelos.

Watermetabolisme.—Noukeurige waterbalansstudies is uitgevoer op die bobbejaan tydens die normale maandstondsiklus. Daar is bepaal dat die oormatige urienafskeiding wat net na eieruitstoting voorkom, nie deur die hormone van die agterste slymklier voorkom kan word nie. Bowendien is gevind, in teenstelling met die algemene verwagting, dat die toediening van desoksikortikosteron-asetaat of progesteron gedurende die eerste fase van die siklus, nie alleen die ophoping van water stuit nie maar inderdaad 'n negatiewe waterbalans bespoedig.

Dit is duidelik dat 'n korrelasie tussen die skommeling in die proteïene en in die elektroliete veel lig mag werp op die faktore wat die buitengewone waterskuivings gedurende die maandstondsiklus van die bobbejaan kontroleer. Die verklaring van hierdie probleem sal 'n bydrae lewer tot die kennis van watermetabolisme in die algemeen.

Koolhidraatmetabolisme.—Die studie van koolhidraatmetabolisme het onlangs 'n aanvang geneem met normale bobbejane en bobbejane waarvan die skildklier en harsingaanhangsel verwyder is.

of techniques for removal of the adrenal, thyroid and pituitary (the latter with the skilled assistance of Dr. E. Epstein), has enabled preliminary assessments of the effects of such endocrine ablations on growth and on the reproductive cycle in male and female baboons to be made. The way has been paved now for extending these investigations to the metabolic level with particular reference to the metabolism of protein, carbohydrates, water, electrolytes, lipids and iodine.

Protein Metabolism During the last two years a great mass of data on the factors regulating the plasma proteins in female baboons during the menstrual cycle and pregnancy, in thyroidectomised, in hypophysectomised, in castrated male and female baboons and in animals under experimental treatment is now being assembled in monographic form. When published, this monograph will be a fundamental contribution to the understanding of protein metabolism.

Iodine and Lipid Metabolism A comprehensive analysis of iodine and lipid metabolism during the menstrual cycle and pregnancy in the baboon has been made. Experimental results are now being assembled for publication. In the course of this investigation, distillation techniques for the estimation of protein-bound iodine were critically examined and many difficulties hampering the routine estimation of protein-bound iodine have been overcome.

Water Metabolism.—Careful water balance studies have been conducted in the baboon throughout the normal menstrual cycle. It has been established that the remarkable diuresis occurring just after ovulation cannot be prevented by the hormones from the posterior pituitary. Moreover, contrary to expectation, desoxycorticosterone acetate or progesterone, administered in the first part of the cycle, not only arrests the accumulation of water but indeed precipitates a negative water balance.

It is apparent that a correlation of the fluctuations in the protein and in the electrolytes may throw much light on the factors regulating the remarkable shifts of water during the menstrual cycle of the baboon. The understanding of this problem will be a contribution to knowledge of water metabolism in general.

Carbohydrate Metabolism.—The study of the metabolism of carbohydrate has been recently initiated in normal, thyroidectomised and hypophysectomised baboons.

Die Buislose Klier en Maandstondsiklus.—Versteurings van die maandstondsritme het by al tien bobbejaanwyfies voorgekom waarvan die skildklier verwyder is. Hierdie waarneming het aan die lig gebring dat die skildklier in 'n sekere opsig baie nou verbonde is met die reëling van die normale maandstondsiklus. Die storings is noukeurig bestudeer.

In 'n poging om die ingewikkelde en wispelturige reaksies van die baarmoeder, dam en eierstokke by bobbejane waarvan die skildklier verwyder is, uit te plus, is oorweging geskenk aan die rol wat deur die slymklier gespeel word. Daar is gevind dat verwydering van die harsingaanhangsel geen betekenisvolle gevolge op die metabolisme het nie, maar dat die verwydering van die slymklier in verband gebring kan word met die verlenging van die lewensduur en die handhawing van liggaamsgewig.

Voeding en die Bobbejaan.—Nadat aangetoon is dat diëet die maandstondsiklus van die bobbejaan geheelenaal kan wysig en dat hervoeding nie altyd die abnormaliteit kan herstel nie, is daar nou 'n geleentheid om die belangrikheid van die diëet vir die reëling van die funksie van buislose kliere te openbaar. Die storings in die maandstondsiklus wat waargeneem is by ondervoede bobbejane is in baie opsigte dieselfde as dié wat voorkom by bobbejane waarvan die skildklier verwyder is en wat op 'n gebalanserde rantsoen leef.

Deur navorsing op die gebied van buislose kliere en dié op die gebied van voeding te verbind, is dit tans moontlik om die twee studies saam te laat vloei in die sentrale tema van al die navorsing van die Eenheid, naamlik dat diëet metabolismepatrone op die organisme dwing binne die raamwerk van die genotipe en sodoende sekere metaboliese verhoudings op die buislose kliere en die ander komponente van die organisme afdwing met bepaalde morfologiese gevolge.

Eksperimentele Studies van die Lewensgang

Soos hierbo gemeld, is verskeie studies aangaande die aandeel van voeding in die bepaling van die lewensgang van die organisme op die oomblik aan die gang in die laboratorium van die Eenheid en in samewerking met navorsers in Switzerland en Finland.

Histologiese ondersoek van die biniere van 167 manlike en 189 vroulike rotte waarvan die ouderdom gewissel het van 1 maand tot meer as 2½ jaar het 'n hoë voorkoms van phaeochromocytoma getoon. Tot dusver kan geen verduideliking nog gegee word vir die oorsaak van hierdie phaeochromocytoma by rotte. Klem is egter gelê op die noodsaaklikheid om die rol van die erflikheidsleer, diëet en omgewing te ondersoek by die vorming van byniertumors.

The Endocrine Glands and the Menstrual Cycle... Disturbances in the menstrual rhythm occurred in all of ten thyroidectomised female baboons. This observation revealed that the thyroid gland is closely connected in some way with the regulation of the normal menstrual cycle. The disturbances have been studied in detail.

In attempting to unravel the complex and variable reactions of the uterus, perineum and ovaries in thyroidectomised baboons, consideration was given to the role of the pituitary gland. It was found that hypophysectomy does lead to significant effects on the metabolism, but that removal of the pituitary is not incompatible with prolonging survival and maintenance of body weight.

Nutrition and the Baboon.—Having shown that diet can profoundly modify the menstrual cycle of the baboon and that re-feeding may not correct the abnormality, an opportunity is now available for disclosing the importance of diet in regulating endocrine function. The disturbances of the menstrual cycle observed in malnourished baboons are similar in many respects to those occurring in thyroidectomised baboons subsisting on a balanced ration.

By combining endocrine and nutritional investigations, it is now possible to converge the two studies on to the central theme of all the Unit's investigations, namely, that diet imposes patterns of metabolism on the organism within the framework of the genotype, and in so doing forces particular metabolic relationships between the endocrine glands and the other components of the organism with defined morphological consequences.

Experimental Studies of the Life-track

As mentioned above, several studies on the role of nutrition in determining the life track of the organism are at present in progress in the Unit's laboratory and in conjunction with investigators in Switzerland and Finland.

Histological examination of the adrenal glands of 167 male and 189 female rats ranging from 1 month to over 2½ years of age revealed a high incidence of phaeochromocytoma.

As yet no explanation could be offered for the etiology of phaeochromocytoma in the rats, but emphasis was placed on the need for investigating the role of genetics, diet, and environment in the production of adrenal tumours.

Menslike Voeding.—

Gedurende 1953, is die handgewigte van meer as 700 Naturellekinders waarvan die ouderdomme bekend was en gewissel het van geboorte tot ses jaar oud, aan 'n x-straalondersoek onderwerp en tabelle en grafieke is opgestel om die vroegste en laatste middelpunte van beenvorming en hulle rangorde aan te toon sowel as die waarskynlike ouderdom van voorkoms. Hierdie studie sal gevolg word deur gekeurde reekse studies op 'n groep ondervoede babas wat baie noukeurig gekontroleer word. Die werk sal 'n groepsopvoeding wees waarby die kindergeneeskundige van die Coronation-hospitaal, lede van die Voedingseenheid en die Departement van Fisiologie aan die Mediese Skool van die Universiteit van die Witwatersrand ingesluit is.

TERINGNAVORSINGSEENHEID, DURBAN

Hoof van die Eenheid: DR. B. A. DORMER,
Koning George V-hospitaal

Die werk van die afgelope jaar was besonder prikkelend en vrugbaar. Met die koms van streptomisien, P.A.S. en I.N.H. sterf teringgevalle nie meer nie en ons skep 'n groot aantal gesonde mense. Sommige gevalle het egter nog hardnekkige holtes wat Tuberkelbasille uitskei en dit onmoontlik maak om die pasiënt te ontslaan aangesien hy nog 'n gevaar is vir openbare gesondheid. Deur hierdie ophoping van sogenaamde „goeie kroniese gevalle,” is ons hospitaalbeddens vir teringgevalle oorvol. Waar moontlik is snykunde aangewend om hierdie holtes te verwyder, maar daar is gevalle waar uitsnyding as te gevaarlik beskou word. Uitgaande hiervan het die Teringeenheid alle moontlike maniere ondersoek om hierdie teringagtige holtes toe te maak en te steriliseer en het uiteindelik die moontlikhede vir 'n direkte aanval op die holtes in die ongeskonde long ondersoek.

Die gebruik van gehidreerde plantolie met 'n smeltpunt van heelwat bokant liggaamstemperatuur is voorgestel. 'n Eenvoudige maar doeltreffende metode is ontwikkel waardeur holtes vasgestel en geprik kan word en gehidreerde plantolie deurdrenk met antibiotiese middels wat 'n soliede massa by liggaamstemperatuur vorm, daarin gevoer kan word. Die merk wat op die liggaam agterbly is niks meer as dié van 'n naaldprik nie en die holtes is gesteriliseer. Die eindresultaat is 'n negatiewe speeksel wat die pasiënt vrystel van 'n onbepaalde verblyf in die hospitaal. Hierdie metode is vir die afgelope 18 maande met sukses by die Koning George V-hospitaal aangewend en is onlangs gepubliseer as 'n byvoegsel tot die Julie-uitgawe (1953) van die *British Journal of Tuberculosis*. Waar ons voorheen lang waglyste vir chirurgiese gevalle gehad het, is ons nou slegs 'n maand

Human Nutrition

During 1953, the wrists of over 700 Bantu children of known age, ranging from birth to six years, have been studied by X-ray, and tables and graphs were drawn up to show earliest and latest centres of ossification and their order as well as the probable age of appearance. This study will be followed by studies in a selected series of a very carefully controlled malnourished infants. This work will be a group effort involving the pediatrician at the Coronation Hospital, members of the Nutrition Unit and the Physiology Department of the Witwatersrand University Medical School.

TUBERCULOSIS RESEARCH UNIT, DURBAN

Head of the Unit: DR. B. A. DORMER,
King George V Hospital

This last year's work has been most stimulating and fruitful. With the advent of Streptomycin and P.A.S. and I.N.H., tuberculosis cases are no longer dying and many are being turned into healthy citizens. Some cases, however, still have persistent cavities, excreting tubercle bacilli, and this condition does not allow the patient to be discharged, as he still a public health problem. With this banking up of so-called good chronics, our tuberculosis hospital beds have been blocked. Surgery where possible has been instituted to remove these cavities. There are, however, cases where resection is considered too formidable. Starting at this point the Tuberculosis Unit investigated all possible means of closing and sterilising tuberculous cavities and eventually explored the possibilities of direct attacks on the cavities in the intact lung.

The use of hydrogenated vegetable oil with a melting point well above body temperature was suggested and a simple but very effective method of localising cavities was evolved, needling them and introducing hydrogenated vegetable oil impregnated with antibiotics, which forms a solid mass at body temperature. The scar left on the body is no more than that left by a needle puncture and the cavities are sterilized. The end result is a negative sputum which frees the patient from an indefinite stay in hospital. This method has been used with success at King George V Hospital for the past 18 months and was recently published as a supplement to the *British Journal of Tuberculosis* for July, 1953. Whereas formerly there were long waiting lists for surgical cases, today there is a lag of only a month. Out of the success of this procedure new and

agter met ons gevalle. Uit die sukses van hierdie procedure, kom nuwe en interessante metodes vir die behandeling van longtering voor.

Danksy die gebruik van streptomisien, P.A.S. en I.N.H. staan Tuberkuloseuse Meningitis wat vroeër die doodsvonnis was vir enigeen wat dit gekry het, vandag byna op dieselfde peil as die ander oorsake van harsingsvliesontsteking hoewel dit nog 'n hoër sterftesyfer het. Dr. Bulkeley het aan hierdie saak gewerk wat die hoogste frekwensie toon onder die nie-Blanke rasse van die land en het 'n waardevolle bydrae gelewer tot die behandeling van Tuberkuloseuse Meningitis deur die aanwending van Adrenokortikotropiese hormoon (A.K.T.H.) met die ander antibiotiese middels en chemo-terapeutiese stowwe. Sedert sy met hierdie metode begin het, het die sterftesyfer tot 6.5 persent gedaal, waarskynlik een van die laagste wat tot op datum opgeteken is en die metode van behandeling is sodanig dat dit in enige algemene hospitaal toegepas kan word en nie noodwendig slegs in een wat spesialiseer in die behandeling van Tuberkuloseuse Meningitis nie. Die A.K.T.H. word gebruik om die akute onstekingsreaksie op die Tuberkuloseuse besmetting te verhoed sodat die isonikotiensuurhidrasied wat in hoë konsentrasies deurgaans in die harsing- en rugmurgvliesvog, sy volle uitwerking op die Tuberkelbasille kan hê voordat hulle opgesluit raak in die fibrien en uitvloeielsel van selle. Aangesien die intratekale toediening van antibiotiese middels nie langer vereis word nie, word ons nie langer omring van gevare soos sekondêre besmetting by harsingsvliesontsteking nie.

In Suid-Afrika waar ons weet dat 'n hoë persentasie van ons beeste aan tering ly, word baie min gevalle van Beesting onder mense gevind. Dit was moeilik om 'n verklaring hiervoor te vind totdat drs. Dörmer, Beemer en Martinaglia die uitwerking van gisting op kalbasemelk ondersoek het; die Naturelle se manier om melk goed te hou. Hulle het gevind dat tuberkelbasille, menslike sowel as dié van die bees, wat gebruik is om die melk te besmet voordat gisting plaasgevind het, vernietig is en nie op kultuurmediums gegroei het nie. Hulle het ook nie laboratoriumdiere besmet nie. Die organismes wat verantwoordelik was vir die vernietiging van die Tuberkelbasille, was laktobasille. Hierdie organismes is oorgeplaas na 'n groot laboratorium in die Verenigde State van Amerika waar hulle verder bestudeer sal word. Onsuiver filtrate wat van hulle gemaak is, het 'n stuitende uitwerking op die groei van tuberkelbasille gehad en het byna so goed gewerk as Streptomisien op besmette diere. Daar word gehoop dat 'n nuwe en kragtige antibiotiese middel teen tering uit hierdie werk sal voortspruit.

interesting methods of treating Pulmonary Tuberculosis are proceeding.

Tuberculous meningitis, which used in the past to bring a death warrant with it, has to-day, with the use of Streptomycin, P.A.S. and I.N.H. been brought almost into line with other causes of meningitis but still with a higher mortality rate. Work has been undertaken on this condition, which is most prevalent amongst the non-European races in this country and a very valuable contribution has been made to the treatment of tuberculous meningitis by using Adrenocorticotrophic hormone (A.C.T.H.) with the other antibiotics and chemotherapeutic substances. Mortality rate since a start was made with the use of this method has dropped to 6.5 per cent., which is possibly one of the lowest recorded to date in the literature, and the method of treatment is one which can be carried out in any general hospital and not necessarily one specialising in the treatment of tuberculous meningitis. The A.C.T.H. is used to prevent the acute inflammatory reaction to the tuberculous infection so that the isonicotinic acid hydrazide, which gets through to the cerebrospinal fluid in high concentrations, can have its full action on the tubercle bacilli before they get locked up in fibrin and exudate of cells. Because intrathecal administration of antibiotics is no longer required the hazards such as secondary infection meningitis are no longer with us.

In this country where it is known that a large percentage of our cattle have tuberculosis we have found very little in the way of bovine tuberculosis in man. An explanation for this fact has been hard to find until investigations were carried out on the effects of fermentation of milk in the calabash, which is the Natives' natural way of preserving milk. It was found that tubercle bacilli, both human and bovine, which were used to infect the milk before fermentation, were killed off and did not grow on culture media and could not infect laboratory animals. The organisms responsible for killing the tubercle bacilli were lactobacilli. These organisms have been passed on to a large laboratory in the United States of America for further studies. Crude filtrates made from them had an inhibitory effect on the growth of tubercle bacilli and almost as good an effect on infected animals as Streptomycin. It is hoped that out of this work a new and powerful antibiotic for tuberculosis may be evolved.

VIRUSNAVORSINGSEENHEID, KAAPSTAD

Hoof van die Eenheid: PROF. M. VAN DEN ENDE,
Universiteit van Kaapstad

Vanaf Februarie tot Junie 1953, het prof. van den Ende saam met Sir MacFarlane Burnet in Melbourne aan die genetiese herbinding van griepviruslyne gewerk.

Bakteriofaagstuitmiddels van Lyne van *Pseudomonas aeruginosa*

Die faagstuitende kragte van uittreksels uit verskeie lyne van *Pseudomonas* wat bestand is teen die gestuie fages dui op 'n ongewone bakteriofaag-verhouding in hierdie groep. Daar word gehoop dat verdere studie van die stuitmiddels hulle werkingswyse sal aandui en inligting sal verskaf aangaande die stuit van ander virusse deur mucopolysaccharides.

Gesuiwerde uittreksels uit drie van die serologies-afsonderlike lyne wat ondersoek is, was kragtige stuitmiddels, twee ander was minder aktief en een was nie-stuitend. 'n Voorlopige skeikundige ondersoek het geen verklaring van hierdie verskille opgelewer nie.

Die stuitmiddel van een lyn is in groot hoeveelhede berei en gefraksioneer. Die aktiefste materiaal stem groo:liks ooreen met die oppervlaksantigene van ander scorte bakterieë wat samestelling betref maar verskil blykbaar van lg. in sover dit groter weerstand bied teen ensiemes en chemiese middels. Die samestellende suikers is voorlopig geïdentifiseer en die aanwesigheid van twee ongewone aminosure is ontdek. Verdere skeikundige ontledingstudie is uitgestel aangesien elektroforese en elektromikroskopie 'n sekere mate van heterogeniteit aandui. Ons is dank verskuldig aan die Nasionale Fisiese Laboratorium vir die elektronmikrograwe. Werk in verband met verdere suiwering duur voert.

In verband met die analitiese werk is gevind dat monoaminomonokarboksiel- (basies sowel as suur) aminosure onder sekere omstandighede deur ionoforese op papier geskei kan word en daar word gehoop om 'n eenvoudige en vinnige metode vir die ontleding van mengsels van suiker en aminosure op hierdie bevinding te baseer.

Fisies-chemiese Studies oor Dierevirusse

Die metode vir die meet van die virus-partikelgrotte wat in die voorafgaande verslag vermeld is, is verbeter. Die deursnit van geelkoors-, sinkdalkoors- (viscerotropies) en perdesiektevirusse is gemeet sowel as die van poliomyelitis (Lansing) en knoppiesvelsiekte is herbepaal.

In medewerking met mej. Wessels (Uniedepartement van Gesondheid) is die bestaan van 'n „oplosbare antigeen” in die bereiding van die hondsdolheidvirus

VIRUS RESEARCH UNIT, CAPE TOWN

Head of the Unit : PROF. M. VAN DEN ENDE,
University of Cape Town

From February to June, 1953, Professor van den Ende worked with Sir MacFarlane Burnet at Melbourne on genetic recombination of strains of influenza virus.

Bacteriophage Inhibitors from Strains of *Pseudomonas aeruginosa*

The phage inhibitory powers of extracts from several strains of *Pseudomonas* which are resistant to the inhibited phages point to an unusual bacterium-phage relationship in this group. It is hoped that further study of the inhibitors may indicate their mode of action and provide information about the inhibition of other viruses by mucopolysaccharides.

Purified extracts from three of the serologically distinct strains examined were powerful inhibitors, two others were less active and one was not inhibitory. No explanation of these differences was provided by a preliminary chemical investigation.

The inhibitor from one strain has been prepared in quantity and fractionated. The most active material broadly resembles surface antigens from other species of bacteria in composition but appears to differ by being more resistant to enzymes and chemical agents. The constituent sugars have been tentatively identified and the presence of two unusual amino acids detected. Further analytical chemical study has been postponed because electrophoresis and electronmicroscopy indicate some heterogeneity. Work on further purification is proceeding.

In connection with the analytical work it has been found that monoaminomonocarboxylic, as well as basic and acidic aminoacids, are separable by ionophoresis on paper under certain conditions and it is hoped to base a simple and rapid method for analysis of mixtures of sugars and aminoacids on this finding.

Physico-chemical Studies on Animal Viruses

The method for measuring the particle sizes of viruses mentioned in the preceding report has been improved. The diameters of yellow fever, rift valley fever (viscerotropic) and horse sickness viruses have been measured and those of poliomyelitis (Lansing) and lumpy skin disease redetermined.

With the co-operation of a member of the staff of the Union Health Department, the existence of a “soluble antigen” in rabies virus preparations has

bevestig en sy partikelgrootte is bepaal deur diffusiemetings.

Oorweging van die partikelgrootte van al die klein virusse (waar hulle noukeurig bereken is) en van die deursnit van twee virusoplosbare antigene (griep en hondsdolheid) waarvan die grootte bepaal is, het gelei tot 'n eenheidsteorie oor die struktuur van die virusse. Al die kleiner virusse kan in drie groepe gerangskik word, sodat almal in dieselfde groep dieselfde gewig het wat 'n eenvoudige veelvoud vorm van die gewig van 'n partikel waarvan die grootte dieselfde is as die oplosbare antigeen van griep en hondsdolheid.

Die apparaat vir elektro-dekantasië van veelvoudige membrane is gebruik vir die bereiding van elektroforetiese homogene proteïene van serum en vir die bereiding van kristallyne tripsien uit 'n onsuiver uittreksel van die alvleesklier. 'n Gewysigde elektroforesesel is ontwerp en gebruik vir die suiwing van die hondsdolheidsvirus en die oplosbare hondsdolheidsantigeen.

Proewe in verband met die konsentrasie en suiwing van dierevirusse is voortgesit. Viruspreparate so suiwer as moontlik, is in die eerste plek nodig vir 'n ondersoek van hulle aard en samestelling en tweedens vir die vervaardiging van entstowwe. Daar is gevind dat gesentrifugeerde uittreksels van breine wat met hondsdolheid of poliomyelitis besmet is, 'n veel kleiner en meer deurskynende viruskocëltye tydens hoësnelheid sentrifugasie lewer indien dit eers by pH 8.2 in die aanwesigheid van serum gedialiseer word. Die virus van poliomyelitis wat op hierdie wyse van die breine van nege honderd suipmuisies gekonsentreer is, is op twee eiers ingeënt maar geen aanpassing het plaasgevind nie. Onlangs is bevind dat sentrifugaalgesuiwerde breinemulsies van muis wat met hondsdolheid of poliomyelitis besmet is, 'n neerslag vorm wanneer dit by pH 4.3 gedialiseer word. Hierdie neerslag bevat byna al die oorspronklike virus. As 'n uittreksel by pH 8.2 gemaak word, word die virus weer vrygestel maar die meerderheid van die neerslag bly onopgelos. Dit behoort 'n belangrike stap te wees in die suiwing van die virusse van poliomyelitis, hondsdolheid en moontlike ander virusse van breinstof. Allantoïenvog reageer op dieselfde manier behalwe dat die neerslag sowel as die virus weer by die hoër pH oplos. Die virusse wat bestand is teen tripsien kan egter van die daaropvolgende oplossing afgesonderd word in 'n gesuiwerde vorm deur vertering met hierdie ensieme gevolg deur ultra-sentrifugasie.

Sinkdalkoors

Die groeikurve van die viscerotropiese lyn in verskillende organe van die muis, is vasgestel en 'n suiwer preparaat van die virus is gemaak vir elektronmikroskopie.

Pogings om rooiselverklompings met hierdie virus te veroorsaak en sy verloop in rotte en ape te verseker, het misluk.

been confirmed and its particle size has been determined by diffusion measurements.

Consideration of the particle sizes of all the small viruses, where these have been accurately estimated, and of the diameter of two virus soluble antigens (influenza and rabies) of which the size has been determined, has led to a unitary theory of virus structure. All the smaller viruses can be arranged in three groups, those in each group having the same weight which is a simple multiple of the weight of a particle equal in size to the soluble antigens of influenza and rabies.

The multi-membrane electodecantation apparatus has been applied to the preparation of electrophoretically homogeneous protein fractions from serum and to the preparation of crystalline trypsin from a crude pancreatic extract. A modified electrophoresis cell has been designed and used to purify rabies virus and rabies soluble antigen.

Experiments on the concentration and purification of animal viruses have been continued. Virus preparations of the highest possible purity are needed, firstly for examination of their nature and constitution and, secondly, for the production of vaccines. It has been found that centrifuged extracts from brains infected with rabies or poliomyelitis yield a much smaller and more transparent virus pellet on high speed centrifugation if they are first dialysed at pH 8.2 in the presence of serum. Poliomyelitis virus concentrated in this way from the brains of nine hundred suckling mice was inoculated into two eggs but no adaptation resulted. More recently it has been found that centrifuge clarified emulsions of brains from mice infected with rabies or poliomyelitis form a precipitate when dialysed at pH 4.3. This precipitate carries nearly all the original virus. On extraction at pH 8.2 the virus is re-liberated but the bulk of the precipitate remains undissolved. This should form an important step in the purification of poliomyelitis, rabies and possibly other viruses from brain material. Allantoic fluid behaves similarly except that the precipitate as well as the virus redissolves at the higher pH. Those viruses which are trypsin resistant can, however, be isolated from the resulting solution in a purified form by digestion with this enzyme followed by ultracentrifugation.

Rift Valley Fever

The growth curve of the viscerotropic strain in various organs of the mouse has been determined and a purified preparation of the virus has been made for electron microscopy.

Attempts to cause haemagglutination by this virus and to secure its passage in rats and monkeys have been unsuccessful. The rate of inactivation of the vis-

Die koers waarteen die viscerotropiese lyn deur ultravioletlig buite werking gestel word, is gemeet en die virus wat sodoende buite werking gestel is, word vir interferensiestudies gebruik.

Virusafsonderings

Poliomyelitis.—'n Lyn wat van 'n dodelike geval van harsingontsteking afgesonder is, is deur dr. Gear en sy personeel aan die Suid-Afrikaanse Instituut vir Mediese Navorsing as lansing 72 geïdentifiseer.

Griep.—Twee afsonderings van 'n ligte epidemie in Kaapstad is as tipe-B geïdentifiseer (Davis).

Limfasiëre choriomeningitis.—'n Taamlik uitgebreide epidemie het gedurende die somer van 1952-53 voorgekom. Intensiewe pogings om 'n virus volgens die gewone prosedure af te sonder, het misluk.

Navorsingsbeurse en Toekennings

Toekennings aan universiteite vir nagraadse navorsing het 20 seniorbeurse, 42 studentebeurse, 53 assistentskappe en talryke toekennings vir lopende uitgawes en gespesialiseerde toerusting ingesluit. Publikasies wat van die houers van navorsingstoekennings van die W.N.N.R. ontvang is, verskyn in Bylae I.

Die Raad het ses beurse toegeken vir gespesifiseerde navorsing in oorsese inrigtings en een in die Raad se Nasionale Instituut vir Personeelnavorsing in Johannesburg. Besonderhede van die applikante en hulle navorsingskemas verskyn in Bylae II. Vir 1954 is vyf beurse vir gespesifiseerde navorsing in die Raad se eie laboratoriums aangebied vir navorsing op die volgende gebiede.

- (a) Mediese, landboukundige en bedryfstoeppassing van radio-aktiewe isotope;
- (b) servomeganismes;
- (c) toegepaste geofisika;
- (d) behandeling van nywerheidsuitvloeiels;
- (e) houtskeikunde en -tegnologie;
- (f) korrosieskeikunde;
- (g) meganika van die deurdringingsvermoë van vloeistowwe deur poreuse mediums;
- (h) hoë polimêre skeikunde;
- (i) beplanning van natuurleedorpe;
- (j) fisiese en ingenieurseienskappe van metale en allooië wat in Suid-Afrika geproduseer word;
- (k) meganika van vloeistowwe;
- (l) personeelkeuring van naturellewerkers.

Die Raad mag meer as een toekening op enige van hierdie gebiede maak en nie een op ander gebiede nie. Dit hang alles af van die standaard van die kandidate.

cerotropic strain by ultraviolet light has been measured and the inactivated virus is being used in interference studies.

Virus Isolations

Poliomyelitis.—A strain isolated from a fatal case of polio-encephalitis has been identified as Lansing (T2) by Dr. Gear and his staff at the South African Institute for Medical Research.

Influenza.—Two isolates from a mild epidemic in Cape Town were identified as type B (Davis).

Lymphocytic Choriomeningitis.—A fairly extensive epidemic occurred in the summer of 1952-53. Intensive efforts to isolate a virus by the usual procedures were unsuccessful.

Research Bursaries and Grants

Awards to universities for post-graduate research included 20 senior bursaries, 42 student bursaries, 53 research assistantships and numerous grants for running expenses and specialized equipment. Publications received from the holders of C.S.I.R. research awards are listed in Appendix II.

The Council awarded six bursaries for directed research in overseas institutions and one in the Council's National Institute for Personnel Research in Johannesburg. Details of the applicants and their research projects are given in Appendix I. Five bursaries for directed research tenable in the Council's own laboratories have been offered for 1954, for research in the following fields:—

- (a) Medical, agricultural and industrial applications of radio-active isotopes;
- (b) servomechanisms;
- (c) applied geophysics;
- (d) treatment of industrial effluents;
- (e) wood chemistry and technology;
- (f) corrosion chemistry;
- (g) mechanics of the penetration of liquids through porous media;
- (h) high polymer chemistry;
- (i) planning of native townships;
- (j) physical and engineering properties of South African produced metals and alloys;
- (k) fluid mechanics;
- (l) personnel selections of native operatives.

The Council may make more than one award in any one of these fields and none in others, depending on the standard of the candidates.

Research Bursaries and Assistantships

awarded by the C.S.I.R. during 1953

Navorsingsbeurse en Assistenteskappe

wat deur die W.N.N.R. gedurende 1953 toegeken is

GENERAL RESEARCH — ALGEMENE NAVORSING

BURSARIES — BEURSE

(i) Senior Bursaries/Senior Beurse (£200–£1,000)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
EWER, Dr. (Mrs.) R. F. M.A., Ph.D. Research Bursar. £400	1948 1950 1951	University of Natal	A study of the fossil carnivora from the deposits at Sterkfontein, Swartkrans and Kromdraai.
SMITH, Prof. J. L. B. M.Sc., Ph.D., F.R.S.S.A., C.M.Z.S. Professor in Ichthyology £1,300	1946, 1947 1948, 1949 1950, 1951, 1952	Rhodes University	Fishes.
ALBERTS, L. B.Sc., M.Sc. Lektor in Fisika £400	—	Cambridge University, Engeland	Kristallografie—veral ferromagnetiese metaal kristalle en die invloed van 'n magnetiese veld op hul plastiese eienskappe.
TESCHE, Dr. O. A. Ph.D. Research Bursar £350	1951 1952	University of Cape Town	X-ray crystallography of Ximenyc Acid.
KOCH, Dr. C. D.Sc. Hon. Coleopterologist £420	1949 1950 1951 1952	Transvaal Museum	The Tenebrionidae of Southern Africa.
FREEDMAN, L. B.Sc. Research Bursar £240	—	Transvaal Museum	The fossil Cercopithecoidea of Southern Africa.

(ii) Student Bursaries/Studente Beurse

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
Chemistry/Skeikunde			
COOKE, J. K. B.Sc., B.Sc. (Hons.)	1952	University of Natal	Alkaloids of the Amaryllidaceae.
FARQUHARSON, D. C. B.Sc.	—	University of Natal	The system BCl_3/BF_3 at moderately low temperatures.
HIGGENS, T. H. S. B.Sc., B.Sc. (Hons.)	—	University of Natal	The viscosity of Boron Halides at moderately low temperatures.
LINDER, P. W. B.Sc.	—	University of Natal	Some aspects of isotopic exchange in the Boron Halides.
POYNTON (Miss), M. B.Sc.	—	University of Natal	The Amaryllidaceae Alkaloids.
RAW, C. J. G. B.Sc., B.Sc. (Hons.)	1952	University of Natal	Diffusion and thermal diffusion studies on Boron Halides with the use of isotopically distinguished Boron.
WATLING, K. H. B.Sc.	—	University of Natal	The triterpenes from Euphorbia resins.
WRIGHT (Mrs.), W. G. B.Sc., D.I.C.	1950 1951 1952	University of Natal	The chemistry of the cassia species.
STEPHEN (Miss), E. M. B.Sc.	—	University of the Witwatersrand	The synthesis of sulphoquinazolones.
DAWSON, M. F. B.Sc., B.Sc. (Hons.)	1952	Rhodes University	Thermal decomposition of calcium lactate.
DRY, M. E. B.Sc.	—	Rhodes University	Determination of the solubility of calomel in water by electrometric methods.
PALMER (Miss), A. H.	—	Rhodes University	A study of the organic chemistry of polyacraldehyde.
EHLERS, A. B.Sc.	—	Universiteit van Pretoria	(a) Bereiding en skeiding van isomere alkielbromiede. (b) Chemiese ondersoek van Dip-cadi-Glaucum (Malkop-ui)—'n giftige plant vir skape.
LE ROUX, F. H. B.Sc.	—	Universiteit van Pretoria	Ondersoek van alkaloiede en ander verbindings in die peule van die „Honey Locust” boom (Gleditsia Triacanthos).
SEGAL, B. B. B.Sc.	—	Universiteit van Pretoria	Die ondersoek van substituenten in die benzeenkern op die kinetika van die uitruilreaksie van gesubstitueerde bromolbenzeen met bromied-ion.
JACH, J. B.Sc.	1952	University of Cape Town	A study of the fundamentals of the melting process.
DE VILLIERS, J. P. B.Sc., M.Sc.	—	University of Oxford	Synthetical experiments in the group of the alkaloids of the Amaryllidaceae.

(ii) Student Bursaries/Studente Beurse (contd./vervolg)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
Physics/Fisika ALLSOP, H. L. B.Sc., B.Sc. (Hons.), M.Sc.	—	Bristol University	Investigation of the properties of ferro-electric materials.
HOLT, D. B. B.Sc., B.Sc. (Hons.)	1952	University of the Witwatersrand	Internal friction in metals.
LITTLE, W. A. B.Sc., B.Sc. (Hons.)	1952	Rhodes University	Decay time measurements of organic crystals and spectroscopic observation of mixed crystal spectra.
BROOKS, F. D. B.Sc.	—	Rhodes University	Fluorescent properties of organic solutions.
MALAN, O. G. B.Sc.	—	Universiteit van Stellenbosch	Die spektrografiese bepaling van sporelemente in karroo doleriet.
DE VALENCE, E. L. P. B.Sc., M.Sc.	1952	Royal Cancer Hospital, London	Standardisation of radio-active isotopes using scintillation counting techniques.
O'BRIEN, P. A. B.Sc., B.Sc. (Hons.), M.Sc.	—	University of Cambridge	General radio astronomy.
Geology/Geologie MATHEWS, P. E. B.Sc., B.Sc. (Hons.), M.Sc.	—	University of Natal	A study of the Mfongosi and Nkandhla Series, Tugela Valley, Natal.
AMDURER, S. S. B.B.A., B.A.	1952	University of Cape Town	The engineering geology of the Cape Flats.
Entomology/Insektekunde MEYER (Mej.), M. K. P. B.Sc.	1952	Potchefstroomse Universiteit vir C.H.O.	Die parasiete van die insekte.
STUCKENBERG, B. R. B.Sc., B.Sc. (Hons.)	—	Rhodes University	Some parasites and predators of South African aphids.
Zoology/Dierkunde CHURCHER, C. S. B.Sc., B.Sc. (Hons.)	1952	University of Natal	Fossil Hyracoids associated with the Transvaal Australopithecines.
VAN DIJK, D. E. B.Sc. (Hons.), T.O.D.	—	Universiteit van Stellenbosch	Development of the Proctodaeum in Anura.
DE WET (Miss), P. E. B.Sc.	—	University of Cape Town	The biology of the lucerne caterpillar <i>Colias electo</i> and its parasite <i>Pteromalus puparum</i> .
BROWN, A. C. B.Sc.	—	Rhodes University	Ecological survey of estuary and river mouth at Kleinmond, 10 miles east of Port Alfred.
Botany/Plantkunde LEWIS, O. A. M. B.Sc., B.Sc. (Hons.)	—	University of Natal	Assay of the amino acid and vitamin content of soya bean varieties.
POCOCK, Dr. (Miss), M. A. B.Sc., Ph.D., F.L.S., F.R.S.	1948 1949	Rhodes University	(a) Studies in the cytology of the Volvocales. (b) Continuation of the study of the South African seaweeds.

(ii) Student Bursaries/Studente Beurse (contd./vervolg)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
VAN DER MERWE, W. J. B.Sc.	—	Universiteit van Pretoria	Ondersoeke aangaande die erflikheid van blomkleur.
DE BRUYN, J. A. B.Sc., B.Sc. (Hons.), M.Sc.	1952	University of Chicago	The influence of trace elements on the growth and seed production of certain <i>Setaria</i> species.
Electrical Engineering / Elektriese Ingenieurswese SCHEDEVETZ (Miss), G. M. T. B.Sc. (Eng.)	1952	University of Natal	A quantitative investigation of the propagation of 3 and 10 cm. radio energy over land paths, and the correlation of field-strength measurements with the existing meteorological conditions.
KITAI, R. B.Sc. (Eng.), M.Sc. (Eng.)	—	University of Cambridge	Radiation, propagation and reception of impulse electromagnetic fields.
VAN BINNENDYK, D. B.Sc. (Elec. Eng.)	—	University of Cape Town	Colour rendering of light sources, with special reference to colour rendering references.
Civil Engineering/Siviele Ingenieurswese COGILL, W. H. B.Sc. (Civil Eng.), M.Sc. (Civil Eng.)	—	University of Cambridge	Theory of servomechanisms and vibrations.
LAURIE, J. A. P. B.Sc. (Civil Eng.)	—	Massachusetts Institute of Technology	Advanced training in structural engineering.
Mechanical Engineering/Meganiese Ingenieurswese WHILLER, A. B.Sc. (Eng.), M.Sc. (Eng.), M.I.T.	1951 1952	Massachusetts Institute of Technology	Solar energy utilisation.

(iii) Directed Research Bursaries/Beurse vir Navorsing Onder Leiding

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
KISTNER, A. B.Sc., M.Sc.	1951 1952	Technische Hogeschool, Delft.	Die mikrobiologiese vorming en verwerking van koolmonoksiede.
COOKE, B. A. B.Sc. (Eng.), M.Sc. (Chem. Tech.)	1952	University of London	The effect of apparatus geometry upon the charge acquired by mineral particles in an idealised separation machine and upon the momentum of the particles entering an electric field.
HARINGTON, J. S. B.Sc., B.Sc. (Hons.) Fellow Royal Entomological Society	1952	London School of Hygiene and Tropical Medicine	A study of various aspects of the biochemistry of insect blood.
HARRIS, R. T. B.Sc. (Appl. & Ind. Chem.)	1952	Imperial College, London	The effect of high pressure on reaction rates in solution.

(ii) Directed Research Bursaries/Beurse vir Navorsing Onder Leiding (contd./vervolg)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
DE RIDDER, J. C. B.A., B.A. (Hons.)	—	National Institute for Personnel Research, Johannesburg	Educational and occupational differences in test performance on a battery of adaptability tests designed for Natives.
KAPLAN, Dr. M. F. B.A., B.Com., B.Sc. (Eng.), Ph.D. (Eng.), A.M.I. Struct. E., A.M. (S.A.), I.C.E., M.Am.C.I.	1951	Department of Scientific and Industrial Research's Road Research Laboratory, Middlesex.	Investigation into methods of producing and controlling the quality of the high strength concrete required for pre-stressed concrete construction.
LANGER, G. B.Sc. (Eng.), M.Sc. (Eng.) A.M.I. Mech. E., A.F.R.Ae.S.	—	University of Cambridge	Heat and mass transfer between gas streams, with and without internal generation.

ASSISTANTSHIPS — ASSISTENTSKAPPE (£450-£650)

(a) Grants for the employment of skilled research assistants—Toekennings vir die indiensneming van geskoolde navorsings-assistente

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
BOTHA, Dr. P. J. B.Sc., M.Sc., Ph.D. Senior Lektor en Direkteur Plant Fisiologiese Navorsingsinstituut	1946, 1947, 1949, 1950, 1951, 1952	Universiteit van Potchefstroom	'n Fisiologiese studie van 'n aantal inheemse parasitiese blomplante.
CONNEL, Prof. P. H. B.Arch. Professor of Architecture	1951 1952	University of Natal	(a) Survey of geographic distribution of building materials in South Africa. (b) Convertibility and usage of materials.
DAY, Prof. J. H. Ph.D., F.R.S. (S.A.) Professor of Zoology	1947, 1948, 1950, 1951	University of Cape Town	A biological survey of South African estuaries.
DAY, Prof. J. H. Ph.D., F.R.S. (S.A.) Professor of Zoology	1951 1952	University of Cape Town	A biological survey of streams in the Cape Peninsula.
ELOFF, Dr. G. M.A., D.Sc. Senior Lektor.	1949, 1950, 1951, 1952	Universiteit van die Oranje-Vrystaat	Leefwyse van knaagdiermolle en insek-voormolle met spesiale verwysing na inheemse molsoorte.
GANE, Dr. P. G. M.Sc., Ph.D., A.Inst.P. Deputy Director of the Bernard Prince Institute	1949, 1950, 1951, 1952	University of the Witwatersrand	Sub-crustal exploration by seismic methods, using the Witwatersrand earth-tremors, and associated investigations.
KRUGSMAN, Dr. B. J. D.Phil. Senior Lecturer	—	University of Cape Town	(a) Electrophysiology of the nerve-muscle system of estuarine animals in relation with osmoregulation. (b) Heart mechanisms in invertebrate animals.

(a) Grants for the employment of skilled research assistants— Toekennings vir die indiensneming van geskoolde navorsings-assistent (*contd./vervolg*)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
MAXKENZIE, Dr. H. A. E. M.Sc., Ph.D., D.I.C. Senior Lecturer in Chemistry	—	University of Natal	(a) Diffusion studies on boron trifluoride (b) Isotopic exchange in the boron halides. (c) Phase equilibria in the liquid boron halides. (d) Exchange of oxygen between carbon dioxide and oxygen-containing liquids.
MES (Mej.), Prof. M. G. B.Sc., Biol. Doct., Ph.D. Professor in Plantfisiologie en Plantbiochemie	1951 1952	Universiteit van Pretoria	(a) Stikstof-assimilasie, minerale voeding, plant-hormoonwerking, asemhaling, kieming van sade, water-verhoudings, toksines en klimaats-invloede op groei van plante en op blomvorming. (b) 'n Studie van die invloed van lae temperatuur op die metabolisme van perskesade en van die tussenstappe in plantasemhaling en van sitroensuurvorming.
OCKLESTON, Prof. A. J. B.E., Ph.D. (Eng.), D.Sc. (Eng.) (2 Assistantships) Professor of Structural Engineering	1952	University of the Witwatersrand	Demolition tests on the University Dental Hospital building, and the necessary analytical studies and follow-up tests.
WARREN, Prof. F. L. B.Sc., Ph.D., D.Sc., D.I.C., A.R.C.S. Professor of Chemistry and Chemical Technology	1950, 1951, 1952	University of Natal	The chemistry of national products derived from South African plants.

(b) Grants for the employment of unskilled research assistants — Toekennings vir die indiensneming van ongeskoolde navorsingsassistente (£350–£450)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
ISAAC, Prof. E. I. Professor of Botany	1950 1951 1952	University of Cape Town	Investigations on South African seaweeds in relation to commercial and industrial exploitation.
LUTJEHARMS, Prof. W. J. Nat. Phil. D. Professor en Hoof van Departement Plantkunde	—	Universiteit van die Oranje-Vrystaat	'n Bakteriologiese studie van stikstof-bindende organismes (in die besonder peulplantknolletjiesbakterieë) met die oog op stamspesifisiteit, doeltreffendheid en stikstofbindende vermoë onder Suid-Afrikaanse toestande.

MEDICAL, DENTAL AND NUTRITIONAL RESEARCH — MEDIESE, TANDHEELKUNDIGE EN
VOEDINGSNAVORSING

BURSARIES — BEURSE

(i) Senior Bursaries — Senior Beurse (£200–£1,000)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
HICKLEY, Dr. (Mrs.) J. M.B., B.Ch. Research Bursar, £400	1952	Moorfields Ophthalmic Hospital, London, England	Ophthalmology
SOUGIN-MIBASHAN, Dr. R. B.Sc., M.B., Ch.B Senior Bursar, £400. Groote Schuur Hospital	—	University of Cape Town	Clinical and metabolic investigation of Benemid and Cortisone in gout, with additional work on the related prob- lem of glutathione in various condi- tions in Bantu and Europeans.
MUSPRATT, J. B.A. (Hons.) Research Bursar, £500	1950 1951 1952	South African Institute for Medical Research	The Aedes and allied mosquitoes of South Africa in relation to Yellow Fever prevention.
BOTHA, Dr. M. C. M.B., Ch.B., D.Path. D.C.P. (R.C.P.E. and R.C.P.L.) Research Bursar, £200	—	Post-Graduate Medical School London	(a) New methods of preservation and demonstration of tissue enzymes. (b) Autoradiographic studies at the isotope laboratory.

ASSISTANTSHIPS — ASSISTENTSKAPPE (£450–£650)

(a) Grants for the employment of skilled research assistants — Toekennings vir indiensneming van geskoolde navorsings-
assistente

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
BOTHWELL, Dr. T. H. M.B., Ch.B. Medical Registrar	1951 1952	University of the Witwatersrand	Studies in iron transport in conditions of iron "Overload".
ERASMUS, Prof. J. F. P. Ch.M., M.D. Professor of Surgery	1952	University of Cape Town	A study of the effects of trauma, including surgical operation on blood volume—blood chemistry, wound healing—the effects of the diet of local racial groups on these problems.
FORMAN, Prof. Frank B.A., M.B., Ch.B., M.D., M.R.C.P. F.R.C.P. Professor of Medicine	—	University of Cape Town	Metabolism and endocrinology.
GORDON, Dr. I. M.B., Ch.B. Senior Government Pathologist	1952	Union Department of Health, Durban	Forensic pathology.

(a) Grants for the employment of skilled research assistants — Toekennings vir indiensneming van geskoolde navorsings-assistente (contd./vervolg)

<i>Name and qualifications Naam en kwalifikasies</i>	<i>Previous awards Vorige toekennings</i>	<i>Where tenable Waar geldig</i>	<i>Subject of research Onderwerp van navorsing</i>
HEYNS, Prof. O. S. M.A., B.Sc., D.Sc., M.R.C.S., L.R.C.P., F.R.C.O.G. Professor of Obstetrics and Gynaecology	1947, 1950, 1951, 1952	University of the Witwatersrand	(a) A study of electrical potentials observed in the human uterus during pregnancy and labour. (b) Contractile, mechanical and other physical properties of uterine (and other smooth) muscle.
IRVING, Prof. J. T. B.A., M.A., Ph.D., M.D., M.R.C.S., L.R.C.P. Professor of Physiology	1946, 1947, 1948, 1949, 1950, 1951, 1952	University of Cape Town	Influence of dietary and other factors upon dentin enamel and bone forma- tion.
PIJPER, Prof. A. M.D., D.Sc. Professor in Patologie	1947, 1948, 1949, 1950, 1951, 1952	Universiteit van Pretoria	Beweging en bewegingsorgane en struk- tuur van bakterieë.
SNYMAN, Prof. H. W. M.B., B.Ch., M.D. Professor en Hoof van Departement Interne Geneeskunde	1951 1952	Universiteit van Pretoria	(a) Miokard aandoenings by die Bantoe. (b) Bepaling van die gevoeligheid van die Bantoe vir Insulien.
THERON, Dr. Pieter Ch.B., Ch.M., F.R.C.S. Senior Surgeon and Professional Assistant	1951 1952	University of the Witwatersrand	Cirrhosis of liver and portal hyper- tension. Surgical shock. Small intestine obstruction.

(b) Grants for the employment of unskilled research assistants — Toekennings vir die indiensneming van ongeskoolde navorsingsassistentente (£350-£450)

BARNARD, Dr. P. J. J. M.B., Ch.B., M.R.C.P. Senior Lektor	—	Universiteit van Pretoria	Proefnemings oor die invloed van auto- gene fibrine embolisme op die slag- aarboom van die longe van konyne en muise.
HEEREMA, Dr. J. C. (Miss) Oogarts (Utrecht) Ophthalmic Surgeon	1950 1952	University of Cape Town	Investigation of the physico-chemical nature of migrating cells.

Publications — Publikasies

- A. C.S.I.R. Publications/W.N.N.R. Publikasies.
 B. Publications in Periodicals by Members of C.S.I.R. Staff/Publikasies in Tydskrifte deur Lede van die W.N.N.R. Personeel.
 C. Publications Received from Members of Medical Research Units/Publikasies wat van Mediese Navorsingseenhede Ontvang is.
 D. Publications Received During 1953 from Holders of C.S.I.R. Research Awards/Publikasies wat Gedurende 1953 Ontvang is van Houers van W.N.N.R. Navorsingstoekennings.

A.—C.S.I.R. PUBLICATIONS/W.N.N.R. PUBLIKASIES

Library and Information Division

C.S.I.R. Information (monthly library accessions list).
List of current journals received in the Library, March, 1953. Pretoria, C.S.I.R., 1953.

Books and Pamphlets on soil mechanics. Pretoria C.S.I.R. W.N.N.R. 1952 (Library class list No. 3).
Books and Pamphlets on leather and related industries. Pretoria C.S.I.R. W.N.N.R. 1953 (Library class List No. 4).

Biblioteek en Inligtingsafdeling

W.N.N.R. Inligting (maandelikse biblioteekbyvoegingslys).
Lys van lopende tydskrifte ontvang deur die biblioteek, Maart, 1953. W.N.N.R. Pretoria, 1953.

Books and Pamphlets on soil mechanics. Pretoria C.S.I.R. W.N.N.R. 1952 (Library class list No. 3).
Books and Pamphlets on leather and related industries. Pretoria C.S.I.R. W.N.N.R. 1953 (Library class List No. 4).

National Institute for Personnel Research.

Journal of the N.I.P.R. thrice yearly/driemaal per jaar.

ARBOUS, A. G. *Tables for aptitude testers—the operating characteristic of aptitude test batteries.* Council for Scientific and Industrial Research, National Institute for Personnel Research, Pretoria, 1953. Price £2 10s. 0d.

ARBOUS, A. G. *Selection for industrial leadership.* Council for Scientific and Industrial Research, National Institute for Personnel Research, Pretoria, 1953. Price £1 10s. 0d.

Nasionale Instituut vir Personeelnavorsing.

National Building Research Institute

Information Sheets (Series DIS)—bi-monthly selections of technical enquiries with replies (during the year DIS 24—DIS29).

Bulletin (Series DB)—half-yearly—on topics relating to the work of the Institute (during the year *Bulletin* no. 9, October, 1952. *Bulletin* no. 10, June, 1953).

Nasionale Bounavorsingsinstituut

Inligtingspamflette (Reeks DIS)—twee-maandelikse seleksie van tegniese navrae met antwoorde (gedurende die jaar DIS 24—DIS 29).

Bulletin (Reeks DB)—half-jaarliks—artikels oor onderwerpe wat in verband staan met die werk van die Instituut (gedurende die jaar *Bulletin* no. 9 Oktober 1952, *Bulletin* no. 10, Junie 1953).

Telecommunications Research Laboratory

Monthly basic radio-propagation predictions for Southern Africa.

Monthly bulletin of ionospheric characteristics observed at Johannesburg and Cape Town.

Telekommunikasies-Navorsingslaboratorium

Maandelikse voorspellings van basiese radiovoortplanting in Suidelike Afrika.

Maandelikse bulletin van ionosferiese karakteristieke soos waargeneem in Johannesburg en Kaapstad.

Liaison Division

Annual Report of the C.S.I.R.

Research Review—quarterly.

Science News Selections—weekly.

Skakelafdeling

Jaarverslag van die W.N.N.R.

Navorsingsoorsig—driemaandeliks.

Keur van Wetenskaplike Nuus—weekliks.

B.—PUBLICATIONS IN PERIODICALS BY MEMBERS OF THE C.S.I.R. STAFF B.—PUBLIKASIES IN TYDSKRIFTE DEUR LEDE VAN DIE W.N.N.R. PERSONEEL

National Building Research Institute/Nasionale Bounavorsingsinstituut

CALDERWOOD, D. M. Native housing. *S. Afr. Annual Review*, vol. I, no. 1, January 1953.

JENNINGS, J. E. A slip in fissured clay in the Wonderboom reservoir. *Trans. S. Afr. Inst. Civil Eng.*, vol. 2, no. 2, February, 1952, p. 46.

JENNINGS, J. E. The heaving of buildings on desiccated clay soils. *Proc. Third International Conference on Soil Mechanics and Foundation Engineering*, Switzerland, 1953, vol. 1, section 4, no. 14, pp. 390–396, republished in *Municipal Affairs*, vol. 18, nos. 215 and 216, August, 1953.

JENNINGS, J. E. Research on the cost of building. *S. Afr. arch. Record*, vol. 38, no. 6, June, 1953, pp. 32–34.

- KANTEY, B. A. The application of the Dutch deep sounding apparatus in South Africa. *Trans. S. Afr. Inst. Civil Eng.*, vol. 1, no. 10, December, 1951, p. 210.
- KANTEY, B. A. Field and laboratory determinations of strength characteristics of a normally consolidated clay in the Durban Bayhead Area, South Africa. *Proc. Third International Conference on Soil Mechanics and Foundation Engineering*, Switzerland, 1953, vol. 1, section 3, no. 6, pp. 241-245.
- STEYN, A. K. Pressure cells. *Trans S. Afr. Inst. Civil Eng.* vol. 1, no. 9, November, 1951, p. 282.
- STUTTERHEIM, N. and J. H. P. van Aardt. Corrosion of concrete sewers and some possible remedies. *S. Afr. industr. Chem.*, vol. 7, no. 10, October, 1953, pp. 185-195.
- WEBB, T. L. Chemical aspects of unsoundness and plasticity in building limes. *S. Afr. industr. Chem.*, vol. 16, no. 12, December 12, 1952, pp. 290-294.

National Chemical Research Laboratory/Nasionale Chemiese Navorsingslaboratorium

- AHLERS, N. H. E. and S. P. Ligthelm. The infra-red spectra of methyl ximenynate and ximenynyl alcohol. *J. Chem. Soc.*, Dec., 1952, p. 5039.
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- BOTHA, G. R. and M. M. Webb. The versenate method for the determination of calcium and magnesium in mineralized waters containing large concentrations of interfering ions. *J. Inst. Water Eng.*, vol. 6, no. 6, October, 1952, pp. 459-462.
- BOTHA, G. B. The treatment of effluents from milk processing factories. Methods for improving the quality of effluents by preventing unnecessary waste of milk products. *S. Afr. Dairyman*, vol. 15, no. 1, January, 1953, pp. 9-11.
- CARMAN, P. C. Properties of capillary held liquids. *J. phys. Chem.*, vol. 56, June, 1953, pp. 56-64.
- CILLIE, G. G. Defluoridation of water supplies using an activated superphosphate. *Chem. Ind.*, no. 30, August 30, 1952, pp. 856-857.
- CLINGMAN, A. L. and D. A. Sutton. The chemistry of polymerised oils. Part II. Dehydro-Polymers of Methyl Linoleate and Methyl Stearate. *J. Amer. Oil Chem. Soc.*, vol. 30, no. 2, February, 1953, pp. 53-56.
- CLINGMAN, A. L., D. E. A. Rivett and D. A. Sutton. Thermal polymerization of methyl-elaeostearate. *Chem. Ind.*, no. 30, July 25, 1953, p. 798.
- DE WET, J. F. Chromite investigations III. Variation in the composition of pure chrome mineral in the Eastern Chrome Belt, Lydenburg district. *J. Chem. Metall. Min. Soc. S. Afr.*, vol. 52, no. 7, January, 1952, pp. 143-155.
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- DE WET, J. F. and J. N. van Niekerk. Chromite investigations. V. The total analysis, composition and structure of Transvaal Chromite. *J. Chem., Metall. Min. Soc. S. Afr.*, vol. 53, no. 1, July, 1952, pp. 11-21.
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- STANDER, G. J. and R. Snyders. Effluents from fermentation industries. V. Re-innoculation as an integral part of the anaerobic digestion method of purification of fermentation effluents. *J. and Proc. Inst. Sewage Purif.*, Part 4, April, 1950, pp. 447-458.
- STEIN, L. H. and J. B. C. Marais. Fertilizer studies with tobacco plants using radio phosphorus labelled superphosphate. Part II. *S.A. ind. Chem.*, vol. 6, no. 6, June, 1952, pp. 147-150.
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National Physical Laboratory/Nasionale Fisiese Laboratorium

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