



COLONIAL OFFICE

COLONIAL RESEARCH 1946—47 REPORTS

OF

I. THE COLONIAL RESEARCH COMMITTEE
Fourth Annual Report

II. THE COLONIAL PRODUCTS RESEARCH COUNCIL
Fourth Annual Report

III. THE COLONIAL SOCIAL SCIENCE RESEARCH COUNCIL
Third Annual Report

IV. THE COLONIAL MEDICAL RESEARCH COMMITTEE
Second Annual Report

V. THE COMMITTEE FOR COLONIAL AGRICULTURAL
ANIMAL HEALTH AND FORESTRY RESEARCH
Second Annual Report

*Presented by the Secretary of State for the Colonies to Parliament
by Command of His Majesty.
June, 1947.*

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CONTENTS

(More detailed contents will be found preceding each separate Report.)

	<i>Page</i>
I. COLONIAL RESEARCH COMMITTEE (Fourth Annual Report)	21
II. COLONIAL PRODUCTS RESEARCH COUNCIL (Fourth Annual Report)	28
III. COLONIAL SOCIAL SCIENCE RESEARCH COUNCIL (Third Annual Report)	47
IV. COLONIAL MEDICAL RESEARCH COMMITTEE (Second Annual Report)	54
V. COMMITTEE FOR COLONIAL AGRICULTURAL ANIMAL HEALTH AND FORESTRY RESEARCH (Second Annual Report)	64

COLONIAL RESEARCH COMMITTEE

Fourth Annual Report

MEMBERSHIP

THE LORD HAILEY, G.C.S.I., G.C.M.G., G.C.I.E., *Chairman.*

SIR EDWARD APPLETON, G.B.E., K.C.B., D.Sc., LL.D., F.R.S., Secretary, Department of Scientific and Industrial Research.

SIR ALEXANDER CARR-SAUNDERS, M.A., LL.D., Director, London School of Economics.

SIR DAVID CHADWICK, K.C.M.G., C.S.I., C.I.E.

SIR JOHN FRYER, K.B.E., M.A., Secretary, Agricultural Research Council.

SIR HAROLD HARTLEY, K.C.V.O., C.B.E., M.C., F.R.S.

SIR EDWARD MELLANBY, K.C.B., M.D., F.R.C.P., F.R.S., Secretary, Medical Research Council.

SIR ARNOLD PLANT, B.S. (Econ.), B.Com., Sir Ernest Cassel Professor of Commerce in the University of London.

DR. AUDREY RICHARDS, M.A., Ph.D., Reader in Anthropology, University of London.

MR. J. G. HIBBERT, M.C., Colonial Office

DR. E. B. WORTHINGTON, M.A.

} *Joint Secretaries.*

CONTENTS

	<i>Paragraphs</i>
I.—GENERAL	1-8
 II.—FIELDS OF RESEARCH REVIEWED IN THIS AND THE OTHER ANNEXED	
ANNUAL REPORTS	9-36
A. Agricultural, Animal Health and Forestry	9
B. Demography and Census	10
C. Economic	11
D. Fisheries	12-13
E. Geodetic and Topographical Surveys	14-18
F. Geological Survey	19
G. Housing	20
H. Insecticides	21
I. Land Tenure Systems	22
J. Locust Control	23-26
K. Medical	27
L. Meteorology	28
M. Native Law	29
N. Products Research	30
O. Social Sciences	31
P. Statistics	32
Q. Tsetse Fly and Trypanosomiasis	33-36
R. Work carried out for Colonial Governments by the Department of Scientific and Industrial Research	37-39

APPENDIX I :

Table I : List of schemes approved for research grants under the Colonial Development and Welfare Acts during the period 1st April, 1946 to 31st March, 1947.

Table II : Allocations for Research under the Colonial Development and Welfare Act, 1940 to 31st March, 1947 broadly classified by subjects.

Table III : Actual Issues in respect of research schemes to 31st March, 1947.

APPENDIX II :

Composition and functions of the Colonial Insecticides Committee.

APPENDIX III:

Composition and functions of the Colonial Economic Research Committee.

Palace Chambers,
9, Bridge Street,
S.W.1.

10th June, 1947.

Sir,

On behalf of the Colonial Research Committee, I have the honour to transmit to you the Fourth Annual Report of the Committee, covering the period 1st April, 1946, to 31st March, 1947.

I have the honour to be,

Sir,

Your most obedient,
humble Servant,

HAILEY.
(Chairman).

The Right Honourable
Arthur Creech-Jones, M.P.
Secretary of State for the Colonies.

COLONIAL RESEARCH COMMITTEE

I.—General

1. As was indicated in the report for the year 1945-46,* the task of the Colonial Research Committee has been progressively lightened by the creation of separate bodies to advise the Secretary of State on some of the special aspects of research. Early in 1947 the Secretary of State approved the creation of a further advisory body—the Colonial Insecticides Committee. Investigation in this special field of research had previously been carried out under the aegis of the Tsetse Fly and Trypanosomiasis Committee,† but both that body and those responsible for Medical and Agricultural research recommended that the greatly increased importance now attaching to the development of insecticides warranted the institution of a separate committee. Some change has also taken place in the arrangements for research on economic questions which were described in paragraph 3 of last year's report. As there shown, economic enquiries have hitherto been the province of a sub-committee of the Colonial Economic Advisory Committee. This body has been replaced by the Economic and Development Council, which has functions extending over the whole programme of Colonial development, including the proposals of the Colonial Governments for the expenditure of the provision for development projects made under the Colonial Development and Welfare Acts. Economic research has now been placed in charge of a new Committee, entitled the Colonial Economic Research Committee, which is directly advisory to the Secretary of State, and will work in close association with the Colonial Social Science Research Council. The composition and terms of reference of this Committee are given in Appendix III to this report.

2. The Colonial Research Committee continues to act as the central body advising the Secretary of State on schemes for expenditure initiated by the Agricultural, Animal Health and Forestry Research Committee, the Medical Research Committee and the Social Science Research Council, and also on research schemes emanating from some of the functional organisations attached to the Colonial Office, such as the Colonial Geological Survey, the Colonial Fisheries Committee, the Colonial Survey and Geophysical Committee, the Tsetse Fly and Trypanosomiasis Committee and the Interdepartmental Committee on Locust control. The position of the Colonial Products Research Council, which is an executive as well as an advisory body, was explained in the Progress Report of the Colonial Research Committee for 1942-43††.

3. The general position of the Colonial Research Committee remains therefore substantially the same as that indicated in its previous reports. The Secretary of State looks to it for advice on general research policy and on the allocation of funds provided for research under the Colonial Development and Welfare Acts. But the Committee has become increasingly conscious of the difficulty of advising on the relative urgency or importance of schemes of research initiated by the specialist advisory bodies or organisations referred to in the preceding paragraph. It has no desire, and cannot indeed claim to be competent, to scrutinise in detail projects which have been fully considered by these expert bodies. But it is not easy for it to assess the importance of these projects without being able to see them in relation to any general scheme of research which the expert body may have in view. It would be preferable that these

* Colonial No. 208, 1947.

† See paragraph 20 of Report for 1945-46.

†† Cmd. 6486 (1943) paragraph 61.

expert bodies should now make a survey of their requirements, in sufficient outline to enable them to put forward a broad programme of work, to which, under the advice of the Colonial Research Committee, the Secretary of State could give his approval. It should then be possible to give them an increased liberty of operation, within the general scope of an approved programme. This is a view which the Colonial Research Committee has already indicated to the specialist Committees with which it is connected, and will continue to press on them.

4. The Committee has, in previous reports,* indicated its position in regard to the regional or local research activities sponsored by Colonial Governments and carried out from their own funds. A great number of the schemes for which funds have been provided under the Colonial Development and Welfare Act on the advice of the Committee have been suggested by the Colonial Governments, and a number of others can be regarded as complementary to work undertaken by them from their own resources. The local resources for research work vary of course greatly, both in respect of personnel and of funds. There are some territories which have resources so small that little or no research can be done by them, save as the result of a regional operation in which neighbouring territories with larger resources take a part, or of a direct contribution of funds or personnel from home organisations for research. But even where territories with more considerable resources are concerned, it is of course desirable that there should be the closest co-operation in the planning of research between their Governments and the agencies in this country which operate on funds provided under the Colonial Development and Welfare Acts. One of the measures which would make this co-operation more feasible would be the organisation of local research on a regional basis, and the Colonial Research Committee has welcomed any measure taken by the Colonial Governments in this direction. In 1946 the Secretary of State approved the appointment, as Joint Secretary to the Committee, of Dr. E. B. Worthington, previously Director of the Freshwater Biological Association's station at Ambleside. He is the author of the work "Science in Africa," referred to in the Report for 1942-43, and also of a survey of scientific organisation in the Middle East, carried out on behalf of the Middle East Supply Council. It was intended that this appointment should, among other things, provide the means of closer contact between the Colonial Research Committee and the organisations for local research maintained by the Colonial Governments. The Committee took the opportunity of placing Dr. Worthington's services at the disposal of the East African Governors' Conference, for a period of two years, in order to advise on the regional organisation of research in the three East African territories in which the Governor's Conference is interested. The Committee has learnt that the question of establishing a Research Council for Central Africa was considered in November, 1946, by the Central African Council, which was established in 1945 as a consultative body to foster co-operation between Southern Rhodesia, Northern Rhodesia and Nyasaland on all matters of common interest. The Central African Council has decided to appoint a Research Secretary, whose first task will be to conduct for its consideration a survey of the existing research facilities and to report upon the additional facilities required. It is understood that no definite steps have yet been taken to consider the regional organisation of research in West Africa.

5. In this connection it may be noted that the Caribbean Research Council, an auxiliary body of the Caribbean Commission, has been constituted in order to advise the Commission on the general organisation of research in the territories

* Cmd. 6486 (1943) paragraphs 31-35.
Cmd. 6535 (1944) paragraphs 15-21.

with which it is concerned. The Council does not, however, itself undertake or sponsor research projects. The question of agricultural research in the British West Indian region has received special attention during the year by the Committee for Colonial Agricultural, Animal Health and Forestry Research. This Committee was inclined to favour an organisation which conformed to the pattern recommended for East Africa, but for a number of reasons it would not be possible to develop a general organisation on these lines. The academic work of the Imperial College of Tropical Agriculture in Trinidad has been expanded, and part of it will be linked with that of the University College for the West Indies, now being established in Jamaica. In addition, a number of schemes for research within the framework of the College have been approved, providing for work on soils, cacao, bananas and sugar technology. Their cost will be met by means of grants under the Colonial Development and Welfare Acts, but the schemes for cacao research will be financed in collaboration with the cocoa manufacturers of the United Kingdom, and that for sugar technology in conjunction with the British West Indies Sugar Association.

6. The Colonial Research Committee has from the outset been faced with the difficulty of arranging suitable terms of service for scientific workers engaged in research operations carried out by the specialist bodies with which it is connected. It is clear that if these organisations are to be in a position to recruit and retain the services of workers of adequate experience and competence, some arrangement should be made which would secure for scientific workers the benefit of a superannuation scheme analogous to the Federated Superannuation Scheme for Universities, adapted to the special conditions of service in the Colonies. Suggestions as to the form which these arrangements should take have been received from the Colonial Medical Research Committee, the Committee for Colonial Agricultural, Animal Health and Forestry Research and other sources. It is hoped that the details of the scheme, including the provision made for superannuation, will shortly be completed.

7. A reference to the institution of the system of Colonial Research Fellowships will be found in the first Annual Report of the Committee.* During the year under review, five Fellowships were awarded, one of which was ultimately declined by the applicant. The total number of Fellowships awarded since the inauguration of the scheme is eleven, of which two were declined.

8. During the year, a very considerable number of schemes has been approved for grants under the Colonial Development and Welfare Acts. A complete list of these schemes is given in Table I of Appendix I to this report, and it will be noted that the cumulative total of the allocations made for these schemes is over £1,200,000. In many cases, particularly in connection with the more important schemes, the figures shown represent the estimated expenditure involved over a number of years. Table II of Appendix I shows the allocations for research approved under the Colonial Developments and Welfare Acts, broadly classified by subjects, during the period prior to the 31st March, 1943, and during each of the subsequent financial years. Table III shows the actual monies issued in respect of research schemes approved under the Acts for each of the financial years since the year 1940-41. The Committee has still to regret the fact that, in many cases, progress in getting the schemes into full operation has been severely handicapped by shortage of scientific personnel, labour and materials.

* Cmd. 6535 (1944), paragraph 14 and Appendix II.

II. Fields of Research reviewed in the present Report of the Colonial Research Committee, and in the accompanying Reports of the Specialist Advisory Bodies.

A. *Agricultural, Animal Health and Forestry*

9. See the attached Annual Report of the Committee for Colonial Agricultural, Animal Health and Forestry Research for the year 1946-47.

B. *Demography and Census*

10. The position in regard to demographic surveys was discussed in paragraph 25 of the Colonial Research Committee report for 1945-46. During the year under review, censuses have been taken in the following territories:—Aden, Ceylon, Cyprus, the Falkland Islands, Fiji and Western Pacific and St. Helena. A non-African census has also been taken in Northern Rhodesia. Censuses are planned for the near future in East Africa (non-Africans), the Gold Coast (non-Africans, and Africans in selected towns), Sierra Leone (Colony), Bermuda, Seychelles, the Malayan Union and Sarawak. A count of the population, not amounting to a complete census, was effected during the year in the Gambia and the New Hebrides, and a similar count is planned for the near future for Africans in East Africa, the rural districts of the Gold Coast and Sierra Leone, the rural districts of the Gold Coast and Sierra Leone (Protectorate). These counts are useful, since, although they do not provide a basis for research or for welfare and development measures, they provide approximate data of the distribution of men, women and children in the various districts. The most urgent need is for the taking of complete censuses in all Colonial territories in Africa. The difficulties are considerable, but in many cases are not insurmountable, as has been shown by the census taken in Basutoland.

C. *Economic*

11. See the remarks at paragraph 1 of the present report regarding the establishment of the Colonial Economic Research Committee.

D. *Fisheries*

12. See paragraph 9 of the Colonial Research Committee's report for 1945-46. Plans for the development of fisheries are being put into operation as quickly as present circumstances will allow, but there are great obstacles in the shortages of trained personnel and equipment. On the research side, Regional Fisheries Research Institutes are being organised in East, Central and West Africa. Research projects in Malaya, Ceylon, Hong Kong and the West Indies are under consideration. An important development is the organisation of a Freshwater Research Station at Jinja in Uganda, near the outlet of the Nile from Lake Victoria, for which funds are being made available from the Colonial Development and Welfare Research allocation.* The foundations of the laboratory have been laid. A survey of the fishing banks of Mauritius and Seychelles will be undertaken shortly. The equipment of the vessel needed to carry out this work is almost completed, and she will sail in the near future. This scheme is also being financed from the Colonial Development and Welfare Research allocation.

13. At the end of 1946, the Colonial Fisheries Adviser proceeded to the Far Eastern area on a tour which was to include the Colonial territories in the South Pacific. His investigations cover freshwater as well as sea fisheries.

* See paragraph 11 of Report for 1945-46.

E. Geodetic and Topographical Surveys

14. See paragraph 5 of the report of the Colonial Research Committee for 1944-45* and paragraph 9 (a) of that for 1945-46. The headquarters of the Geodetic and Topographical Survey at Bushy Park, to which reference was made in the latter report, opened officially on March 11th, 1946. The recruitment of staff, particularly of trained men, has proved difficult, since competition has been encountered with commercial firms which are able to offer salaries greatly in excess of those laid down for the Directorate. At the end of March, 1947, the Directorate had on its strength only 94 Cartographers out of an establishment of 146, and only 20 of those on the strength could be said to be fully trained. It had a Chief Computer and 2 Computers out of an establishment of 7. Surveyors have proved an exceptional difficulty, as it is not at present possible to offer them permanent and pensionable employment. 10 were appointed during the year out of a total establishment of 72.

15. As stated in last year's report, the Royal Air Force undertook a large and rather ambitious programme of photography in West Africa and the first machines arrived in the Gold Coast in April, 1946. Although 6 aircraft were in West Africa for ten months, it was only found possible to complete about one quarter of the photography, owing to bad photographic weather during most of the period. The aircraft were withdrawn in February, 1947, when there was no hope of good photographic weather for several months, in order that they could be refitted and proceed to East Africa in April. In the period available for work some 32,850 square miles were photographed on the scale of 1/30,000, and 1,350 square miles on the scale of 1/10,000 and 1/5,000. It is hoped to arrange for one or two aircraft to go back to West Africa towards the end of 1947 to do some of the more urgent of the outstanding photography.

16. A large programme of air photography covering parts of all East and Central African Colonies and the High Commissioner's Territories has been arranged to start in May, 1947. This, it is hoped, will be more successful, as weather conditions should be better. On the conclusion of this, it is proposed to carry out an air survey programme in the Malayan Union, North Borneo and Sarawak, and Brigadier Hotine proceeded to those territories in March, 1947, to make the necessary arrangements. He expected also to be able to arrange for the Royal Air Force unit now in the Far East to photograph in advance of the programme those areas of which maps are urgently required for development purposes.

17. A survey party consisting of all available surveyors went out to West African in December, 1946, to put in the necessary ground control in the areas photographed in the Gold Coast. This party is still there.

18. As regards cartography, a considerable quantity of mapping was done from air photographs taken by the U.S.A. authorities in the West Indies, and made available by them to us. This included a map of the whole island of Jamaica, at the scale of 1/50,000 (a total of twelve sheets) and also two sheets, at the scale of 1/25,000, covering the island of Antigua. Most of the mapping was done by trainees and the output was therefore restricted.

F. Geological Survey

19. See paragraph 7 of report of the Colonial Research Committee for 1944-45 and paragraph 10 of that for 1945-46. Dr. F. Dixey, O.B.E., previously Director of Geological Survey, Nigeria, was appointed by the Secretary of State as Geological Adviser and Director of Colonial Geological Surveys with effect

* Cmd. 6663 (1945).

from the 1st January, 1947. Dr. Dixey has been studying the needs of Colonial Geological Surveys in regard to the organisation and enlargement of staffs, in the light of the replies received to a circular despatch addressed to Colonial Governments by the Secretary of State on the 14th March, 1945. It is intended that the Director shall visit Colonial territories as soon as possible to discuss his proposals with the Governments concerned, and he is proceeding to East Africa in the early part of the summer, to the West Indies at the beginning of the winter, and to the Malayan Union, North Borneo and Sarawak in the early part of 1948. The shortage of geologists is likely to handicap expansion.

G. *Housing*

20. In the report for 1945-46 reference was made to the proposed establishment of a Colonial Housing Bureau in this country to work in co-operation with the Building Research Station of the Department of Scientific and Industrial Research. Difficulty was, however, experienced in finding a suitable officer to take charge, and it has in the meantime been decided to select a suitable senior officer for appointment as a Colonial Liaison Officer at the D.S.I.R. Building Research Station. A scheme for this purpose has been made under the Colonial Development and Welfare Acts.

H. *Insecticides*

21. See paragraph 1 of the present report of the Colonial Research Committee. The constitution of the new Committee, and its terms of reference, are given in Appendix II to this Report.

I. *Land Tenure Systems*

22. See paragraph 27 of the report of the Colonial Research Committee for 1945-46. During the year, the Land Tenure Advisory Panel discussed with officers of the Gold Coast and Nigerian Governments problems of research regarding land tenure systems in those territories. The Panel has also put in hand the preparation of a bibliography of land tenures in South East Asia, in co-operation with the Royal Institute of International Affairs. A research worker has been appointed for this purpose and has started work.

J. *Locust Control*

23. See paragraph 20 of the report of the Colonial Research Committee for 1944-45 and paragraph 24 of its report for 1945-46. Active control campaigns against the Desert Locust in the Middle East and in the East African and adjacent territories continued throughout the year, and a considerable measure of success was achieved, particularly with the introduction of Gammexane as a poison in baits. The anti-Locust Research Centre is involved in planning these campaigns, in maintaining a central information service producing monthly bulletins on the locust situation, and in issuing forecasts which are essential for carrying out operations.

24. The experiments carried out in Kenya in 1945 on the spraying of liquid insecticide on to locusts from aircraft have been fully analysed and a much more toxic spray has now been developed. It is possible that the spray could be most effectively used against flying swarms, and plans for the further field investigations required are now under consideration.

25. The Centre is engaged in a variety of research projects, which include toxicity of insecticides, nutrition, sense physiology and locust pigments in relation to the phase theory.

26. Field studies on locust migrations in relation to the weather factors have been carried out in Kenya by a research officer of the Centre, with the co-ope-

tion of the East African Anti-Locust Directorate. Data have been obtained which should make it possible to clarify the problem of migrations and assist in the forecasting of swarm movements.

K. *Medical*

27. See attached Annual Report of the Colonial Medical Research Committee for 1946-47.

L. *Meteorology*

28. See paragraph 18 of the report of the Colonial Research Committee for 1944-45 and paragraph 14 of that for 1945-46. The Committee regrets that it has not been possible to make the progress for which it had hoped in connection with the organisation of a meteorological service. Until such a service is organised, the Colonies will not be in a position to take a part in research connected with meteorological problems or the collection of magnetic data. Proposals for the constitution of a unified service in the United Kingdom and in certain Colonial territories were discussed at the Colonial Civil Aviation Conference convened in April, 1947, but it became apparent that such a scheme would not be acceptable to most of the Colonial Governments concerned. It has accordingly become necessary to consider what alternative forms of organisation can be designed.

M. *Native Law*

29. The advisory Panel on Native Law, set up in 1946, has discussed with the Judicial Adviser in the Gold Coast certain questions regarding the native law of succession and the limits of Native Authority jurisdictions. It has also discussed with the Solicitor-General, Northern Rhodesia, the question of changes in the customary law of that territory. The Panel is interested in the production of a bibliography on Native Law, but is awaiting the issue of work done in this connection at the instance of the Oxford Institute of Colonial Studies. It is hoped that a Research Assistant will shortly be appointed who will be available for work in the Colonial Office in connection with the two Panels dealing with Land Tenure systems and systems of Native Law.

N. *Products Research*

30. See attached Annual Report of the Colonial Products Research Council for 1946-47.

O. *Social Sciences*

31. See attached Annual Report of the Colonial Social Science Research Council for 1946-47.

P. *Statistics*

32. Mr. K. M. Francis, previously employed as Statistician in connection with the East African Governors' Conference, was appointed Statistician to the Colonial Office in February, 1947. His duties include the collation of any statistics that may be required in connection with Research schemes.

Q. *Tsetse Fly and Trypanosomiasis*

33. See paragraph 19 of the report of the Colonial Research Committee for 1944-45 and paragraph 17 of that for 1945-46. At the instance of the Tsetse Fly and Trypanosomiasis Committee, a visit was paid to the Central African territories in 1946 by Professor P. A. Buxton, Director of the Department of Entomology, London School of Hygiene and Tropical Medicine. The fact-finding survey of West Africa for which provision was made during 1945-46

was completed during the year by Dr. T. A. M. Nash, Medical Entomologist, Nigeria. Much useful information was furnished during the year by the Insecticide Research Unit operating in Uganda. Responsibility for this unit has now passed from the Tsetse Fly and Trypanosomiasis Committee to the Colonial Insecticides Committee.

34. In his report on his visit to West Africa in 1945, reference to which was made in last year's report, Professor Davey recommended the institution of a West African Trypanosomiasis Research Institute. A grant from the Research allocation under the Colonial Development and Welfare Acts has been approved to enable this institute to be established, and plans will be pushed forward as soon as a Director has been appointed.

35. Mr. F. L. Vanderplank, a member of the Tsetse Research staff in Tanganyika, has been working on secondment during the year in the Zoology Department of the University of Bristol, and has been carrying out experiments on Tsetse flies.

36. During the course of the year, reports and memoranda were received from the Southern Rhodesia Trypanosomiasis Committee and the Nyasaland Standing Committee on Tsetse and Trypanosomiasis.

R. *Work carried out by the Department of Scientific and Industrial Research for Colonial Governments.*

(i) *Road Research*

37. During the year under review, the Department of Scientific and Industrial Research made available two of their officers, a Research Engineer and a Research Chemist, to assist the Nigeria Public Works Department in connection with their road construction programme, and to advise on projected extensions of the Public Works Laboratory in Lagos for the testing of materials suitable for road making and building purposes.

(ii) *Building Research*

38. The establishment of a Building Research Station in West Africa is projected, and, as a first step, the Department of Scientific and Industrial Research made available two officers, an Architect and a Scientist, to visit West Africa to advise upon this question after consultation with the West African Governments.

(iii) *Water Pollution Research*

39. The Water Pollution Research Board of the Department of Scientific and Industrial Research has agreed to act as an official central organisation in this country for assisting Colonial water biologists in solving hydrobiological problems. The Board will act in consultation with the Metropolitan Water Board and the Freshwater Biological Research Association. Investigations have been carried out by the Board into the treatment of waste waters from the processing of coffee and sisal in Kenya.

APPENDIX I

Table I

LIST OF SCHEMES APPROVED FOR RESEARCH GRANTS UNDER THE COLONIAL DEVELOPMENT AND WELFARE ACTS DURING THE PERIOD 1ST APRIL, 1946 TO 31ST MARCH, 1947

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
57A	General :— General	<p>Research into economic factors underlying location of industries engaged in processing certain important colonial raw materials.</p> <p><i>Grant to continue research for a second year (see House of Commons 150).</i></p>	Misc.	£ 850
119	do.	<p>Locust Control.</p> <p><i>Research on the design and construction of equipment for the "air-to-air" spraying of flying locusts from aircraft (see R.74A below).</i></p>	Agric. etc.	1,000
120	do.	<p>Fisheries Research.</p> <p><i>Grant for the purchase of books of reference to form a library in this country.</i></p>	do.	2,000
51A	do.	<p>Deficiency grant towards the expenses of the Anti-Locust Research Centre.</p> <p><i>Supplementary grant necessitated by an increase in the establishment at the Centre (see House of Commons 106).</i></p>	do.	11,000
74A	do.	<p>Locust Control.</p> <p><i>Research, development and entomological testing of certain chemical solutions for spraying from aircraft, to be carried out at the Porton Experimental Station (see R.119 above and House of Commons 150).</i></p>	do.	1,500
124	do.	<p>Colonial Medical Research Studentships.</p> <p><i>Grant for the institution of ten Research Studentships, tenable at any University, for British graduates in medicine and cognate sciences who desire to prepare themselves for research work in tropical medicine and related subjects.</i></p>	Medical	6,000
128 128A	do.	<p>Research on the design of apparatus for the application and dissemination of insecticides.</p> <p><i>The work will include engineering, research into the design of suitable apparatus, and the chemical entomological and botanical assessment of the sprays produced. Most of the work will be carried out at the Imperial College of Science and Technology.</i></p>	Agric., etc.	17,200

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
129	General— <i>contd.</i> General	Grant to the "Annals of Tropical Medicine" to assist in the publication of a paper on the control of malaria.	Medical	£ 50
131	do.	Appointment of Dr. A. F. Mahaffy, C.M.D., M.D., D.P.H., as Joint Secretary of the Colonial Medical Research Committee.	do.	15,000
137	do.	Appointment of Dr. F. Dixey, O.B.E., D.Sc., F.G.S., as Director of Colonial Geological Surveys, together with a small planning staff (interim grant).	Misc.	2,100
139	do.	Provision for the appointment of a Secretary to the Research Sub-Committee of the Colonial Economic Advisory Committee.	do.	2,000
143	do.	Provision for the appointment of a Colonial Liaison Officer at the Building Research Station of the Department of Scientific and Industrial Research. <i>This appointment will facilitate the interchange of information on building research between this country and the Colonies.</i>	Misc.	4,750
149 149A	do.	Appointment of a Colonial research worker at the Liverpool School of Tropical Medicine.	Medical	1,665
156	do.	Appointment of a Colonial clinical research worker at Oxford University.	do.	1,480
163	do.	Appointment of a Colonial research worker on Schistosomiasis at the London School of Hygiene and Tropical Medicine.	Medical	1,100
164	do.	Appointment of a Colonial research worker on Viruses at the Central Public Health Laboratory, Hendon.	do.	1,100
104A	do.	Grant to Oxford University for the study of French Administration in North Africa. <i>A supplementary grant to cover increased travelling expenses (see House of Commons 150).</i>	Social Sciences	528
167	do.	Review of the organisation and methodology of agricultural statistics in the Colonies. <i>The Agricultural Economics Research Institute of the University of Oxford will review the reports which have been submitted by Colonial</i>	Agric., etc.	1,000

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	General—contd.			£
168	do.	<p>Governments on Agricultural Statistics and make recommendations for their improvement and expansion.</p> <p>Fundamental research on insecticides. The experiments, which will be carried out at the Porton Experimental Station, will aim at devising methods of applying insecticides so as to avoid loss through the action of the sun, absorption by vegetation, mud, thatch and through the skin of cattle (see R.174 below).</p>	Agric., etc.	19,350
172	do.	<p>Co-ordination of Information about Native Affairs in the African Colonies.</p> <p>Grant for the appointment of a research assistant in the Colonial Office to co-ordinate information on native administration, African local government, native land tenure and native law and courts, etc.</p>	Misc.	2,100
174	do.	<p>Insecticide Research</p> <p>Grant for the appointment of a Principal Scientific Officer to conduct insecticide research in the United Kingdom and advise on Colonial insecticide problems (see R.168 above).</p>	Agric., etc.	2,500
78A	Africa—General ..	<p>Compilation of an annotated bibliography of works in Land Tenure in Africa.</p> <p>Supplementary grant to enable the bibliography to be completed (see House of Commons 150).</p>	Social Sciences	108
141	do.	Grant to assist in the completion of the manuscript of a book on African Separatist Churches.	do.	120
165	do.	<p>Studentships in African Languages . .</p> <p>Further grant for training ten African students in linguistics at the School of Oriental and African Studies. The previous scheme, R.26, provided for ten similar studentships (see Cmd. 6532).</p>	do.	9,190
126	East Africa—General ..	<p>Tsetse fly and trypanosomiasis research and reclamation.</p> <p>The grant covers two-thirds of the total estimated expenditure on tsetse fly, trypanosomiasis and reclamation research in East Africa. This will be developed on a regional basis and</p>	Medical	£ 234,660

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	East Africa :— General—contd.			£
127	do.	entail a Central Research Institute and a separate Reclamation Service with close liaison between the two. The East African Governments have agreed to pay the remaining one-third. Visit to Canada of the Director of the East African Veterinary Research Institute to study a new method of producing rinderpest serum.	Agric., etc.	230
79A	do.	Survey of water resources of Northern Rhodesia and Nyasaland. <i>Supplementary grant to enable Professor F. C. Debenham, of Cambridge University, to visit the East African territories on his return journey to study their water problems on the spot (see House of Commons 150).</i>	Misc.	300
148 148A	do.	Labour efficiency research <i>Grant to enable a team of experts to undertake a survey among the 6,000 African employees of the Kenya-Uganda Railways stationed in Nairobi in order to study the factors affecting the efficiency of African labour, e.g., nutrition, housing, social environment, and economic factors.</i>	Social Sciences	5,720
153	do.	Agricultural research <i>Provision for the appointment over a period of five years of a Director of Agricultural Research, East Africa, who will prepare detailed proposals for an expanded organisation of agricultural research in that region.</i>	Agric., etc.	20,000
68A	do.	Experiments with D.D.T. and other insecticides and repellants in East Africa. <i>A supplementary grant to continue the work of the Insecticide Research Unit for a further three years after the termination of the existing scheme R.68 (see House of Commons 150).</i>	Agric., etc.	29,000
108	Kenya ..	Malaria Control <i>Grant to enable malaria control trials, using D.D.T., to be carried out in the highlands of Kenya, under the general direction of the officer in charge of the Colonial Insecticides Research Unit (see R.68A above).</i>	Medical	9,500
116	do.	Social Research <i>Grant for the employment of three sociologists to investigate land and</i>	Social Sciences	5,100

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	East Africa— <i>contd.</i> Kenya ..	<i>settlement problems. They will join the sociologist already employed under Scheme R.83 (see House of Commons 150).</i>		£
152	do.	Social Research <i>To finance the visit of an expert to draw up a plan of social research, to be carried out under Scheme R.116.</i>	do.	560
170	do.	Insecticide Research <i>Grant to enable experiments on the disinfection of aircraft to be conducted, employing aircraft of the East African Airways.</i>	Agric., etc.	500
162 162A	Tanganyika ..	Malaria Research <i>Scheme to enable investigations into the bionomics of certain vectors of malaria, similar to those made for West Africa under Schemes R.8 and R.40, to be carried out in Tanganyika (see Cmd. 6422 and House of Commons 106).</i>	Medical	4,670
173	do.	Medical Survey in connection with the East African Groundnut Scheme (see Cmd. 7030). <i>It is intended that a Medical Survey should be carried out to elicit information as to the relative incidence and importance of diseases and their causes in East Africa. The survey will be associated with the East African Groundnut Scheme and the present preliminary scheme provides for the purchase of transport and equipment and for the secondment of a Tanganyika Medical Officer for a period of two years.</i>	Medical	4,600
117 117A	Uganda ..	Linguistic Research <i>Visit of a member of the staff of the School of Oriental and African Studies, University of London, to study the Ganda language.</i>	Social Sciences	1,630
125	do.	Rockefeller Yellow Fever Research Institutes in Entebbe, Uganda and Lagos, Nigeria. <i>It is intended that the two Institutes will be transferred to British responsibility when the Rockefeller Foundation withdraws from participation in the work at or about the end of 1948. The Institutes will then be widened in scope to undertake research into virus problems generally. The present grant is to cover the cost of staff</i>	Medical	20,000

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	East Africa— contd.			£
	Uganda ..	<i>housing required for the proposed expansion and is divided between (a) Uganda £20,000 and (b) Nigeria £15,000 (see below).</i>		
135	do.	Water storage in Lake Victoria .. <i>Grant enabling an expert to visit Uganda to investigate the possibility of water storage in Lake Victoria and to assess the prospects of hydro-electric development.</i>	Misc.	8,050
136	do.	Geological Research <i>Grant in favour of the University of Edinburgh to provide for analytical work on mineral specimens from Uganda.</i>	Misc.	600
142	do.	Appointment of a Laboratory Assistant to the Yellow Fever Research Institute at Entebbe (see R.125 above).	Medical	1,140
144	do.	Physiological and Biochemical Research at Makerere College. <i>This grant provides for buildings, equipment and the appointment of staff to undertake physiological and biochemical research in association with the Biochemistry Department of Makerere College.</i>	do.	44,200
147 147A	do.	Appointment of an Entomologist to the Yellow Fever Research Institute, Entebbe (see R.125 above).	do.	2,720
151	do.	Yellow Fever Research Institute, Entebbe. <i>Grant to provide for the salaries of a Pathologist, Laboratory Assistant and Stenographer-Secretary (see R. 125 above.)</i>	do.	2,380
134	Zanzibar ..	Appointment of the Director of Clove Research. <i>This grant provides for the appointment of the Director and for visits by him to the United Kingdom, advanced plant physiological centres in the United States of America and other centres to enable him to prepare plans for research into the "sudden death" disease of cloves in Zanzibar.</i>	Agric., etc.	7,820
	Central Africa—			
43B	Nyasaland ..	Survey of fisheries of Lake Nyasa .. <i>Supplementary grant to enable certain marking experiments to be repeated, in extension of Schemes</i>	Agric., etc.	250

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	Central Africa— <i>cont.</i> Nyasaland ..	R.43 and R.43A (see House of Commons 106 and House of Commons 150).		£
157 157A	do.	Agricultural Research and Experimental Station in Nyasaland. <i>Grant to cover the whole of the capital cost and half of the recurrent cost, over a period of five years, of the Agricultural Research and Experimental Station, Nyasaland. The remainder of the recurrent cost will be met from local resources.</i>	do.	35,845
123	West Africa— General ..	West African Cacao Research Institute <i>Visit of a virus expert to the Research Institute to advise on investigations now being undertaken to find a cure for the swollen shoot disease of cacao.</i>	do.	350
130	do.	Appointment of Director of Fisheries Research. <i>Grant providing for the appointment of a Director of Fisheries Research, West Africa. He will prepare plans to implement the present proposals for this area which envisage the establishment of two fisheries research stations and the purchase and operation of two fisheries research vessels.</i>	do.	3,500
133	do.	Building Research <i>Visit by two officers from the Department of Scientific and Industrial Research to advise on the establishment of a building research station in West Africa.</i>	Misc.	800
106A	do.	Research in medical psychology in West Africa. <i>Supplementary to Scheme 106 (see House of Commons 150).</i>	Medical	330
140	do.	Tsetse fly and Trypanosomiasis Research Institute. <i>In 1945 Professor T. H. Davey of the Liverpool School of Tropical Medicine visited West Africa to advise on the organisation of research and reclamation against the tsetse fly. In his Report Professor Davey recommended the establishment of a Tsetse Fly and Trypanosomiasis Research Institute. The West African Governments have accepted this recommendation and have agreed to</i>	do.	207,000

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	West Africa— <i>cont.</i> General ..	<i>meet one-third of the total cost, the remaining two-thirds being met from the Colonial Development and Welfare Fund. The present grant covers this latter expenditure for a period of 5 years, subject to the provision of annual estimates by the Nigerian Government, which will be responsible for administering the scheme.</i>		£
155	do.	Investigations into the problems of secondary school science teaching in West Africa. <i>The scheme covers the cost of seconding a Nigerian official for a period of one year to carry out the investigations, with special reference to the training of teachers and the requirements of other professions, and the formulation of proposals for re-organisation and development of secondary school science teaching.</i>	Social Sciences	1,700
150	Gambia ..	Nutrition Field Research Station .. <i>Interim grant for the purchase of equipment required for the Field Research Station which it is proposed to establish in Gambia.</i>	Medical	3,000
134	Gambia ..	Nutrition Field Research Station .. <i>Visit by Professor B. S. Platt, Director of the Human Nutrition Research Unit of the Medical Research Council to discuss plans for the Nutrition Field Research Station (see R.150 above).</i>	Medical	410
160	do.	Nutrition Field Working Party .. <i>A grant to cover the cost for three years of a joint survey by nutritionists, agriculturalists, sociologists, economists and administrators. The scheme provides for work on the treatment of existing foods, the trial of new foods, the introduction of new minor industries and similar matters bearing on the improved nutrition of Colonial peoples.</i>	do.	57,750
109	Nigeria ..	Hot Climate Physiology Research .. <i>Provision for a laboratory assistant and the purchase of equipment for the research worker appointed under Scheme R.98 (see House of Commons 150, also R.98A and B below).</i>	do.	2,850
110	do.	Oil Palm Research .. <i>Grant to cover part of the cost of a three year scheme for oil palm research, the balance of £53,000 being</i>	Agric., etc.	152,160

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
	West Africa— <i>cont.</i> Nigeria ..	<i>contributed by the Nigerian Government. The scheme involves appreciable extensions to the acreage planted in oil palms at the Research Station in the Benin Province, the establishment of laboratories, etc., and the setting up of a small subsidiary station in the Eastern Provinces.</i>		£
111	do.	Grant for the purchase of certain equipment, literature, etc., required for investigations into the pathology of the liver in West Africa.	Medical	200
113	do.	Library of the Nigerian Medical Research Institute. <i>Visit of the Assistant Librarian, National Institute for Medical Research, to help in re-organising the library of the Nigerian Medical Research Institute.</i>	Medical	770
122	do.	Linguistic Research <i>Visit of a member of the staff of the School of Oriental and African Studies to study the Igbo language.</i>	Social Sciences	1,040
125	do.	Rockefeller Yellow Fever Research Institutes in Entebbe, Uganda and Lagos, Nigeria (<i>see under Uganda above</i>).	Medical	15,000
98A 98B	do.	Hot Climate Physiology <i>Grant to enable the research worker to visit Palestine to advise the Board for Scientific and Industrial Research on hot climate physiological problems (see House of Commons 150).</i>	do.	145
146	do.	Linguistic Research <i>Financial assistance towards the completion of a dictionary of the Fulan language.</i>	Social Sciences	500
40A	do.	Scientific investigation into the habits and bionomics of <i>Anopheles gambiae</i> . <i>Scheme 40—supplementary grant (see House of Commons 106)</i>	Medical	300
36A	Sierra Leone	Sociological research and anthropology: Survey in Sierra Leone. <i>Scheme 36—supplementary grant (see House of Commons 106).</i>	Social Sciences	400
169	South African High Commission Territories Basutoland ..	Investigation into Pellagra <i>Visit by two members of the Human Nutrition Research Unit to investigate the Prevalence of pellagra in Basutoland and its relation to the various methods of handling maize.</i>	Medical	880

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
112	Mediterranean— Malta ..	Undulant fever in goats <i>Grant to finance preliminary investigations into Brucella Melitensis by Dr. A. W. Taylor, lately of the Animal Diseases Research Association. These investigations will be carried out in the first instance in this country but will be transferred to Malta at a later date.</i>	Agric., etc.	£ 23,700
88A 88B 88C	Indian Ocean— Mauritius ..	Purchase, refitting and running of a fishery research vessel. <i>Supplementary grants for the appointment of scientific personnel and for the expenditure incurred in taking the fishery research vessel out to Mauritius (see House of Commons 150).</i>	Agric., etc.	14,618
138	do.	Visit of an expert to investigate the economic possibilities of using night-soil for the manufacturing of compost.	Misc.	430
158	Far East— General ..	Malaria Research <i>A preliminary scheme providing for the appointment of an experienced medical officer with a number of scientific and local staff. After investigation in Borneo he will submit plans for a scheme covering (a) a survey of the distribution and intensity of malaria in the most important areas of North Borneo, Brunei and Sarawak; (b) identification and study of the bionomics of the most important insect vectors of malaria leading to (c) the working out of appropriate control measures.</i>	Medical	20,800
161	do.	Annotated bibliography of Land Tenure in the Far East. <i>The work will be carried out under the supervision of the Royal Institute of International Affairs.</i>	Misc.	375
115 115A	Malayan Union	Malaria Research <i>Grant to enable field trials with new anti-malarial drugs to be carried out by the Institute of Medical Research at Kuala Lumpur.</i>	Medical	1,500
118	do.	Visit of an economist on the staff of the London School of Economics to undertake a study of the economics of smallholdings connected with the Malayan rubber industry.	Social Sciences	700

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (see Table II)	Amount
114	West Indies— General ..	Agricultural Research <i>Grant for the purchase of equipment which will be used for research into plant physiology in the West Indies.</i>	Agric., etc.	£ 1,778
132	do.	Preservation of Architectural Treasures <i>A grant to contribute towards the cost of a visit to the West Indies by the Treasurer and Secretary of the "Georgian Group" to advise on the preservation of certain buildings of architectural and historical importance.</i>	Misc.	400
84A	do.	Sociological survey, West Indies .. <i>Scheme 84—supplementary grant (see House of Commons 150).</i>	Social Sciences	92
159	do.	Cocoa Research <i>An interim grant (including the making of a comprehensive scheme of cocoa research in the West Indies) to provide for the maintenance of existing cocoa research at the Imperial College of Tropical Agriculture and the working expenses on an estate which has recently been made available for cocoa research. The cocoa industry in the United Kingdom, the West Indian Governments and the West Indian cocoa growers, have agreed to assist the financing of the scheme.</i>	Agric., etc.	10,825
93A	do.	Training grants for psychological research. <i>Supplementary grant to cover the cost of a short extension to the period of training in this country for two education officers from the West Indies who are preparing to undertake psychological research work there (see House of Commons 150).</i>	Social Sciences	900
82A	Jamaica ..	Investigation into the problems of refrigerated gas storage of bananas. <i>Supplementary grants to enable a senior officer from the Department of Scientific and Industrial Research to pay three visits to Jamaica during the research work to discuss progress. The supplementaries also provide for an adjustment of the salaries of the research workers (see House of Commons 150).</i>	Agric., etc.	1,140
145	do.	Sociological Survey : Jamaica .. <i>Grant to provide for a sociological survey of peasant families (see 84A above).</i>	Social Sciences	12,700

Scheme No. (Prefix R)	Territory	Description of Scheme	Classification by Subjects (See Table II)	Amount
166	West Indies— <i>cont.</i> St. Vincent ..	Arrowroot crop processing : St. Vincent. <i>As a result of the visit by an experienced factory technician to inspect the equipment of the arrowroot industry (financed under R.60) experiments were conducted in this country under the supervision of the Colonial Products Research Council to discover a more effective process for the extraction of starch. The present grant will enable two improved grinding machines to be purchased and despatched to St. Vincent for experimental tests under local conditions (see House of Commons 150).</i>	Agric., etc.	£ 450
171	Trinidad ..	Research into vacuum-oil food drying process. <i>Work has been in progress for several years at the Human Nutrition Research Unit on a new method of drying foodstuffs. It is expected to be particularly suitable to Colonial Territories for distributing local supplies of perishable foodstuffs and the present grant is to enable experimental work on a pilot scale to be carried out in Trinidad under tropical conditions and on tropical materials.</i>	Medical	2,600
				£1,085,259

In addition to the grants recorded above, estimates amounting to £116,700 were approved during 1946-47 under Scheme R.7 (reference to which is made in Cmd. 6486 of 1943) to finance the setting up of the Colonial Microbiological Institute in Trinidad and other work which the Colonial Products Research Council have been authorised to carry out.

Table II

ALLOCATIONS FOR RESEARCH UNDER THE COLONIAL DEVELOPMENT AND WELFARE ACTS, 1940 AND 1945, BROADLY CLASSIFIED BY SUBJECTS.

Period to	TOTALS				BY SUBJECTS							
	For Period		Cumulative		Agriculture, Veterinary, Forestry, Fishery		Medical		Social Sciences		Miscellaneous	
	Schemes	Allocation	Schemes	Allocation	Schemes	Allocation	Schemes	Allocation	Schemes	Allocation	Schemes	Allocation
31.10.42	11	£ 57,158	11	£ 57,158	7	£ 45,440	2	£ 11,218	1	£ 500	1	£ (Scheme R.7 see footnote*)
31.3.43	3	15,340	14	72,498	3	15,340	—	—	—	—	—	—
31.3.44	16	224,835	30	297,333	7	86,660	—	—	4	18,475	5	119,700
31.3.45	21	116,795	51	414,128	7	55,175	5	17,250	9	44,370	—	—
31.3.46	54	629,753	105	1,043,881	21	456,717	8	47,703	13	80,270	12	45,063
31.3.47	67	1,130,405*	172	2,174,286*	18	357,716	27	663,800	13	40,988	9	67,901*
Totals ..	172	2,174,286	—	—	63	1,017,048	42	739,971	40	184,603	27	232,664

Notes :—

The majority of the allocations are in respect of schemes extending over more than one year. For actual expenditure, see Table III.

* These figures include the sum of £45,146 which is the expenditure up to 31.3.47 on Scheme R.7 (work of the Colonial Products Research Council, including the establishment of the Colonial Microbiological Institute in Trinidad)—See Appendix II, Cmd. 6486.

Table III
ACTUAL ISSUES IN RESPECT OF RESEARCH SCHEMES 1940-47

Financial Year								Issues		
								£	s.	d.
1940—41	..	..	..	..	..	..	..	Nil		
1941—42	..	..	..	..	..	..	..	6,670	0	0
1942—43	..	..	..	..	..	..	..	13,793	7	2
1943—44	..	..	..	..	..	..	..	30,450	6	6
1944—45	..	..	..	..	..	..	..	58,345	5	2
1945—46	..	..	..	..	..	..	..	93,306	10	1
1946—47	..	..	..	..	..	..	..	164,329	4	3
Total 1940—47								..	..	..
								366,894	13	2

APPENDIX II

COLONIAL INSECTICIDES COMMITTEE

1. The composition of the Committee is as follows :—

PROFESSOR SIR IAN HEILBRON, D.S.O., D.Sc., LL.D., F.R.S. (Professor of Organic Chemistry at the Imperial College of Science and Technology) (*Chairman*).

PROFESSOR P. A. BUXTON, C.M.G., F.R.S. (Professor of Entomology, London School of Hygiene and Tropical Medicine) (*Vice-Chairman*).

DR. J. CARMICHAEL (late Colonial Veterinary Service).

DR. R. A. E. GALLEY (Secretary, Inter-Departmental Co-ordinating Committee on Insecticides).

DR. D. L. GUNN (Anti-Locust Research Centre).

DR. W. J. HALL, M.C. (Director, Imperial Institute of Entomology).

DR. F. HAWKING, D.T.M. (National Institute for Medical Research—Joint Secretary of the Colonial Medical Research Committee).

DR. A. F. MAHAFFY, C.M.G. (Joint Secretary, Colonial Medical Research Committee,

PROFESSOR J. W. MUNRO, M.A., D.Sc. (Professor of Zoology and Applied Entomology) Imperial College of Science and Technology).

PROFESSOR J. L. SIMONSEN, D.Sc., F.R.S. (Director of Colonial Products Research)

DR. H. H. STOREY, F.R.S. (Scientific Secretary, Committee for Colonial Agricultural, Animal Health and Forestry Research).

MR. J. K. THOMPSON (Secretary, Tsetse and Trypanosomiasis Committee).

Ex-Officio Members

The Secretary of State's Medical, Agricultural, Animal Health and Forestry Advisers.

LT.-COL. H. J. HOLMAN, B.Sc., A.R.I.C. (*Secretary*).

2. The terms of reference of the Committee are as follows :—

- (i) to initiate Insecticide Research, including experimental field work ;
- (ii) to examine Insecticide Research and Experimental Schemes submitted to it by Colonial Governments or other appropriate bodies ;
- (iii) to advise on any problems concerning the use of insecticides which may be submitted to it ;
- (iv) to make available the latest scientific information to those concerned with the use of insecticides in the Colonies.

3. At a meeting held on the 21st March, 1947, the Committee reached the following conclusions :—

- (a) that it should concern itself primarily with the experimental application of the results of fundamental insecticide research ;
- (b) that in the final stages of the development of insect control it would almost certainly be necessary for the Committee to sponsor field experiments on a large scale ;
- (c) that it should be its task to encourage and reinforce when required research projects undertaken by Colonial Government Departments ;
- (d) that it should co-ordinate agricultural, medical* and veterinary interests in the use of insecticides. (In this connection the need for full consideration being given to the effects of insecticides on beneficial insects was emphasised, and also the need for experiments to ascertain the ecological problems involved in the use of insecticides.)

APPENDIX III

COLONIAL ECONOMIC RESEARCH COMMITTEE

1. The composition of the Committee is as follows :—

SIR ARNOLD PLANT, B.Sc.(Econ.), B.Com., Sir Ernest Cassel Professor of Commerce, University of London (London School of Economics) (*Chairman*).

PROFESSOR G. C. ALLEN, M.Com., Ph.D., Professor of Political Economy, University of London (University College).

DR. A. J. BROWN, M.A., Director, Economic Section, Offices of the Cabinet.

PROFESSOR S. H. FRANKEL, M.A., Professor in Colonial Economic Affairs, University of Oxford.

MR. R. GLENDAY, M.C., M.A., LL.B., Federation of British Industries.

MR. H. LEAK, C.B.E., B.A., Head of Statistics Division, Board of Trade.

PROFESSOR J. E. MEADE, C.B., M.A., Director of Economic Section, Offices of the Cabinet.

MR. E. A. G. ROBINSON, M.A., Lecturer in the Faculty of Economics and Politics, University of Cambridge.

MR. J. STAFFORD, M.A., Acting Director, Central Statistical Office, Offices of the Cabinet.

MR. P. A. WILSON, M.A. (*Acting Secretary*).

2. The terms of reference of the Committee are to advise the Secretary of State in connection with Economic research and statistics.

COLONIAL PRODUCTS RESEARCH COUNCIL

Fourth Annual Report

MEMBERSHIP

THE RT. HON. LORD HANKEY, G.C.B., G.C.M.G., G.C.V.O., F.R.S., *Chairman*.

MR. ERIC BARNARD, C.B.E., D.S.O., M.A., Deputy Secretary, Department of Scientific and Industrial Research.

PROFESSOR H. V. A. BRISCOE, D.Sc., F.R.I.C., University Professor of Inorganic Chemistry, Imperial College of Science and Technology, London.

MR. ANEURIN DAVIES, Co-operative Wholesale Society.

MR. C. G. EASTWOOD, C.M.G., Colonial Office.

SIR JOHN FRYER, K.B.E., M.A., Secretary, Agricultural Research Council.

PROFESSOR SIR NORMAN HAWORTH, D.Sc., Sc.D., F.R.S., Professor of Chemistry, University of Birmingham.

PROFESSOR SIR IAN HEILBRON, D.S.O., D.Sc., LL.D., F.L.S., Professor of Organic Chemistry, Imperial College of Science and Technology, London.

SIR HARRY LINDSAY, K.C.I.E., C.B.E., Director of the Imperial Institute.

SIR EDWARD MELLANBY, K.C.B., M.D., F.R.C.P., F.R.S., K.H.P., Secretary, Medical Research Council.

PROFESSOR J. L. SIMONSEN, D.Sc., F.R.I.C., F.R.S., *Director of Research*.

MR. G. THOMSON, Chairman, General Council, Trades Union Congress.

PROFESSOR A. R. TODD, M.A., D.Sc., F.R.I.C., F.R.S., Professor of Organic Chemistry, the University of Cambridge.

LT.-COL. H. J. HOLMAN, B.Sc. } *Joint Secretaries.*
MR. J. G. HIBBERT, M.C. }

During the year, Sir Gerard Clauson resigned from the Council and Mr. C. G. Eastwood was appointed in his place.

The transfer of Mr. C. Y. Carstairs from the Research Department of the Colonial Office to other duties has necessitated his resignation from the office of Joint Secretary. At their meeting on the 27th March, 1947, the Council recorded their warm appreciation of his services. Mr. Carstairs has been replaced by Mr. J. G. Hibbert as Joint Secretary.

The terms of reference of the Council are given in full in the First Annual Report, 1943-1944 (Cmd. 6529).

CONTENTS

	<i>Paragraphs</i>
PART I.—GENERAL	1–25
Research on Sugar and Starch	2–3
St. Vincent Arrowroot	4
Tanganyika Bitter Orange Oil	5
<i>Tetracarpidium conophorum</i> oil	6
Kouso flowers	7
Visit to East Africa, Southern Rhodesia and the Union of South Africa	8–19
East African Industrial Management Board and Industrial Research Board	9
Calcium fluorophosphate deposits in Uganda	10
Laboratory of the Government Chemist, Tanganyika	11
Mineral Resources of Tanganyika	12
East African Sisal Growers' Association	13
Colonial Insecticide Research Unit, Uganda	14
Colonial Insecticides Committee	14
Malaria Control in British Guiana	14
Zanzibar Clove Industry	15
Methods of Purchase of Research Equipment	16
Central African Council	17
Regional Research in Africa	18
British Commonwealth Official Scientific Conference	20
Royal Society Empire Scientific Conference	20
Colonial Microbiological Research Institute	21
Colonial Geological Survey	22
Contacts with Scientific Officers Overseas	23
 PART II.—REVIEW OF RESEARCH WORK IN PROGRESS	 26–38
Citrus Products	26
Clove Oil	27
Petroleum	28

	<i>Paragraphs</i>
Carbohydrates	29–31
(1) Sugar	29
(2) Starch	30
(3) Arrowroot	31
Theobromine	32
Timber Research	33
Wallaba Wood Resin	34
Vegetable Oils	35
Plants of Possible Medicinal and Insecticidal Value	36
<i>Striga lutea</i>	37
Colonial Microbiological Research Institute	38
(a) Antibiotics	
(b) Tea cider	
(c) Fermentation of Cocoa Beans	
(d) Food Yeast	
(e) Post Graduate Students.	

APPENDIX I.—List of Publications.

APPENDIX II.—List of Patent Applications.

TREASURY CHAMBERS,
WHITEHALL, S.W.1.
21st May, 1947.

SIR,

I have the honour to enclose herewith the Annual Report of the Colonial Products Research Council for the year 1946–47.

I am,
Sir,

Your Obedient Servant,
HANKEY,
(Chairman).

The Right Honourable A. Creech Jones, M.P.,
Secretary of State for the Colonies.

COLONIAL PRODUCTS RESEARCH COUNCIL

PART I.—GENERAL

The programmes of research covering a wide range of Colonial products which are being conducted on behalf of the Council in Universities and other institutions in this country have progressed satisfactorily along their already established lines. From the outset the Council have particularly emphasised that this work is of a long term nature and early spectacular results leading to immediate industrial development cannot be expected. During the past year, however, it has become evident that certain lines of investigation are yielding results which give promise of practical application. The time is now not far distant when the exploration of channels for their industrial utilisation will have seriously to be considered. The results of research so far achieved are available to all and a list of papers and patent applications in which will be found full details, appears as Appendices I and II in both this year's and last year's reports.

2. The work conducted in Sir Norman Haworth's laboratory at the University of Birmingham on sugar and starch is of particular interest in this connection. In the course of the study of the chemistry of cane sugar (sucrose) and its immediate transformation products (see para. 29), substances have been prepared which offer prospect of being of value in medicine, in the plastics industry and as solvents, detergents and emulsifiers. One product, sodium levulinate, is an anti-freeze agent superior in some respects to ethylene glycol.

3. The central feature of the research on starch (see para. 30) is the separation of starch into its two components known as amylopectin and amylose. From this investigation it seems clear that the industrial use of starch could be widely extended and existing processes much improved if starch was first separated into these two components each of which could be used for a purpose appropriate to its properties. Amylopectin, for instance, has properties which make it superior to whole starch as a beater size in paper-making and amylose acetate is comparable with cellulose acetate in the manufacture of textile fibres and films.

4. Reference was made in the last Report (para. 7) to experiments which were being conducted with St. Vincent arrowroot in order to determine the optimum conditions for the extraction of starch. As a result of this investigation two grinding mills of a special design are being sent to St. Vincent in the hope that tests on a factory scale will prove that the suggested method of treatment will result in the release of practically the whole of the starch present in the roots. Further details of this investigation are given in para. 31 of the present Report.

5. An investigation of obvious practical significance is being carried out at the Imperial College under the direction of Sir Ian Heilbron and Dr. E. R. H. Jones (see para. 26). This is concerned with the study of Tanganyika bitter orange oil, which during shipment and storage forms a troublesome deposit. The nature of the deposit has now been finally determined and the properties of the compound concerned are being studied to see how best its separation from the oil can be prevented.

6. An important study of the oil from the seeds of a West African vine (*Tetracarpidium conophorum*) is described in para. 35. Work in Professor Hilditch's laboratory at Liverpool University suggests that the oil prepared

from specially heat-treated seeds may prove to be a satisfactory substitute for linseed oil. There are, however, several factors to be determined before it can be decided whether the oil is of economic significance in this direction.

7. An appreciable number of Colonial plants have been or are being obtained from overseas for examination. It is as yet too early in the majority of cases to say whether the plants will prove of value, but the study of kousso flowers (*Brayera anthelmintica*) from East Africa is yielding interesting results. The various constituents of the flowers have been tested *in vivo* for action against internal parasites, and one of these, "kosotoxin," a homogeneous crystalline substance, has been found to be highly toxic against them.

8. The Council appreciates the vital need of maintaining the closest possible contact with research workers in the Colonies and they feel that this can only be fully achieved by visits to the Colonies and discussion of problems on the spot. Accordingly, the Council recommended that a visit be paid early in September, 1946, to the East African colonies, Kenya, Tanganyika, Uganda and Zanzibar, by Sir Ian Heilbron and the Director of Research. This proposal was approved by the Secretary of State; the tour was later extended when an official invitation was received to visit the Union of South Africa. This provided an opportunity of contacting also the Central African Council by visiting Salisbury. On their return Sir Ian Heilbron and the Director of Research submitted a detailed report to the Council. The recommendations contained in this Report were approved by the Council and the necessary action to implement them is being taken. Copies of the Report have been sent to the Colonial Governors of the Colonies visited. It may be of interest to refer here to some of the more important aspects of the visit.

9. Mention was made in the last Report (para. 3) of a proposal for the continuance of the East African Industrial Research Board established during the war as a permanent regional research organisation under a Director of high scientific qualifications. One of the main objects of the visit to East Africa was to consider the present organisation of industrial research in the East African Colonies and its future development leading to the improvement of existing and the encouragement of new industries. During their stay in Nairobi, Sir Ian Heilbron and the Director were able to discuss the position of both the Industrial Management Board and the East African Industrial Research Board, with Sir Charles Lockhart, the Economic Adviser, Governors' Conference, Colonel Griffiths, the Managing Director of the Board and Mr. H. B. Stent, the Acting Chairman of the East African Industrial Research Board. Whether it is finally decided to set up a central regional research organisation as originally envisaged or whether the best interest of each Colony will be served by its having its own general research and development laboratories it cannot be too strongly stressed that scientific staffs should make full use of the facilities afforded by the Colonial Products Research Council and also of the Council for Scientific and Industrial Research in the Union of South Africa.

10. The most important investigation in which the Research Laboratory of the East African Industrial Research Board is at present concerned is the conversion of calcium fluorophosphate occurring in large deposits in Uganda, into a soluble phosphate suitable for replacing imported superphosphate as a fertiliser. During their visit, Sir Ian Heilbron and the Director of Research had an opportunity of seeing the work being done and subsequently on their return they held discussions with interested bodies in this country. The

problem presents difficulties both from the technical and economic viewpoints, but the matter is being actively pursued.

11. An interesting visit was paid to the laboratory of the Government Chemist (Dr. W. D. Raymond) at Dar-es-Salaam. Very valuable work is being done in this laboratory and recommendations have been made for an increase in staff and extension of accommodation.

12. As an outcome of their visit to Tanganyika, Sir Ian Heilbron and the Director of Research were greatly impressed by the possible future mineral developments of the territory. The newly discovered diamond field at Shinyanga has provided an immediate important source of income, which will undoubtedly aid considerably the economic development of Tanganyika. Of equal importance are the developments likely to be associated with the discovery of large lead deposits and the extensive seams of low grade coal. If full advantage is to be taken of the mineral possibilities of the territory additional geological staff are urgently required.

13. The Council has followed closely the interesting work on sisal (see last Report, para. 5) carried out in this country and in East Africa on behalf of the Sisal Growers' Association. During the visit to Tanganyika, Sir Ian Heilbron and the Director were able to discuss fully the work being conducted there under Mr. Locke and Dr. S. L. Wilson and to offer a number of suggestions.

14. In Uganda, Sir Ian Heilbron and the Director visited the Colonial Insecticide Research Unit which had been in operation since 1945. They had an opportunity of discussing the work and seeing the field experiments in mosquito and tsetse control which were being conducted. In spite of the many difficulties with which it has been confronted, the achievements of the unit have been quite remarkable. It is evident that if the Colonies are to derive the fullest advantages of insect control that the new synthetic insecticides offer, a considerably increased provision of scientific manpower and equipment will be necessary. In their report to the Council, Sir Ian Heilbron and the Director of Research urged the establishment of a specific Colonial insecticide committee to co-ordinate research effort in the Colonial field and to bring to the notice of workers the latest information and advice. In January, 1947, the Secretary of State constituted the Colonial Insecticides Committee under the Chairmanship of Sir Ian Heilbron. The closest relationship exists between this new Committee and the Council. The Director of Research is a member and the Secretary of the Council has been appointed Secretary to the Colonial Insecticides Committee. Further, the Director of Research, as Chairman of the Insecticide Research and Development Co-ordinating Committee of the Agricultural Research Council, and he and the Secretary as members of the Imperial Institute Consultative Committee on Insecticide Materials of Vegetable Origin, form additional links between those bodies who can best serve the Colonies in the field of insect control. The valuable results which can be achieved by the application of the new synthetic insecticides has been made clear by the experiments on malaria control which have been conducted in British Guiana. In the second report of the Council (Cmd. 6663, para. 8) reference was made to the field trials being carried out in British Guiana on the initiation of Sir Robert Robinson and the Director of Research. This work has been continued on an extended scale under the direction of the malariologist Dr. Giglioli and has met with remarkable success.

15. The visit to Zanzibar provided an opportunity of seeing at first hand the serious effect of "sudden death" disease of cloves and of discussing other

problems relating to the clove industry. At the same time attention was drawn to the desirability of extending the cultivation of the cashew nut tree in the island.

16. The progress of work in any laboratory is dependent upon an adequate supply of equipment and materials always being available. During the East African visit it was abundantly clear from discussions with research workers that whilst the present purchase of the annual laboratory requirements through the Crown Agents is on the whole satisfactory this was not the case with the supply of special research requirements. The question of finding a remedy for these difficulties has been energetically taken up and it is hoped that as a result of discussions which are now proceeding they may be overcome.

17. At Salisbury, Sir Ian Heilbron and the Director of Research attended a meeting of the Central African Council's Economic Development Committee at which scientific officers from all the Central African territories were present. Their views were sought on proposals for the appointment of a Scientific Secretary to make a detailed survey of the territories and also for the setting up of a Research Council. These were heartily endorsed and it has subsequently been learned that steps have been taken to put these proposals into effect. During their stay the advice of Sir Ian Heilbron and the Director of Research was invited in connection with a number of other problems and at an interview with the Prime Minister, Sir Godfrey Huggins, the more important of their recommendations were brought to his notice.

18. The very considerable facilities available for research and development were clearly appreciated from the visit paid to the Union of South Africa. It is felt that great benefit would accrue to both the Central and East African Colonies from close association with many of the research institutions in the Dominion. In this connection it is of interest to note that during the British Commonwealth Scientific Official Conference the subject of Regional Research in Africa was discussed (Cmd. 6970, para. 64) and it is hoped that a meeting will be arranged by the Union of South Africa in 1948, between as many as possible of the Governments or groups of Governments having responsibility in Africa, south of the Sahara.

19. The Council desire to record their thanks to their Excellencies the Governors of Kenya, Southern Rhodesia, Tanganyika and Uganda also to the Resident of Zanzibar and to their Principal Officers for all the assistance they rendered and which assured the success of the tour. The thanks of the Council are due also to the officers of the East African Governors Conference and the Central African Council for their help and to Mr. Stent for so kindly acting as Secretary to Sir Ian Heilbron and the Director of Research during the East African part of the tour. The Council desire also to express their thanks to the Government of the Union of South Africa and to Dr. Schonland and his colleagues for the warm hospitality extended to Sir Ian Heilbron and the Director of Research.

20. The Royal Society Empire Scientific Conference followed by the British Commonwealth Scientific Official Conference were events of major importance during 1946, and of particular interest to Colonial workers. The Royal Society Conference was concerned with general questions of scientific collaboration particularly in the academic field. The means of assuring continuous scientific collaboration between official scientific services of the Commonwealth was a matter appropriate to the Official Conference. The Official Conference further provided a background of official support for the

recommendations of the Royal Society Conference which was necessary in many cases for their full implementation. The Director of Research took an active part in the work of both Conferences. He was leader of the Colonial Delegation at the Official Conference and served on its Standing Committee, its Steering Committee and a number of group Committees. At the Royal Society Conference the Director presented a paper entitled "Natural Products of the Empire and their Utilisation" and acted as Chairman of the Meeting at which this subject was discussed. It would be inappropriate here to consider the large number of recommendations of the two Conferences. These are readily available in the Report of the Proceedings of the Official Conference (Cmd. 6970) and needless to say have particular significance in relation to Colonial Research problems. In order to provide suitable machinery for initiating action for the calling of specialist conferences and for following up the recommendations and decisions of the Official Conference after it dispersed, a Standing Committee of the Conference was established. The Director of Research is a member of this Committee and of its Working Party. The Council welcome the opportunities that have been afforded to the Director of Research, through his activities in connection with these Conferences, of maintaining and extending his personal contacts with scientific workers in the Commonwealth overseas. They regard this aspect of his duties of paramount importance and value.

21. In the last Report (para. 8) a brief description was given of the proposed Colonial Microbiological Research Institute to be established in Trinidad. The construction of the laboratory has begun and the Institute's Director, Dr. A. C. Thaysen is now in Trinidad, where temporary laboratory accommodation for himself and his staff has been provided through the kindness of the Director of Medical Services.

22. The Council learned with pleasure of the appointment of Dr. F. Dixey, O.B.E., D.Sc., F.G.S., as Director of the newly formed Colonial Geological Survey. Dr. Dixey's offices are located in the Imperial Institute and this has facilitated the close liaison which exists between him and the Director of Research of the Council.

23. In the two previous reports (Second Report, para. 10 ; Third Report, para. 12) lists have been included of overseas officers who have been nominated officially to correspond with the Director of Research. The following further nominations were made during the year under review :—

Falkland Islands : Dr. J. E. Hamilton, Government Naturalist.

Hong Kong : Dr. G. A. C. Herkiots, Secretary for Development.

24. Apart from the overseas contacts established during the Commonwealth Scientific Conference, the Director of Research has been in close touch with Scientific workers in the Colonies by correspondence or discussion during their visits to this country. The Council value highly such liaison and invite officers from overseas when on leave in this country to discuss their problems with the Director of Research.

25. The Council wish to place on record their grateful thanks to many official bodies and firms in this country who have readily given assistance and information to the Council whenever they have been approached.

PART II.—REVIEW OF RESEARCH WORK IN PROGRESS

Citrus Products

26. (16)* Work in this field during the past year has been concerned mainly with the investigation of Tanganyika bitter orange oils to which a brief reference was made in last year's report. This oil, during shipment and storage, forms a troublesome deposit which has now been investigated by Mr. J. H. Chapman working under the supervision of Professor Sir Ian Heilbron and Dr. E. R. H. Jones. It has been found to consist essentially of the coumarin derivative, auroptene, and a study of its properties is being made with a view to inhibiting its separation from the oil. Several other constituents of these oils are being examined and work has been resumed on the more general problem of the difference between expressed and distilled citrus oils. It is hoped also to examine some Palestinian orange oils samples of which have been received.

Clove Oil

27. (17) Progress in the study of the chemistry of eugenol has during the past year been somewhat limited. We have to deplore the death of Professor F. M. Rowe, F.R.S., of the University of Leeds and also of his collaborator Mr. L. D. Barker ; as a result, the investigation on the possibility of utilising eugenol in the manufacture of intermediates of the dyestuff industry ceased. Their experiments have not reached a stage suitable for publication. In Professor Clemo's laboratory work has also advanced more slowly since two of his assistants, Dr. A. L. Challis and Dr. J. H. Turnbull, have taken up other appointments. It had been hoped that Dr. Turnbull would have continued his work, but he was offered and accepted a Senior Research Exhibition at Cambridge. Dr. Turnbull's work was concerned mainly with the preparation of *iso*quinoline derivatives from eugenol and a number of substances were prepared bearing a structural resemblance to the alkaloid papaverine. Professor J. H. Burn has found some of these to be superior to the alkaloid as analgesics, but less active than other synthetic products such as phenazone and pethidine. An account of much of this work has already been published and further papers are in the press.

Dr. Challis has also prepared a number of new substances and of considerable interest is the method which he has now perfected for the preparation of homovanillin. A paper on this subject will, it is hoped, shortly be published.

Mr. W. A. Cummings is engaged in a study of the chemistry of dehydrodi-eugenol, a eugenol derivative for which a convenient new method of preparation has been devised. He is engaged also in examining certain optically active derivatives of vanillin.

Petroleum

28. (19) Reference was made in last year's report to an investigation which had been commenced on samples of naphthenic esters received from the Trinidad Leaseholds Ltd. These esters were found to be insufficiently purified for the investigation to be profitably undertaken and it is anticipated that more highly purified products will shortly be made available.

*Figures in parentheses refer to the corresponding paragraph in the 1945-46 Report.

Considerable progress has been made with the synthesis of pure alkyl naphthalenes and the absorption spectra of a number of these have been examined by Mr. K. C. Bryant at the King's Langley Laboratory of Trinidad Leaseholds Ltd. Unfortunately, the identification of these isomeric alkyl naphthalenes in admixture cannot, with the exception of 2:6-dimethylnaphthalene, be determined spectroscopically.

A full account of this interesting work is being prepared for publication. It has been carried out by Mr. A. B. Pickering working under the direction of Dr. J. C. Smith in the Dyson Perrins Laboratory, Oxford, and it has already proved to be of technical value.

Carbohydrates

29. (20a) *Sugar*.—When the investigation of the possibility of the utilisation of sucrose as a raw material for the chemical industry was opened by Dr. Wiggins and his collaborators working under the direction of Professor Sir Norman Haworth a general plan of campaign was laid down. This was the study of the chemistry of sucrose and its immediate transformation products. This plan has been pursued during the past year although on a somewhat more limited scale owing to the shortage of research assistants.

It was early found that levulinic acid whose sodium salt is an excellent anti-freeze agent could be prepared in excellent yield by a comparatively simple economic process and a comprehensive study of its reactions is being made. A sulphonamide derivative has been prepared which shows promise as a chemotherapeutic agent and the most convenient method for its preparation has been carefully examined. In addition several different substances derived from levulinic acid have been found to possess marked analgesic properties, one of them being notably superior to similar well known drugs. Progress in the pharmacological screening of the very large number of substances prepared by Dr. Wiggins has been much facilitated by the valuable co-operation given by Professor Burn, Department of Pharmacology, Oxford, and by Professor Frazer and Mrs. Wajda in the Physiology Department of the University of Birmingham.

It has been found that in addition to their possible uses in chemotherapy a number of derivatives of levulinic acid may be found to be of value as solvents and plasticisers.

Extensive investigations have been carried out also on the structural aspects of various derivatives of sucrose; during the course of this work a process, for which a patent has been filed, has been worked out for the conversion of sucrose into (a) mannitol and dianhydrosorbitol; and (b) dianhydro-mannitol and dianhydrosorbitol.

It would appear possible that the palmityl and stearyl derivatives of these dianhydro sugars may find application as detergents and emulsifiers. In the course of this work it was observed that glucamine, a basic derivative of glucose, can be readily converted into a monoanhydride of sorbitol, a substance previously obtained only in small yield from sorbitol itself.

The methods at present employed in the preparation of hydroxy methyl furfural from sucrose involved the loss of half the sucrose molecule since this important substance is derived from the fructose, the glucose formed simultaneously being lost. A convenient method has now been worked out for the separation of the glucose and fructose formed by the hydrolysis of

sucrose. By working in acetic acid medium 65 per cent. of the glucose is recovered, the fructose being separated as calcium fructosate which may then be used for the preparation of hydroxy methyl furfural. Preliminary experiments are being carried out on the bacterial oxidation of sucrose having as their object the preparation of 2 : 6-ketogluconic acids. A further aim has been to gain experience of the technique of this field which has many obvious technical applications. It is hoped that this work may at a future date benefit by collaboration with the Colonial Microbiological Research Institute.

The above summary only indicated very inadequately the field covered by the work in the Birmingham laboratories, the wide scope of which can be gathered from the long list of papers submitted for publication during the past year. (See Appendix I.)

30. (20*b*) *Starch*.—Fundamental investigations on the starch constituents have been continued in Sir Norman Haworth's laboratory by Dr. S. Peat and his collaborators. Refinements in the technique of analysis have revealed constitutional differences in the starches from different plant sources, which had not hitherto been apparent. This is undoubtedly a matter of potential technical importance requiring prolonged study. Arrowroot starch (from fresh roots) has been closely examined and compared with the starches of potato, cassava (from Mauritius) waxy maize, sorghum and pea.

A central feature of the research is the separation of starch into its branched and unbranched components (amylopectin and amylose). Additional methods of separation have developed requiring a procedure which involves the absorption of the branched component of alumina hydroxide gel. This method provides a rapid and convenient means of preparing a high purity amylose.

It is becoming obvious from these investigations that the industrial use of starch could be widely extended and the existing processes much improved if starch was first separated into its components each of which could be used for a purpose appropriate to its properties. Thus, for example, it has been shown that amylopectin has properties which make it superior to whole starch as a beater size in papermaking and it is already well known that amylose acetate is comparable with cellulose acetate in the manufacture of textile fibres and films.

One further interesting result of the study has been the observations that starch glycollate is an ideal indicator in iodometric analysis. This derivative is simple to manufacture and its use in the place of the usual starch indicator would facilitate iodometry in many different analytical fields.

A survey of the indigenous starch bearing plants of Kenya is being made by Mr. H. E. Watson in Nairobi. The seeds of the wild fibrous banana contain a starch of high amylose content which merits further examination as does "Uwanga" starch. "Uwanga" is already extensively cultivated, being used locally as a foodstuff and for laundry purposes. During his recent visit to East Africa, the Director of Research had the opportunity of meeting Mr. Watson and discussing with him the work which he was carrying out for the Council.

31. (7) *Arrowroot*.—In 1945, Mr. A. R. Williamson visited St. Vincent at the request of the Secretary of State to report upon the arrowroot industry. It was clear from the valuable report which he submitted that the efficiency of

this industry was capable of considerable improvement ; two main problems on which the Council was able to offer assistance being

- (a) the determination of the actual starch of the roots of the two cultivated varieties, creole and banana, and
- (b) the most suitable method of grinding the root allowing the maximum extraction of the starch.

For the investigation of these two problems a quantity of each variety of root was flown to this country, accurate estimations of the starch content were carried out in the Birmingham laboratories under the direction of Dr. Peat whilst two firms, Messrs. Christy and Norris of Chelmsford and Messrs. Whiffen & Sons Ltd. of London very kindly collaborated in the grinding and extraction processes. A process has now been devised by Messrs. Whiffen & Sons, which allows the extraction of practically the whole of the starch from the roots. An order has been placed with a firm for the supply to St. Vincent of the grinding mills recommended by Messrs. Whiffen, and full details of the method by which they should be worked has also been sent to this island. It is hoped that the extraction when carried out in St. Vincent will give equally good results. We are greatly indebted to the two firms who have assisted us and more especially to Messrs. Whiffen & Sons and their Chief Chemist, Dr. Boyd, for their most valuable assistance.

Theobromine

32. (21) This research terminated in September, 1946, with the departure of Dr. F. Whittaker to take up an industrial post with the Wellcome Foundation. Since these investigations, although revealing much of scientific interest, failed to indicate any useful new technical applications, they have not been further pursued.

Timber Research

33. (22) Progress in this work has not been possible owing to the difficulty of obtaining suitable plant. Mr. Campbell and his collaborators have therefore given attention to the possibility of utilising wallaba wood resin and reference to this work is made in the next paragraph.

Wallaba Wood Resin

34. (23) A report has been received from the Director, Road Research Laboratory (D.S.I.R.) of the possibility of using the wallaba wood resin in soil stabilisation. Whilst it would appear that the resin exerts some waterproofing action when mixed with loamy soil in the proportion of 4 per cent. by weight, the action is not so marked as that obtained by Manila copal resin from the Dutch East Indies. Neither of these resins is as efficacious as the proprietary stabilising agent known as "Vinsol." It is proposed to try further experiments with the calcium salts of the resin and also with its benzoyl derivative.

Some experiments being made by Mr. Campbell and his collaborators in the Forest Products Research Laboratory on the chemistry of the resin suggest that it is related chemically to lignin with possibly a somewhat less complex structure. On destructive distillation at a comparatively low temperature it yields a residual coke which may be of use in the metallurgical industry.

Vegetable Oils

35. (24) Notable progress has been made during the past year in Professor Hilditch's laboratory in the field of Colonial vegetable oils. Until last September he was assisted by Drs. F. D. Gunstone, J. P. Riley and Mr. H. C. Dunn, B.Sc. Dr. Gunstone was then appointed Assistant Lecturer in the Department of Organic Chemistry, University of Glasgow, whilst Dr. Riley was awarded a Campbell Brown Research Fellowship in the University of Liverpool. This latter appointment has enabled Dr. Riley to continue to give his valuable assistance to the Council.

Reference was made last year to the oil from the seeds of *Tetracarpidium conophorum* and it was mentioned that this oil judging from its acid components, might prove to be of economic value, if the enzymatic hydrolysis in the sun dried seeds could be prevented. Thanks to the active co-operation of the Department of Agriculture, Nigeria, and more especially to that of Mr. K. T. Hartley, the Agricultural Chemist, it was found that, by drying the freshly collected seeds at 100° prior to despatch to this country, an oil could be obtained from them with a free acid value of about 1.

An examination of this oil has confirmed the opinion previously expressed and suggests that it might prove to be a substitute for linseed oil. It is hoped that the larger quantity of kernels (1 cwt.) which Nigeria have promised to supply, may be available at an early date when a thorough technical trial may be made with it. In the meantime, a small quantity has been sent to the Paint Research Department of the L.M.S. Railway. It must be emphasised that the possibility of the development of this linseed oil substitute depends (a) on whether the oil responds satisfactorily to the tests of the paint experts, (b) on the kernels being treated immediately after collection in the manner necessary to give the lowest free acid content with a reasonably good colour of the oil, and *above all*, (c) on the problem being envisaged in terms of an output of at least 10,000 tons of oil per year (or 20 to 25 thousand tons of kernels). The spasmodic production of a few tons or hundreds of tons of a drying oil is of no permanent interest to the paint and varnish industry. A paper giving an account of this work is in the press and an advance copy of the paper has been sent to the Director of Agriculture, Nigeria, without whose assistance further work in this field will not be possible.

The great improvement in the quality of the *Tetracarpidium* oil resulting from the heat treatment of the kernels has suggested that rubber seed oil of equally high quality might be obtained if the seeds were treated in a similar manner. With the assistance of Dr. Child of Ceylon, this has now been done and the kernels have been despatched to this country for examination.

At the request of Mr. A. R. Penfold, Director of the Museum of Technology and Applied Science, Sydney, N.S.W., a very good sample of lumbang oil from Northern Queensland has been investigated since this oil is of interest also to Fiji. A detailed study of the acids present in this oil has been made and a paper on the subject will shortly be published. Mr. Penfold has informed us that the results of this investigation would be of great value to him.

In pursuance of our general policy to examine all colonial oils and fats, the West Indian citrus seed fats comprising those from grapefruit, orange and lime, have been subjected to a preliminary examination. These oils bear a general resemblance to cotton seed oil but since they contain appreciable quantities of linolenic acid they would probably develop rancidity more rapidly

than the latter oil. If the West Indian citrus juice factories were able to market a thousand tons or upwards of these seeds they should find a ready market for edible oil purposes comparable with the best cotton seed oil. It would, of course, be essential to control the handling of the seeds so that the oil would have a low acid value.

Two other materials of minor importance, West Indian beni seed oil from *Moringa oleifera* and mango seed have also been examined for their general characteristics. Neither of these is likely to be of any technical value although Ben (Behen) oil of good quality might be equal to olive oil as a salad oil.

A considerable number of other drying oils await examination. Only two have so far been studied, namely those from *Ocimum virida* (Nigeria) and *O kilimandscharicum* (Sudan). The oil content of these seeds is too small to be of much technical interest whilst the minute size of the seeds would make the extraction of the oil difficult.

In addition to the work summarised above investigations of a more fundamental character have also been carried out in the Liverpool laboratories. Of particular theoretical importance is the attempt now in progress to determine the structure of the hydroperoxides formed in the autoxidation of methyl oleate.

This is a continuation of the work carried out by Dr. Gunstone which has already been published. It has been found that the rate of autoxidation is much accelerated by exposure to a Hanovia ultra-violet lamp. This observation will greatly facilitate further work in this field which has an important bearing on the problem of the development of rancidity.

Finally, it may be mentioned that work is in progress on the development of methods for the determination of the percentage of hydroxy acids in oils. The necessity for this has developed during a study of the fat of "Boleka" oil from the seeds of *Ongokea Gore* and if this work is brought to a satisfactory conclusion it will be of value in the examination of castor oils.

Plants of Possible Medicinal and Insecticidal Value

36. (25) (a) *Brayera anthelmintica*. Dr. D. E. A. Rivett, working under the supervision of Professor A. R. Todd, has been occupied on exhaustive fractionation of the extract from the flowers of *B. anthelmintica*. This work has been made possible by the setting up of an effective *in vivo* test for the antelmintic principle which has been devised by Professor Burn of the Pharmacology Department, University of Oxford. A considerable concentration has been achieved and a point of special interest is that kosotoxin, a homogeneous crystalline substance, which was isolated from the flowers some years ago, has been found to be highly toxic. This is the only crystalline active material so far obtained from the drug since it has been shown that protokosin, the major crystalline constituent, is devoid of activity *in vivo*.

During their visit to East Africa, Sir Ian Heilbron and the Director of Research were able to arrange with Dr. Beckley and Mr. Greenway for the collection of further flowers of this interesting drug from Kenya and Tanganyika. It is hoped that with this new material sufficient of the active principle may be obtained for the determination of its structure.

(b) *Hydrocotyle asiatica*.—It was reported from Madagascar in 1945 (Nature, 155, 601) that this plant contained a "glucoside" which was highly active in the clinical treatment of leprosy. With material obtained from

Ceylon, Dr. B. Lythgoe and Mr. S. Bhattacharya, working in Professor Todd's laboratory, have devised a method for the separation of the principal carbohydrate fractions of the plant tissues. The antibiotic and the chemical properties of these fractions are now being carefully investigated.

(c) *Hippomane mancinella* and *Hura crepitans*.—The latices of these two plants which were obtained from Trinidad for Professor F. S. Spring were found to be devoid of polyterpenes. It is proposed to obtain further material concentrated under other conditions.

(d) *Cnarium schweinfurthii*.—A quantity of this resin has recently been received from East Africa and has been forwarded to Professor Spring for investigation.

(e) *Gums*.—Reference was made in last year's report of a number of gums which had been collected in Somaliland and forwarded to Professor E. L. Hirst. Contrary to the information available in the literature these were not carbohydrate gums and they have therefore been sent to Professor R. D. Haworth at the University of Sheffield for investigation.

Arrangements have been made for the collection of the following materials :—

The seeds of *Aframomum aminiense*—

Professor J. W. Cook, Glasgow.

The seeds of *A. melegueta*—

Professor J. W. Cook, Glasgow.

The root bark of *Alangium lamarckii*—

Professor W. H. Linnell, Pharmaceutical Society.

The seeds of *Caesalpinia crista*—

Professor J. W. Cook, Glasgow.

The leaves of *Catha edulis*—

Professor J. W. Cook, Glasgow.

The bark of *Mitragyne inermis*—

Professor J. W. Cook, Glasgow.

The seeds of *Picralima nitida*—

Professor J. W. Cook, Glasgow.

The seeds of *Piptadenia peregrina*—

Professor Sir Robert Robinson, Oxford.

The bark of *Simaruba amara*—

Professor J. W. Cook, Glasgow.

The seeds of *Strophanthus hispidus*—

Dr. C. W. Shoppee, Royal Cancer Hospital, London.

We have once more to express our thanks to the Colonial Agricultural and Forest Officers for the willing assistance they have given us in the laborious work of collecting these materials.

Striga Lutea

37. A pest of considerable importance to sugar cane, maize and millets is the parasite *Striga lutea*. The problem of its control is of great interest to agriculture not only in the African territories but also to India and the Union of South Africa. An investigation has been commenced with the object of determining the nature of the factor secreted by the host plants which is responsible for the germination of the seeds of the parasite. This investigation is being carried out jointly by Dr. R. Brown in the Department of Botany, University of Leeds and by Dr. A. W. Johnson (I.C.I. Fellow) in Professor Todd's laboratory in the University of Cambridge. The work so far is only in its preliminary stages and cannot be further developed until fresh supplies of sorghum and striga seeds are obtained from East Africa this spring.

Colonial Microbiological Research Institute

38. (27) An important stage in the establishment of the new Research Institute has been reached during the year since a commencement was made during February in the erection of the laboratory. This is very much later than had been anticipated but the delay was unavoidable. Unfortunately, a great rise in the building costs in Trinidad has necessitated a large increase in the budget provision. Dr. A. C. Thaysen and his assistant, Miss Morris, left for Trinidad in December and with the generous assistance of the Director of Medical Services temporary laboratory accommodation has been made available to them. Progress in research will necessarily be slow since much of Dr. Thaysen's time will be spent in the supervision of the erection of the new laboratory.

(a) *Antibiotics*—Prior to his departure, Dr. Thaysen had actively continued his study of the Actinomycetes which were referred to in the previous report (27 (a)) and a suitable new culture medium has been developed. Fourteen species of Actinomycete which had been isolated from composting and soils on Jamaica banana plantations, were obtained from the National Type Culture collection and examined during the year. Two of these were found to be antagonistic to *Fusarium oxysporum cubense*. It was observed also that the Actinomycetes which were active against this *Fusarium* was active also against a number of pathogenic fungi including the plant pathogenic *Cercosporium Nicotiana*, the cause of leaf spot leaf disease in tobacco.

Parallel with Dr. Thaysen's biological experiments on the Actinomycetes Dr. A. H. Cook and Dr. Arnstein, working in Sir Ian Heilbron's laboratory, have been attacking the very difficult problem of the isolation and purification of the active principle. The product, as isolated, is not homogeneous and the experiments are not sufficiently advanced to permit their summarisation but the work is likely to show results of considerable importance.

(b) *Tea cider*.—In collaboration with Dr. Wiggins, the products formed by the action of two species of yeast used in the preparation of tea cider in Ceylon are being examined. It has been claimed that some of these active organisms are of value in the treatment of nephritis.

(c) *Fermentation of cocoa beans*.—There would appear to be a general consensus of opinion amongst those engaged in the roasting of cocoa beans that the flavour of the cocoa is dependent largely on the fermentation processes taking place after the harvesting of the beans.

Dr. Thaysen is proposing to study this fermentation and in anticipation of this, after consulting the Director of the British Food Manufacturing Industries

Research Association (formerly the British Association of Research for the Cocoa, Chocolate, Sugar Confectionery and Jam Trades), he paid three visits to chocolate firms in the Midlands. The fundamental importance of this research was recognised by the Cocoa Research Conference held in May and June, 1945 (Colonial No. 192, p. 14).

(d) *Food Yeast*.—During the year Dr. Thaysen paid two visits to Jamaica to advise on difficulties which had arisen in the new factory for the manufacture of food yeast. It is hoped that as a result of these visits the difficulties have been resolved.

(e) *Post Graduate Students*.—A brief training in microbiological technique was given to two scientific workers, one being a research student from Sir Norman Haworth's laboratory and the other a Chinese lady sponsored by the British Council.

APPENDIX I

List of Publications

Papers Published

The Terpenes, Volume I. By J. L. Simonsen. Revised Edition by J. L. Simonsen and L. N. Owen. Cambridge University Press, 1947.

Natural Products of the Empire and their Utilisation. By J. L. Simonsen. Royal Society Empire Scientific Conference, 1946.

A Chemical Process for the Production of Lactic Acid from Sucrose. By W. N. Haworth, (Mrs.) H. Gregory and L. F. Wiggins. *Journal of the Society of Chemical Industry*, 1946, **65**, 95-96.

Anhydrides of Hexahydric Alcohols, Part IV. The Constitution of Dianhydro Sorbitol. By R. Montgomery and L. F. Wiggins. *Journal of the Chemical Society*, 1946, 390-393.

Anhydrides of Hexahydric Alcohols, Part V. 2 : 5 Diamino 1 : 4-3 : 6-Dianhydro Mannitol and Sorbitol and their Sulphanilamide Derivatives. By R. Montgomery and L. F. Wiggins. *Journal of the Chemical Society*, 1946, 393-396.

Some Derivatives of Simple Carbohydrates Containing Unsaturated Substituents. By W. N. Haworth, Hilda Gregory and L. F. Wiggins. *Journal of the Chemical Society*, 1946, 488-491.

The Conversion of Sucrose into Furan Compounds, Part III. Some Furan Amidines. By F. H. Newth and L. F. Wiggins. *Journal of the Chemical Society*.

The Action of Acidic Reagents on Ethylene Oxide Anhydro Sugar. Part I. The Action of Acid Reagents on 4 : 6-Benzylidene 2 : 3-Anhydro-Methylalloside. By F. H. Newth, W. G. Overend and L. F. Wiggins. *Journal of the Chemical Society*, 1947, 10-18.

The Conversion of Sucrose into Pyridazine Derivatives, Part I. 3-Sulphanilamido -6-Methylpyridazine. By W. G. Overend and L. F. Wiggins. *Journal of the Chemical Society* 1947, 239-244.

The Effect of Heat on Aqueous Solutions of Sucrose and other Carbohydrates. By R. Montgomery and L. F. Wiggins. *Journal of the Society of Chemical Industry*, 1947, 31-32.

The Use of Low-Temperature Crystallisation in the Determination of Component Acids of Liquid Fats, III. Fats which contain Elaeostearic as well as Linoleic and Oleic Acids. By T. P. Hilditch and J. P. Riley. *Journal of the Society of Chemical Industry*, 1946, **65**, 74-81.

The Autoxidation of Methyl Oleate in Presence of Small Proportion of Methyl Linoleate. By F. D. Gunstone and T. P. Hilditch. *Journal of the Chemical Society*, 1946, 1022-1025.

The Preparation and Bacteriostatic Properties of some Amines derived from Citral. By A. G. Caldwell and E. R. H. Jones. *Journal of the Chemical Society*, 1946, 597-599.

Rearrangements of Aldoximes into Amides with Raney Nickel Stereoisomeric Geranamides. By A. G. Caldwell and E. R. H. Jones. *Journal of the Chemical Society*, 1946, 599-601.

An Investigation of some Coloured Iminazolidines derived from Theobromine. By A. R. Todd and N. Whittaker. *Journal of the Chemical Society*, 1946, 628-635.

The Synthesis of 3-Methylisoquinolines, Part II. By G. R. Clemo and J. H. Turnbull. *Journal of the Chemical Society*, 1946, 701-705.

The Sulphonation of some Derivatives of Eugenol. By G. R. Clemo and J. H. Turnbull. *Journal of the Chemical Society*, 1947, 124-127.

Medium Suitable for the Cultivation of Meredith's Actinomycete. By A. C. Thaysen and Muriel Morris, *Nature*, 1947, **159**, 100.

Papers in the Press

The Terpenes, Volume II. By J. L. Simonsen. Revised Edition by J. L. Simonsen and L. N. Owen. Cambridge University Press.

The Terpenes, Volume III. By J. L. Simonsen. Revised Edition by J. L. Simonsen and D. H. R. Barton. Cambridge University Press.

Anhydrides of Polyhydric Alcohols, Part VI. 1 : 4-3 : 6-Dianhydro Mannitol and 1 : 4-3 : 6-Dianhydro Sorbitol from Sucrose. By R. Montgomery and L. F. Wiggins. *Journal of the Chemical Society*.

Anhydrides of Polyhydric Alcohols, Part VII. 1 : 4-3 : 6-Dianhydro *d* and *l*-Iditol. By L. F. Wiggins. *Journal of the Chemical Society*.

Anhydrides of Polyhydric Alcohols, Part VIII. Some Alkenyl Ethers of 1 : 4-3 : 6-Dianhydro Mannitol and 1 : 4-3 : 6-Dianhydro Sorbitol. By Hilda Gregory and L. F. Wiggins. *Journal of the Chemical Society*.

The Conversion of Sucrose into Thiazole Derivatives, Part I. Sulphanilamidothiazoles derived from Levulic Acid. By Hilda Gregory and L. F. Wiggins. *Journal of the Chemical Society*.

The Conversion of Sucrose into Thiazole Derivatives, Part II. 2 : 4-Dimethylthiazole Derivatives and 2 : 4 : 5 Trimethylthiazole Derivatives. By Hilda Gregory and L. F. Wiggins. *Journal of the Chemical Society*.

The Conversion of Sucrose into Pyridazine Derivatives, Part II. 4-Amino-2-Phenyl-6-Methyl-3-Pyridazine, 4-Amino-2 (*p*-Nitrophenyl)-6-Methyl-3-Pyridazine and their Sulphanilamido Derivatives. By W. G. Overend and L. F. Wiggins. *Journal of the Chemical Society*.

The Component Acids and Glycerides of Australian Lumbang Oil. By F. D. Gunstone and T. P. Hilditch. *Journal of the Society of Chemical Industry*.

Notes on the Component Acids of West Indian Ben and Mango Seed Oils. By H. C. Dunn and T. P. Hilditch. *Journal of the Society of Chemical Industry*.

African Drying Oils, I. The Seed Oil of *Tetracarpidium conophorum*. By F. D. Gunstone, T. P. Hilditch and J. P. Riley. *Journal of the Society of Chemical Industry*.

Nitration of Some Derivatives of Eugenol. By G. R. Clemo and J. H. Turnbull. *Journal of the Chemical Society*.

Some Amines and Amides Derived from Vanillin. By A. A. L. Challis and G. R. Clemo. *Journal of the Chemical Society*.

Homovanillin. By A. A. L. Challis and G. R. Clemo. *Journal of the Chemical Society*.

APPENDIX II

List of Patent Applications

- No. 10729. A method of manufacturing 3-sulphanilamide 6-methyl pyridazin (Great Britain).
No. 20721. Sulphanilamido Thiazoles (Great Britain).

COLONIAL SOCIAL SCIENCE RESEARCH COUNCIL

Third Annual Report

MEMBERSHIP

SIR ALEXANDER CARR-SAUNDERS, M.A., LL.D., F.B.A., Director, London School of Economics, *Chairman*.

PROFESSOR RAYMOND FIRTH, M.A., Ph.D., Professor of Anthropology, University of London.

PROFESSOR A. L. GOODHART, K.C., LL.M., LL.D., D.C.L., Professor of Jurisprudence, University of Oxford.

MR. H. V. HODSON, M.A., formerly Editor of the *Round Table* and lately Reforms Commissioner, Government of India.

SIR ARNOLD PLANT, B.Sc.(Econ.), B.Com., Sir Ernest Cassel Professor of Commerce, University of London.

DR. MARGARET READ, M.A., Ph.D., Reader in Education and Head of Colonial Department, Institute of Education, University of London.

DR. AUDREY RICHARDS, M.A., Ph.D., Reader in Anthropology, University of London.

DR. W. T. S. STALLYBRASS, O.B.E., D.C.L., M.A., Principal, Brasenose College, and the Chairman of Committee for Colonial Studies, University of Oxford.

PROFESSOR GODFREY H. THOMSON, D.C.L., D.Sc., Ph.D., Professor of Education University of Edinburgh.

PROFESSOR R. L. TURNER, M.C., M.A., Litt.D., F.B.A., Director of the School of Oriental and African Studies, University of London.

MR. P. A. WILSON, M.A., *Secretary*.

CONTENTS

	<i>Paragraphs</i>
I.—INTRODUCTORY	1-3
II.—GENERAL SITUATION IN SOCIAL SCIENCE RESEARCH	4-5
III.—RESEARCH NEEDS	6-9
IV.—ORGANISATION	10
V.—PERSONNEL	11
VI.—RESEARCH PROJECTS	12-16

COLONIAL OFFICE,
DOWNING STREET, S.W.1.

22nd May, 1947.

SIR,

I have the honour, on behalf of the Colonial Social Science Research Council to transmit to you the third Report of the Council covering the period from 1st April, 1946 to 31st March, 1947.

I have the honour to be,

Sir,

Your most obedient servant,

A. M. CARR-SAUNDERS,
(*Chairman*).

The Right Honourable A. Creech Jones, M.P.,
Secretary of State for the Colonies.

COLONIAL SOCIAL SCIENCE RESEARCH COUNCIL

I. Introductory

1. During the year 1st April, 1946, to 31st March, 1947, the Council held nine meetings.
2. No change has taken place in the membership of the Council.
3. In the earlier part of the year the Council continued to work in collaboration with the Research Sub-Committee of the Colonial Economic Advisory Committee. In September, 1946, the Colonial Economic and Development Council, replaced the Colonial Economic Advisory Committee and the Research Sub-Committee ceased to exist. The Council are informed that the Secretary of State has now constituted a new Colonial Economic Research Committee, and they look forward to collaboration with the new Committee.

II. General Situation in Social Science Research

4. As in previous years the Council have continued to call attention to the need for sound demographic data. While shortage of staff still retards the process of census taking, the Council have been gratified to learn that a considerable acceleration of this process is foreshadowed for the near future, and that steps are now being taken to enlarge and strengthen the statistical departments of Colonial Governments and regional Colonial authorities such as the East African Governors' Conference. Some progress has also been made with arrangements for improving the custody of official archives, and rendering them more readily accessible to research students without causing interference with the ordinary work of administration, though more still remains to be done in this direction.

5. Broadly, it remains as true as it was two years ago that the progress of Colonial research in the social sciences has been sporadic and unequal, and it will not be out of place to call attention to some of the difficulties encountered in planning research in this field. The greatest difficulty may be summarised as that of bringing the right man to the right project in the right place at the right time. As we point out in Section V, PERSONNEL, the chief difficulty is still that of finding the right man. In some cases, however, though the right man can be found, he is not attracted by the type of project to which the highest priority is accorded. In other cases, though, there is agreement regarding both the man, and the general type of project, the candidate is not attracted towards work in the Colony where the need is most urgent or is precluded on medical grounds from working there.

III. Research Needs

6. The Council's functions include not only advice on the suitability of projects for research, and on the qualifications of candidates proposed to undertake them, but also recommendations in regard to finance. Since the funds available, though considerable, are limited by comparison with the immense amount of research that would be desirable, the Council, without attempting to lay down any rigid scheme of relative priority, have attempted to arrive at some broad estimate of the varying importance and urgency of the many different kinds of projects which might be undertaken. In preparing such an estimate a number of factors must be taken into account, and full consultation with the Governments and territories concerned is very necessary in order to ascertain what in their view are the most pressing matters on which they would desire information.

7. The Council are able to record some further progress in the preparation of programmes of research needs and priorities. Professor Firth's survey of research needs in West Africa, referred to in the last Annual Report, has been considered by all four West African Governments, and on the basis of the survey together with the Governments' comments, the Council have prepared a "short list" of projects which may be regarded as being of the greatest urgency at present in this region. The "short list" contains some twenty research projects for which active steps are now being taken in consultation with the relevant university departments to recruit the necessary personnel. But the need for social science research in West Africa and the field to be covered is extensive and varied, and it is recognised both by the Council and by the Governments of the territories concerned, that other projects in this region have high, even if they have not the highest priority.

8. No such "short list" has yet been prepared for any other main Colonial region, though it is hoped that further progress in this direction will be recorded before long. A visit was recently paid to Kenya by Professor Schapera to advise the Government in planning the work of the sociological research workers attached to the Government under a scheme referred to in the last annual report. Professor Schapera was also enabled to survey briefly the needs of the Colony in respect of social science generally, and his report is awaited with interest. The appointment of a Director to the East African Institute of Social Research, referred to in Section IV, ORGANISATION, will afford an opportunity to supplement the work of Professor Schapera in Kenya, and to extend it to the other East African territories. The Council hope, later in the year, to be furnished with a report on research needs and priorities in Malaya and Borneo. The research needs of the Western Pacific region have also been under review, while those of the West Indies will, it is hoped, form the subject of discussion with Dr. Taylor, Principal Designate of the West Indian University College, who has recently returned to this country after a reconnaissance visit to that region.

9. To assist them in the preparation of regional research programmes and in the recruitment of research personnel, the Council have, during the year under review, adopted an innovation in procedure by constituting regional sub-committees for West Africa, East Africa, the West Indies, and the Far East. The result has been very considerably to increase the burden of work on certain members, and the Council as a whole would like to take this opportunity of recording their appreciation of the work put in by them. They would also like to record their appreciation of the willingness of Mrs. Gertrude Williams of the Bedford College for Women to serve as a co-opted member on the West Indian Sub-Committee.

IV. Organisation

10. Attention has been called in earlier reports to the difficulty of the adequate planning and supervision of Colonial research from London. The formation of the regional sub-committees referred to in the preceding paragraph has helped to overcome this difficulty but is only a stop-gap measure. It remains the policy of the Council to foster the formation of Institutes of Social Research located in the several regions, and attached, wherever possible, to centres of higher learning. In this connection the Council are gratified to note that progress continues to be made towards the establishment of such centres of higher learning in the West Indies, West Africa, East Africa and the Far East. The detailed organisation and planning of social research in these regions is a function which, as the Council see it, should be taken over by the appro-

appropriate regional Institute of Social Research, leaving to the Council itself no more than the general planning and supervision of the work from the standpoint of the Colonial Empire as a whole. During the year under review progress with the establishment of such Institutes has not been as rapid as the Council could have wished. The Rhodes-Livingstone Institute which, though it receives a research grant to finance a part of its programme of work, was already in existence before the Council was set up, has continued to progress during the year. The Director of the Institute, Dr. Gluckman, visited this country during the long vacation, and the Council had the benefit of consultations with him. The West African Institute of Industries, Arts and Social Sciences, whose sociological department made a most promising start some years ago under Dr. Fortes, has, unfortunately, been in a state of suspense throughout the period under review. In December, 1946, the Secretary of State commissioned Mr. Henry Morris to visit West Africa, and report on the future of the Institute, and his findings are awaited. In the West Indies further progress awaits the development of plans for a University College. Just before the close of the year, in March, 1947, the Chairman of the Council, at the request of the Secretary of State, left on a visit to Singapore and Malaya to head a commission to report on the future of higher education in that region, and the Council hope to have the benefit of his views in regard to the possibility of establishing an Institute of Social Research. In East Africa, it is possible to record a more definite step forward. The directorship of the Institute of Social Research at Makerere has been offered to, and accepted by, Lieutenant-Colonel J. B. Stanner, who is at present working for the Institute of Pacific Relations. It is hoped that Dr. Stanner will take up his duties in the summer of 1947.

V. Personnel

11. The efforts of the Council to recruit research workers to carry out the twenty priority projects in West Africa have revealed only too clearly how little alleviation there has yet been in the shortage of personnel trained for investigation into social problems to which reference has been made in the two preceding annual reports. It was not, of course, anticipated that this alleviation would come at all rapidly. In the Council's first annual report reference was made to the need for training. It was reported that in the linguistic field a number of African studentships, tenable at the School of Oriental and African Studies, had been created to meet this need, but that in other subjects no similar studentships had been established. It was thought that so far as these subjects were concerned the need could be met by the provision of training grants. In a few instances such training grants have been made to enable a potential research worker to undergo a period of training to equip him or her to carry out a specific research project. It is becoming more and more doubtful whether the training grant, linked to a specific project, useful though this may be in the individual case, will meet all requirements. Young men and women with a good degree and an inclination for Colonial research may yet have no clear idea of the exact field of research for which their aptitudes fit them, or of the locality or problem to which they would be most attracted. In such cases to select the project first and then afterwards arrange the training may mean that a wrong choice is made, and that the scanty available manpower is not put to the best use. Experience has shown that there are available a number of promising young men and women interested in the colonial field, who after, say, six months' specialised training in field research techniques and the social institutions and other special features of a selected region, would turn into competent research workers. The recommendations of the Clapham Committee regarding provision of funds for the social sciences, welcome though these are, will not by

themselves solve the special problems with which the Council are confronted, if their effect is merely to enable Universities to turn out a larger number of graduates with degrees in the social sciences, and to carry out a greater volume of research in these sciences within their own walls or elsewhere in the United Kingdom. What is needed for Colonial research in the social sciences is more adequate provision for post-graduate training in the special techniques and skills required, and in the special background knowledge without which the social science graduate, however well trained in other respects, cannot be considered as equipped for field work among the simpler and less developed peoples. To the need for such training the Council have been giving long and earnest consideration.

VI. Research Projects

12. Of the projects mentioned in previous annual reports a number have now reached, or have nearly reached, completion. Instances are :—

- (a) the study of the *Economic and Cultural Status of Women in the British Cameroons* by Miss Phyllis Kaberry.
- (b) the *Ethnographical Study of the Mende* in Sierra Leone by Dr. K. Little.
- (c) the study of the *Role of Gold in the Art and Culture of the Gold Coast* by Mrs. Meyerowitz.
- (d) the study of the *Legal Aspects of Land Tenure in the Gold Coast* by Mrs. Matson.
- (e) the study of *Mental Illness and Juvenile Delinquency in West Africa* by Dr. Geoffrey Tooth so far as it relates to Juvenile Delinquency in the Gold Coast.
- (f) the documentary survey of *Social and Economic Conditions in the Ashanti Protectorate*, by Mrs. Ingrams.

On the following, work is still proceeding:—*A Handbook of African Languages*, and *An Ethnographic Survey of Africa*, both being carried out under the direction of the International African Institute ; *Economic and Social Aspects of Colonial Policy during the War Period* by Mr. F. J. Fisher ; *A Study of French Colonial Administration in North Africa* being carried out by Miss Sybil Eyre Crowe under the supervision of the University of Oxford ; and two projects planned by the Research Sub-Committee of the Colonial Economic Advisory Committee ; *Occupational Structure as influenced by War-time Government Expenditure in the Gold Coast*, by Miss P. Ady and *National Income in Northern Rhodesia and Nyasaland* by Miss Phyllis Deane.

13. In accordance with the recommendation noted in the first annual report that a sociologist from South Africa should visit Zanzibar to advise the Government in connection with a proposed social and economic survey, a pilot survey of the protectorate has now been completed by Professor Batson and it is hoped that Professor Batson will, in due course, conduct the main survey as originally asked for, though administrative difficulties make it probable that this will have to be postponed until 1948.

14. New projects launched during the year under review include :-

- (i) a *Sociological Study of the Peasant Community in Jamaica*, being carried out under the supervision of the London School of Economics, by Miss Edith Clarke with the assistance of Dr. Obrebski.
- (ii) four linguistic studies :

<i>Ganda</i> , by Dr. A. N. Tucker.	<i>Ibo</i> , by Miss M. Green.
<i>Kikuyu</i> , by Rev. Lyndon Harries.	<i>Hadrami Arabic</i> , by Dr. R. B. Serjeant.

- (iii) an investigation of *Secondary School Science Teaching in West Africa* by Mr. F. Smithies.
- (iv) a study of the *Relations between the Content of Education, and the After-School Occupational Life of Girls and Women in the Gold Coast* by Miss Catherine Fletcher.

The anthropological studies forming part of the programme of work at the Rhodes-Livingstone Institute for which a grant was approved last year, have now been launched, and are being carried out among the Tonga, the N'goni and the Yao. Another project which is being carried out in close association with the Institute, though financed under the Colonial Research Fellowship scheme, is a psychological study in Northern Rhodesia by Mr. M. G. Marwick of the adaptation of the individual to life in a social community and of primitive social communities to contact with Western Society. On the recommendation of the Council financial assistance has been given towards the completion of the following research projects commenced under other auspices—

- (i) a *Dictionary of the Fulani Language* by Mr. de St. Croix, and
- (ii) a study of the *Development of African Separatist Churches* by Dr. Sundkler.

15. A field of research to which the Council have given much thought ever since their inception has been that of the efficiency of African labour, and its dependence on various factors, psychological, sociological, economic, physiological, medical, and nutritional. Much has been written about the alleged low level of efficiency among African labour, but comparatively little work has been done hitherto in the Colonial Empire either to ascertain and measure the efficiency of African labour, or to determine the causes of low efficiency where this is found to prevail. During the year under review approval was given to a project for a study of this important subject to be undertaken by a team of research workers under the leadership of Dr. C. H. Northcott, until recently labour manager of a well-known firm in this country. The study will be confined to the 6,000 African employees of the Kenya-Uganda Railway stationed in Nairobi. Upon a subject of such importance and such wide ramifications it would be too much to hope that a limited survey such as this, extending over not more than six months, will provide the answers to all the questions; but the Council are confident that it will both produce results that are valuable in themselves, and at the same time act as a pointer to further lines of investigation in the same field which require to be followed up in the future. This project has been planned in conjunction with the Human Nutrition Research Unit.

16. Another team work project, though the Council's participation in it has not yet advanced beyond the preliminary stage, may appropriately be referred to in this context. On the recommendation of the Human Nutrition Research Unit there has been launched in the period under review, a scheme for a survey of nutritional problems in all their aspects in the Gambia, this survey to be followed up by experimental work on the introduction of new crops, and new methods of husbandry, with the primary object of raising standards of nutrition among the people of this territory. The Unit invited the collaboration of the Council in the working out of their plans, and after joint consultation it was decided to attach to the team a sociologist to undertake a survey of the social structure of the locality in which the main survey and the experimental work are to be carried out, and an economist to study the economic implications of this project, which, if it expands as it is hoped and anticipated that it will, is calculated to produce profound effects on the entire economic life and structure and the national income and balance of payments of the territory.

COLONIAL MEDICAL RESEARCH COMMITTEE

Second Annual Report

MEMBERSHIP

SIR EDWARD MELLANBY, K.C.B., M.D., F.R.C.P., F.R.S., K.H.P., Secretary, Medical Research Council, *Chairman*.

BRIGADIER J. S. K. BOYD, O.B.E., M.B., Ch.B., D.P.H., D.T.M. & H., (late R.A.M.C.), Director, Wellcome Laboratories of Tropical Medicine.

PROFESSOR P. A. BUXTON, C.M.G., O.B.E., D.Sc., D.T.M. & H., F.R.S., Professor of Medical Entomology, London School of Hygiene and Tropical Medicine.

DR. A. N. DRURY, C.B.E., M.D., F.R.S., Director, Lister Institute of Preventive Medicine.

BRIGADIER N. HAMILTON FAIRLEY, C.B.E., M.D., D.Sc., F.R.C.P., F.R.S., Wellcome Professor of Tropical Medicine, London University.

DR. W. H. KAUNTZE, C.M.G., M.B.E., M.D., Ch.B., F.R.C.P., D.P.H., Medical Adviser to the Secretary of State for the Colonies.

PROFESSOR B. G. MAEGRAITH, M.B., B.S., D.Phil., Professor of Tropical Medicine, School of Tropical Medicine, Liverpool.

DR. B. S. PLATT, C.M.G., M.Sc., Ph.D., M.B., Ch.B., Professor of Nutrition, London University.

MAJOR-GENERAL SIR JOHN TAYLOR, C.I.E., D.S.O., M.D., LL.D., D.P.H. (I.M.S. ret'd.),

DR. F. HAWKING, D.M., D.T.M., National Institute
for Medical Research

DR. A. F. MAHAFFY, C.M.G., M.D., D.P.H., D.T.M.,
Colonial Office

} (Joint Secretaries).

CONTENTS

	<i>Paragraphs</i>
WORK OF THE COMMITTEE	2
SUB-COMMITTEES	5
REVIEW OF RESEARCH ACCOMPLISHED AND IN PROGRESS :	
Malaria	6
Nutrition	12
Helminthiasis (Schistosomiasis and Filariasis)	17
East African Medical Survey	20
Viruses	21
Hot Climate Physiology	22
Makerere College	23
Scrub Typhus	24

MEDICAL RESEARCH COUNCIL,

38, OLD QUEEN STREET, S.W.1.

10th June, 1947.

SIR,

As Chairman of the Colonial Medical Research Committee, I have the honour to forward herewith the Annual Report of the Colonial Medical Research Committee for the year 1946/47.

I am, Sir,

Your obedient Servant,

E. MELLANBY.

The Right Honourable A. Creech-Jones, M.P.,
Secretary of State for the Colonies.

COLONIAL MEDICAL RESEARCH COMMITTEE

General

1. During the year the Committee held seven meetings. The constitution of the Committee was unchanged. Dr. Mahaffy took up his appointment as Joint Secretary on October 16th, 1946.

Work of the Committee

2. Much attention has been paid to the institution of the Colonial Medical Research Service mentioned in the previous report, but owing to various difficulties which have arisen, it has not yet been possible to bring it into being. Meanwhile contract appointments have been given to selected workers with the expectation that when a service is formally instituted the holders of these appointments will pass into it.

3. During the period covered by this report Professor B. S. Platt visited the Gambia (18th January—6th February, 1947) to survey the site for a Field Research Station to work on nutrition; Dr. W. H. Kauntze visited the British Colonies in the Far East as Medical Adviser to the Secretary of State and was able to report on the position of medical research in these Colonies (11th January—14th March, 1947); Dr. F. Hawking visited the Institute of Tropical Medicine at Antwerp (July, 1946) and discussed liaison in research on tropical medicine with Belgian workers; Dr. W. S. S. Ladell visited Palestine (January, 1947) and reported on various problems concerning hot climate physiology in that country.

4. At its Eleventh meeting on December 2nd, 1946, the Committee endorsed the proposal that a Colonial Insecticides Committee should be instituted, and recommended that Professor Buxton, Dr. Hawking and Dr. Mahaffy should represent the Colonial Medical Research Committee on it. This Committee was subsequently set up by the Secretary of State. Particulars of its composition and terms of reference are given in the report of the Colonial Research Committee.

5. **Sub-Committees.**—In addition to the Malaria Sub-Committee described in the report of the previous year, certain other Sub-Committees have been set up—viz. :—

(a) *Nutrition Sub-Committee*

This was set up to advise the Secretary of State through the Colonial Medical Research Committee on the nature and solution of nutrition problems in the Colonies. Its membership includes :—

Professor B. S. Platt (*Chairman*).
Mr. G. F. Clay.
Dr. C. S. Hanes.
Dr. F. Hawking.
Dr. W. H. Kauntze.
Dr. A. F. Mahaffy.
Professor A. Moncrieff.
Dr. W. G. Ogg.
Dr. Audrey I. Richards.
Dr. H. H. Storey.
Mr. A. J. Wakefield.
Mrs. G. M. Culwick (*Secretary*).

It held its first meeting on May 28th and seven further meetings were held during the period under review.

(b) *Helminthiasis Sub-Committee*

The purpose of this is to promote research on helminthiasis under the Colonial Medical Research Committee. The first meeting was held on October 28th, 1946. The members of this Sub-Committee are :—

Professor N. Hamilton Fairley (*Chairman*).
 Professor J. J. C. Buckley.
 Professor R. M. Gordon.
 Dr. W. H. Kauntze.
 Dr. A. F. Mahaffy.
 Dr. J. Walker.
 Dr. F. Hawking (*Secretary*).

(c) *Personnel Sub-Committee*

Its purpose is to assist and advise the main Committee on matters concerning the appointment and organisation of the personnel engaged in carrying out research under its auspices. The first meeting was held on October 9th, 1946, and four other meetings have been held during the period under review, at which applications were considered and candidates were interviewed, and at which questions relating to appointments have been discussed. Five applicants have been recommended for appointment. The members of this Sub-Committee are :—

Dr. W. H. Kauntze (*Chairman*).
 Dr. A. N. Drury.
 Dr. F. H. K. Green.
 Dr. F. Hawking.
 A member of the Colonial Office Appointments Committee.
 Dr. A. F. Mahaffy (*Secretary*).

(d) *East African Medical Survey Sub-Committee*

The work of this Sub-Committee is described in more detail below.

Review of Research Work Accomplished and in Progress

Malaria

6. Field trials of paludrine have been arranged in many different colonies but reports from most of these are not yet available. Preliminary reports on the use of paludrine as a suppressive to control malaria were received from Dr. A. S. M. Douglas, Medical Officer, Konongo Gold Mines Limited, Gold Coast, and from Dr. P. C. C. Garnham of the Kenya Medical Service. These preliminary reports showed that 0.1 gm. paludrine given once weekly had a definite action in diminishing the amount of malaria which occurred among persons taking it but that this small dose was not sufficient completely to suppress all clinical attacks of malaria, or to prevent appearance of parasites in the blood. Similar results were obtained in a preliminary trial by Lieut.-Colonel O. J. S. Macdonald in Ceylon. Dr. G. Watt, C.M.S., Gold Coast, has reported that a group of European volunteers have taken 0.5 gm. as a single dose once weekly and have remained free from any toxic effects. Extensive trials are being carried out by Dr. J. Field in Malaya but results are not yet available. In the light of this information it has been recommended that the suppressive dose of paludrine should be either 0.1 gm. taken twice weekly or (for the benefit of plantation workers who are mustered only once weekly) 0.3 gm. once weekly.

7. The question has frequently been asked during the last decade as to whether further cultivation of cinchona plantations should still be encouraged in view of the increasing replacement of quinine by synthetic antimalarial compounds. On previous occasions scientific opinion had considered that synthetic compounds were not yet adequate substitutes for quinine, and that extension of cinchona cultivation was desirable. The question was considered afresh by the Malaria Sub-Committee on January 13th, 1947, in the light of more recent information about paludrine. Since the main bulk of antimalarial drugs is used for suppressive or prophylactic purposes and only a small proportion is required for therapeutic purposes, and since quinine cultivation would be continued in Java and other established plantations in any case, the practical question was mainly concerned with the relative uses of paludrine and quinine for prophylactic use. Within these limitations the Sub-Committee expressed its opinion that :—

- (a) paludrine is a superior drug to quinine for suppressive or prophylactic purposes ;
- (b) a total weekly dose of 300 mgm. paludrine is more effective than 5-10 gr. quinine daily.
- (c) in much higher total weekly doses than 300 mgm., paludrine has, to date, produced no toxic manifestations, while for therapeutic purposes, latitude between effective and toxic dosage is much greater than with quinine ;
- (d) it will be quite safe to sell paludrine in Post Offices and similar Government Offices in the same way as quinine is now sold.

8. Work by Dr. F. Hawking at the National Institute for Medical Research has shown that paludrine itself probably does not have a direct antimalarial action, but that it is activated in some way in the body so as to produce this effect on the malaria parasite (" Nature," 159, No. 4,038, p. 409, 22.3.47). Work by Miss Ann Bishop, D.Sc., at the Molteno Institute, Cambridge, and, independently, by Dr. E. M. Lourie at the Liverpool School of Tropical Medicine, has shown that it is possible to make the parasite of chicken malaria (*P. gallinaceum*) resistant to paludrine, by repeated administration of small sub-effective doses (" Nature "—to appear).

The significance (if any) of this discovery in the clinical use of paludrine is being investigated.

9. A research team under Dr. J. N. McArthur has been despatched to British Borneo, under a three years' scheme, to study the transmission of malaria in this colony. Dr. MacArthur was engaged on malaria research in North Borneo before the war and he continued on this work, under great difficulties, after the Japanese occupied the island, until eventually he was interned. Previously malaria control in Borneo has been based on experience with mosquitoes in Malaya. But there is considerable evidence that vectors, such as *Anopheles sundaicus* and *maculatus* which are dangerous in Malaya take little part in the transmission of malaria in Borneo while other species, such as *A. leucosphyrus*, previously regarded as harmless may really be quite dangerous. It is hoped that the work of Dr. McArthur will enable malaria control in this region to be placed on a sounder basis.

10. The work of Dr. R. C. Muirhead Thomson on the control of mosquitoes in West Africa has been described in last year's report. As will be recalled, he showed that *Anopheles gambiae* and *melas* (which differ in so many respects that they are best regarded as species), differ in larval and adult habits, and as vectors of malaria. He demonstrated that D.D.T. in kerosene, in West Africa,

has a considerable repellent effect, which makes it less effective against adult mosquitoes in houses than would at first sight appear. (A full account of this work is given by his paper in the "Transactions of the Royal Society of Tropical Medicine," May, 1947). Arrangements have been made for him to continue this work in East Africa, to see whether the same differences of behaviour exist there, and indeed, whether "melas" in East Africa is or is not identical with the organism so-called in West Africa; also to complete certain observations which he has made on the efficacy of D.D.T. sprays inside huts as a means of killing mosquitoes.

Nutrition :

12. The following paragraphs describe investigations immediately connected with Colonial nutrition problems; reference to other relevant research on nutrition is made in a summary of the work of the Human Nutrition Research Unit in the Medical Research Council's Report for the War years (in the press).

13. A report by Dr. J. Waterlow on fatty liver disease of West Indian infants has been completed and has been published in a Special Report Series of the Medical Research Council; a short preliminary communication has been made to the Royal Society of Medicine ("Nutritional Liver Disease in West Indian Infants," Proc. Roy. Soc. Med., Section Experimental Medicine and Therapeutics, Vol. 40, May, 1947). Following on the studies of the microbiology of Kaffir beer and its nutritional value, an investigation is being made into the effect on the nutritional value for man of maize products obtained by various treatments. Drs. Webb and Waterlow are now in Basutoland examining the possibility of a relationship between the increasing occurrence in that territory of pellagra and the introduction of machine-milled maize meal. The physical and chemical changes in rice during soaking and steaming are being examined by Dr. J. Done, with a view to providing a satisfactory basis for parboiling rice—probably the most satisfactory method for retaining the B-vitamins in the grain. Miss M. W. Grant has recently visited Kenya to initiate a food consumption enquiry, part of an investigation sponsored by the Colonial Social Science Research Council, into the efficiency of labour on the Kenya-Uganda Railway, to be continued by Miss J. H. Henry; Dr. H. C. Trowell of Mulago Hospital and Dr. D. Harvey of the Medical Research Laboratory, Nairobi, are taking part in an examination of the state of nutrition of the Railway Company's employees. Nutritional investigations are to be made at the Medical Research Institute, Kuala Lumpur, Malayan Union, and Dr. I. Simpson, a member of the staff of the Institute, has spent several weeks in the Unit studying new methods in analysis for nutrients. Investigations into nutritional problems are also in progress in British Guiana, Trinidad, Nigeria, the Gold Coast, Northern Rhodesia, Uganda, and Mauritius. Mrs. J. Doughty has recently completed a year's work as Nutrition Officer in the Gambia; a preliminary examination shows remarkable similarity between conditions in Gambian villages to that found elsewhere in Colonial territories ("Colonial Nutrition and Its Problems," B. S. Platt, Trans. Roy. Soc. Trop. Med. Hyg., Vol. 40, No. 4, p. 379, 1947).

14. A Nutrition Field Working Party, supported by a Research Grant from Colonial Development and Welfare funds, is now making a survey of food consumption, production, state of nutrition, and of social and economic conditions in villages in the Middle River area of the Gambia. At the same time, experiments on the conditioning of large tracts of salty soils for the production of food crops, with the aid of mechanised equipment and the application of artificial fertilisers, are being made by the Agricultural Department of the Gambia Government in collaboration with the Nutrition Field

Working Party. On the completion of a year's survey, the Field Working Party will make experiments on the application of the results of trials of agricultural methods, as well as of modern development in food technology, in an effort to improve food supplies. The application of measures to reduce or eliminate diseases other than those due directly to malnutrition is also under consideration. The Colonial Social Science Research Council hopes to be able to provide assistance in examining the social and economic aspects of this work.

15. A Nutrition Field Research Station is being established at Farjara, near Bathurst, in the Gambia. Suitable buildings have been acquired and a Research Grant has been approved. The Station will be staffed largely from the Human Nutrition Research Unit. The purpose of the Station is to provide facilities for research into those problems of human nutrition and food technology which, for various reasons, can only be made or can most conveniently be made in a Colonial territory. There will be a close association between the activities of the Nutrition Field Working Party, the Field Research Station and the Human Nutrition Research Unit.

16. Another link in the co-ordination of Colonial Nutrition work is provided by the formation of a Department of Nutrition in the London School of Hygiene and Tropical Medicine and the creation of a Chair in Nutrition in the University of London, to which the Director of the Human Nutrition Research Unit has been appointed. Nutrition is now included as one of the subjects in the courses of instruction at the London School of Hygiene and Tropical Medicine for Diploma in Public Health and Diploma in Tropical Medicine and Hygiene. Instruction is given to prospective Nutrition Officers and to students from Colonial Territories, e.g. social workers and Labour officers.

Helminthiasis :

17. The attention of the Helminthiasis Sub-Committee has been devoted particularly to research on schistosomiasis and filariasis, and plans have been made for carrying out researches on the field aspects of these subjects in the tropics in conjunction with research on more fundamental aspects in the United Kingdom.

Schistosomiasis :

18. Research in the United Kingdom has been carried out by Professor J. J. C. Buckley, Dr. S. G. Cowper, and Professor T. H. Davey at the London and Liverpool Schools of Tropical Medicine. There have been two main objectives :—

- (i) to discover and test new drugs to kill schistosomes in man (or animals) ;
- (ii) to produce and test molluscicidal compounds.

A study has been made of the best ways of maintaining *S. mansoni* and its snail vectors in the laboratory so that small animals can be infected and used for chemotherapeutic investigations. Pharmacological studies have been made on certain new organic compounds, originally discovered in Germany, which have a pronounced action on *S. mansoni* in experimental animals. These studies include toxicity tests for laboratory animals, including monkeys, and a study of the blood concentration of the drug and its distribution in the tissues. As soon as these have supplied sufficient information to allow the drugs to be applied to man, safely and rationally, clinical trials will be made in appropriate areas in the tropics. Preliminary investigations on molluscicides using vectors which occur in temperate zones, such as *Planorbis corneus* have also been carried out. Arrangements are being made to carry out research on schistosomiasis in the tropics, probably under the auspices of the Medical Research Council.

Filariasis :

19. Attention has been directed mainly to a search for a chemotherapeutic remedy. This study is greatly facilitated by the fact that a convenient laboratory infection in small animals has recently become available—namely, *Litomosoides carinii* of the cotton rat *Sismodon hispidus*. This infection can be transmitted fairly easily in the laboratory through the tropical rat mite, *Liponyssus bacoti*. The rats exposed to infection develop microfilariae about 2 months later. The adult worms lie free in the pleura and are easily accessible in subsequent examination to discover the effect of the drug. Work on this infection is being carried out at the National Institute for Medical Research at Hampstead, and at the Liverpool School of Tropical Medicine. Preliminary chemotherapeutic studies have confirmed American reports that arsenical and antimonial compounds both have a marked filaricidal action; these drugs kill the adult worms but leave the microfilariae alive and circulating in the peripheral blood for several months afterwards. Work in the tropics has been postponed until other more active compounds have been discovered. Arrangements have also been made through the Medical Research Liaison Committee for India for screening tests of the action of a series of selected drugs on human microfilariae in India.

East African Medical Survey Sub-Committee

20. In 1946 the late Professor McSwiney visited East Africa at the request of the East African Governors' Conference to study the general situation in regard to medical research and to make detailed recommendations. In his report Professor McSwiney pointed out that little was known of the health of the African and how he lived, and stated that it was impossible at the present time to obtain accurate information of the extent of diseases which figure prominently in hospital returns in the East African Territories. He urged the necessity for a plan of co-ordinated development in which greater emphasis should be placed on the preventive aspect of medicine. His main recommendations were (a) the establishment in East Africa of a Bureau, which might be called the Bureau of Health, and which would collect, analyse and disseminate information relating to health, with particular reference to preventive medicine, and (b) a medical and sanitary survey which would be the first stage in a long term policy of development to establish preventive medicine in the territories of East Africa. After discussion with the local medical authorities, and with their complete agreement, he recommended that the survey should be carried out by teams which should include medical officers with experience of African medicine but which should be under the direction of the Colonial Medical Research Committee.

Professor McSwiney's recommendations were discussed by the Committee and it was agreed that the suggested survey would provide essential information required in formulating a research programme and that it could rightly be regarded as a necessary preliminary stage in such a programme. The Committee decided to accept responsibility for the general direction of the survey and a Sub-Committee was set up to assist and advise in its organisation. The members are :—

Dr. W. H. Kauntze (*Chairman*).
 Dr. J. S. K. Boyd.
 Professor P. A. Buxton.
 Dr. F. Hawking.
 Dr. A. F. Mahaffy.
 Dr. B. S. Platt.
 Mr. G. Humphrey Smith (*Secretary*).

The Sub-Committee has held three meetings and preliminary plans for the organisation and initiation of the survey have been drawn up. Professor G.

Macdonald has joined the Sub-Committee and has accepted an invitation to exercise scientific supervision over the survey. It has been recommended that work should be commenced in Tanganyika Territory in association with the Ground-nut Project. The establishment of a Bureau of Health in East Africa is now under consideration by the Committee in consultation with the East African Governors' Conference.

Virus Research

21. The International Health Division of the Rockefeller Foundation has for some years maintained, in co-operation with the local governments concerned, yellow fever institutes in Entebbe, Uganda and Lagos, Nigeria. In accordance with its normal practice, the Foundation has indicated its intention of withdrawing from participation in the work in these institutes probably at or about the end of 1945. The future of these laboratories has been considered by the Committee and it has recommended that it should assume responsibility for continuing their work, the scope of which should be widened to include research into virus problems generally. To do this it will be necessary to provide British staff as early as possible in order to ensure continuity of the work of the laboratories and to give the new staff ample opportunity of taking over and expanding the programme without undue interruption. The Committee has recommended that 50 per cent. of the running costs of these institutes should be met from research during 1947 and it is proposed that this be increased to 75 per cent. in 1948. Provision has been made for much needed housing in both Entebbe and Lagos and three new staff members have already been selected.

Hot Climate Physiology

22. In the previous report mention was made of research on the physiology of hot climates, planned by Dr. W. S. S. Ladell. Dr. Ladell has now taken up his appointment as lecturer in biochemistry at Yaba College, Nigeria and has made preliminary observations on this subject in Lagos. In August, 1946, he made a tour through representative parts of Nigeria and submitted a report containing interesting suggestions.

Physiological Research at Makerere College

23. Financial provision has been made to promote physiological and biochemical research at Makerere College, Uganda, in the laboratory of Dr. E. G. Holmes. Dr. H. Lehmann has been given a full-time appointment for this purpose. Special attention will be paid to malnutrition, anaemia, and changes of the liver.

Scrub Typhus

24. During the war much research was carried out in this country, in the Mediterranean, and in South East Asia on the problems of typhus, particularly on the infection known as scrub typhus (Tsutsugamushi disease). Arrangements have been made for this work to be continued at Kuala Lumpur, under the general direction of Dr. Lewthwaite. Especial attention will be directed to the epidemiological aspects of the disease and the behaviour and life history of the trombiculid mites.

25. A visit was paid by Miss H. M. Clark, Assistant Librarian at the National Institute for Medical Research, Hampstead, to the Medical Research Institute, Yaba, Nigeria, to assist and advise in the re-organisation of the medical library there. (Visited from 10th December, 1946 to 10th March, 1947).

26. A small grant was given to the "Annals of Tropical Medicine" to assist in the publication of a paper on malaria control by Colonel Tredre.

27. Dr. G. T. Stewart has been given an appointment to carry out research on amoebiasis at the School of Tropical Medicine, Liverpool. A similar appointment has been given to Dr. A. Monck-Mason Payne for training in virus research at the Central Public Health Laboratory, Colindale, London. Dr. J. Newsome was given an appointment for work on intestinal disorders at Oxford. It is expected that these workers will proceed overseas to continue their work in the field.

**COMMITTEE FOR COLONIAL AGRICULTURAL,
ANIMAL HEALTH, AND FORESTRY RESEARCH**

Second Annual Report

M E M B E R S H I P

SIR JOHN FRYER, K.B.E., M.A., Secretary, Agricultural Research Council, *Chairman.*

SIR EDWARD SALISBURY, C.B.E., D.Sc., F.R.S., Director, Royal Botanic Gardens, Kew, *Vice-Chairman.*

DR. J. CARMICHAEL, D.Sc., M.R.C.V.S., Veterinary Research Division, May & Baker, Ltd.

PROFESSOR H. G. CHAMPION, C.I.E., Professor of Forestry, Oxford University.

MR. G. F. CLAY, C.M.G., O.B.E., M.C., Adviser to the Secretary of State on Agriculture.

PROFESSOR T. DALLING, M.A., M.R.C.V.S., F.R.S.E., Director, Veterinary Laboratory, Ministry of Agriculture and Fisheries.

DR. C. D. DARLINGTON, D.Sc., F.R.S., Director, John Innes Horticultural Institution.

SIR FRANK ENGLEDDOW, C.M.G., F.R.S., Drapers Professor of Agriculture, Cambridge University.

PROFESSOR J. W. MUNRO, D.Sc., Professor of Zoology and Applied Entomology in the University of London.

DR. W. G. OGG, M.A., Ph.D., Director, Rothamsted Experimental Station.

MR. W. A. ROBERTSON, Adviser to the Secretary of State on Forestry.

PROFESSOR J. L. SIMONSEN, D.Sc., F.R.S., Director of Colonial Products Research.

MR. J. SMITH, O.B.E., M.R.C.V.S., Adviser to the Secretary of State on Animal Health.

PROFESSOR J. A. SCOTT WATSON, C.B.E., Chief Education and Advisory Officer, Ministry of Agriculture and Fisheries.

DR. S. P. WILTSHIRE, M.A., D.Sc., Director, Imperial Mycological Institute.

DR. H. H. STOREY, Ph.D., F.R.S., *Secretary.*

MR. E. LORD, *Assistant Secretary.*

The Committee records with deep regret the death of an original member, Sir Joseph Barcroft, C.B.E., F.R.S. Mr. G. F. Clay, C.M.G., O.B.E., M.C., became an official member on succeeding Sir Harold Tempany, C.M.G., C.B.E., D.Sc., F.R.I.C., who retired in October, 1946, from the post of Adviser on Agriculture to the Secretary of State. The Secretary, Dr. H. H. Storey, Ph.D., F.R.S., assumed duty in October, 1946.

CONTENTS

	<i>Paragraphs</i>
I.—GENERAL	1-8
II.—REGIONAL ORGANISATION OF RESEARCH IN EAST AFRICA	9-10
III.—REGIONAL ORGANISATION OF RESEARCH IN THE WEST INDIES	11
IV.—INDIVIDUAL RESEARCH SCHEMES	12
V.—REPORTS OF STANDING SUB-COMMITTEES	13-20
(a) Cocoa Research Sub-Committee	13-15
(b) Soils Sub-Committee	16-17
(c) Stored Products Sub-Committee	18-20

6A, DEAN'S YARD,
LONDON, S.W.1.

14th May, 1947.

SIR,

I have the honour, on behalf of the Committee for Colonial Agricultural, Animal Health and Forestry Research to transmit to you the second Report covering the Committee's work from 1st April, 1946, to 31st March, 1947.

I have the honour to be,

Sir,

Your most obedient servant,

J. C. F. FRYER,
(*Chairman*).

The Right Honourable A. Creech-Jones, M.P.,
Secretary of State for the Colonies.

COMMITTEE FOR AGRICULTURAL, ANIMAL HEALTH AND FORESTRY RESEARCH

I. General

1. The stage of preliminary consideration of the vast and complex fields of research covered by the Committee's title, to which reference was made in its First Annual Report, has not yet been passed. During the year the Committee set as its first objective the definition of its policy in relation to Colonial agricultural, veterinary and forestry research ; but at the same time it was called upon to advise on concrete research schemes, consideration of which could not be deferred until policy had taken final shape. Under these circumstances progress in the more general sphere was slowed by the conflicting claims upon the Committee's time.

2. The Committee's tasks, as defined by its terms of reference, which were set out in full in its First Report, fall into two groups. In the first place there are the items that deal with the phase of reconstruction ; in particular, to advise on the scope and functions of regional and other research institutions in the Colonial Empire and on the provision required ; and to advise on the recruitment, training and terms of employment of the Governmental scientific personnel. These two matters have received during the year close attention from two Sub-Committees, and progress is reported below. Some advance is also recorded towards fulfilling the Committee's function, defined in the first term of reference, of advising on general research policy.

3. A second group of tasks covers the review of, and advice upon, research in progress in the Colonies. It is to be expected that in course of time this will constitute its main function. The Committee is far from overlooking the fact that agricultural research is no new thing in the Colonies and that research now in progress is deserving of its close attention. But the needs of reconstruction, expansion and to some extent re-orientation of Colonial research are so pressing, and the opportunities so widened by the growing public appreciation of the value of research that the Committee has felt itself bound to concentrate its attention on the first group of tasks. Its Minutes, in consequence, record many discussions of plans for future research, but little relating to research in progress. This position can only be corrected when the pressure of reconstruction eases.

4. On the general aspects of the reconstruction phase, the Committee considered it desirable to give its prior attention to the terms of service for the Colonial research worker. The Sub-Committee, under the Chairmanship of Sir Edward Salisbury, C.B.E., F.R.S., after examining the problem in the closest detail, prepared a draft memorandum on the terms of service that it considered suitable for a colonial research service for agriculture, animal health and forestry, which was endorsed by the full Committee and recommended for consideration by the Secretary of State. This memorandum was used by the Colonial Office as a basis for the preparation of a scheme for a general Colonial Research Service.

5. The primary concern of the Sub-Committee was to recommend terms that would attract and retain voluntarily in Colonial research a fair proportion of the available research workers in the sciences related to agriculture. It considered that there should be, therefore, as nearly as possible a basic uniformity in scales of salary as between services in the United Kingdom and in the Colonial regions, with graded allowances and other privileges to compensate for disadvantages of service overseas and to bring total emoluments to reasonable

equality with those of fellow officers employed by Colonial Governments. The Sub-Committee was especially concerned that there should be no barrier to free movement of research workers between research institutions in the Colonies and in the United Kingdom and the Dominions. The basic uniformity of salary scales referred to above was held to be one necessary step towards mobility ; but the most important step was to establish a transferable superannuation scheme to replace the existing Colonial pensions system. This step had, at an early stage, been urged by the Colonial Research Committee ; and plans for a Colonial Superannuation Scheme are in preparation in the Colonial Office. Meanwhile it is hoped that the Federated Superannuation Scheme for the Universities may be applied as a temporary measure.

6. The policy Sub-Committee, under the Chairmanship of Sir John Fryer, K.B.E., M.A., continued its studies of policy in relation to Colonial research in agriculture, animal health and forestry. It is expected that a report will be presented to the Secretary of State during 1947. Its purpose is to define the research needs of the Colonies, the conditions that should be met if research is to achieve its purpose, and generally to recommend the manner in which research should be organised in Colonial regions.

7. The Committee's first term of reference called for a determination of the matters in which research is required for Colonial agricultural improvement and advice on the general policy for research. This is, in fact, one of the tasks of the Sub-Committee mentioned in the preceding paragraph. While a full statement must await the completion of its studies, it may be said that the Sub-Committee is fully conscious of the important part that agricultural research is called upon to play in enhancing the world's supply of goods ; that, in consequence, its guiding principle is that research policy should be closely integrated with production policy, and that the aims of Colonial research should be to provide the knowledge needed to raise as rapidly as possible the productive capacity of Colonial territories. The detailed determination of these needs, however, and the formulation of research programmes to meet them, must generally await the appointment of regional Directors of Research, who can give prolonged study to the situation in consultation with all the local authorities in a position to advise. Much can, however, be done by visits of members of the Committee to colonial regions, even though these must usually be of short duration.

8. In February and March, 1946, a mission consisting of Sir Frank Engledow, Professor Munro, and Sir Harold Tempany visited East Africa. Its main purpose, the preliminary negotiations for establishing a regional research organisation in the region, is dealt with in another section of this Report. It was able, however, to state in outline the main research needs of East Africa, which were set out in a memorandum forming a part of the Proceedings of a Conference held in Nairobi, March, 1946 (Government Printer, Nairobi). The prime objective of agricultural policy was defined as to secure an adequate and suitable supply of food for the people, with cash-crops as a secondary objective. But it was necessary that this policy should conform with certain basic requirements, and particularly conservation of land, water and soil fertility, and a high return for labour. The tasks of research to provide basic knowledge on which this general policy could be applied in the form of specific projects. The mission emphasised the importance of surveys of resources, in the widest sense ; but it also recognised an immediate and imperative need for applied research on means for reducing soil erosion and loss of soil fertility ; on means for increasing output without jeopardising the soil ; and on developing live stock appropriate to local circumstances. It was considered that these

needs could generally best be met by the development of suitable forms of mixed rotational farming.

II. Regional Organisation of Research in East Africa

9. The Committee regards as one of its chief immediate tasks to advise on the organisation of Colonial research on a regional basis. Some progress has been made in respect of East Africa, as a result of the visit early in 1946 of Sir Frank Engledow, Professor J. W. Munro and Sir Harold Tempny. As stated above, this mission's recommendations were discussed by East African authorities at a Conference held in Nairobi in March, 1946. The outcome of these discussions was to recommend the formation of an East African Council for Agriculture, Animal Health and Forestry with the functions of formulating policy, determining the priority of research schemes and kindred matters ; and the establishment of regional research organisations for agriculture, animal health, and, when desirable in the future, for forestry. The Conference recommended that an East African Agricultural Research Organisation should replace the existing East African Agricultural Research Institute, whose headquarters at Amani, Tanganyika Territory, should be transferred to a more suitable site ; and that the East African Veterinary Research Institute, already established at Kabete, Kenya, should be expanded. Each of these research organisations should be constituted of a Director, Deputy Director and a number of science divisions each headed by a Chief Scientific Officer. Recommendations were made also on the relations that should exist between the research organisations and Colonial Departments of Agriculture, etc., and commodity research stations.

10. The recommendations of the Nairobi Conference were endorsed, with minor amendments, by the Committee for Colonial Agricultural, Animal Health and Forestry Research and have been accepted by the Secretary of State. First step towards their implementation were the purchase of a farm in the Limuru district, Kenya Colony, intended to be the headquarters of the East African Agricultural Research Organisation, for which a grant under the Colonial Development and Welfare Act was approved ; and the provision of funds from the same source to permit of the appointment of a Director of this Organisation. It is anticipated that appointments to this post and also to the Directorship of Veterinary Research will be made during 1947.

III. Regional Organisation of Research in the West Indies

11. The Committee devoted much attention to the form of research organisation appropriate to the West Indies, which should take full account of the parts that could be played by the Caribbean Commission and its Committees, by the office of the Comptroller of Development and Welfare for the West Indies, and by the Imperial College of Tropical Agriculture which is already an important centre for agricultural research. For a number of reasons it was not possible to reach final agreement on the general organisation ; but on the invitation of the Secretary of State the Governing Body of the Imperial College of Tropical Agriculture prepared schemes for research, within the College framework, on Soils, Bananas, Cocoa and Sugar Technology. (The last mentioned subject does not fall within the purview of the Committee.) The schemes have a solid basis in past work, mainly in the College in Trinidad, but in the case of Bananas in

Jamaica also ; and the Committee was satisfied that an expansion of each was justified at this stage in the interest of agriculture in the region. The Cocoa Scheme, which constituted in fact an attempt to put into effect the recommendations of the Cocoa Research Conference of May, 1945 (Colonial No. 192 of 1945), was strongly supported by the cocoa-manufacturing industry. After detailed examination the Committee recommended the Soils, Bananas and Cocoa schemes to the Secretary of State for assistance under the Colonial Development and Welfare Act.

IV. Individual Research Schemes

12. The Committee has had under examination a number of schemes, mainly for research on particular crops. Among these may be mentioned schemes for research on oil palms and rice in West Africa, on cloves and sisal in East Africa, and on tobacco and general crops in Nyasaland. On all these the Committee has made specific recommendations for financial assistance.

V. Reports of Standing Sub-Committees

(a) COCOA RESEARCH SUB-COMMITTEE

13. The Cocoa Research Committee which had been appointed as a separate advisory committee in 1944 became, at its own suggestion, a Sub-Committee of the Committee for Colonial Agricultural, Animal Health and Forestry Research after the appointment of this Committee. The membership of the Sub-Committee is Sir Gerard Clauson (Chairman), Mr. F. C. Bawden, Dr. L. E. Campbell, Mr. G. F. Clay, Sir Frank Engledow, Sir Geoffrey Evans, Mr. W. M. Hood, Sir Guy Marshall, Professor J. W. Munro, Dr. W. G. Ogg, Mr. W. A. Robertson, Sir Edward Salisbury, Mr. E. E. Wells, and Dr. S. P. Wiltshire.

14. The Sub-Committee's main task has been to keep under close review the progress of the work of the West African Cacao Research Institute. It has noted with great satisfaction the substantial advances achieved by this Institute, not the least of which has been the development of the measures now being applied to the control of swollen-shoot disease of cocoa. Progress of surveys and eradication campaigns under the Departments of Agriculture of the Gold Coast and Nigeria have been reviewed. The Sub-Committee has furnished advice on the research work of the Institute, in particular on the use of tolerant strains of cocoa to the swollen shoot virus, the biological control of capsid bugs, and on the potential importance of forest trees as permanent reservoirs of swollen shoot infection.

15. Other major matters considered by the Sub-Committee included the West Indian regional cocoa research scheme under the aegis of the Imperial College of Tropical Agriculture and the control of cocoa virus diseases in Trinidad. The Sub-Committee examined in detail the research scheme submitted by the College and made a number of suggestions directed to increasing the efficiency of the administration, staffing and work of the scheme. The Sub-Committee has also critically examined memoranda prepared by the Cocoa Research Panel of the British Food-Manufacturing Industries Research Association, on the aims of plant breeding work, and on the preparation of, and quality of, cocoa, with a view to providing guidance to research workers in West Africa and the West Indies. At the beginning of 1947 a member of the Sub-Committee, Mr. Bawden, visited the West African Cocoa Research Institute and cocoa areas in the Gold Coast and Nigeria at the request of the Director of

the Institute. Another member of the Sub-Committee, Mr. Hood, also visited the Institute during the year. During his visit to the Gold Coast, Mr. Bawden attended two meetings convened by the Director of Agriculture for the purpose of discussing Gold Coast cocoa problems, including the existing plan of campaign for the control of swollen-shoot and the replanting of treated areas.

Soils Sub-Committee

16. The Soils Sub-Committee was appointed during the year with the following membership :—Dr. W. G. Ogg (Chairman), Mr. G. F. Clay, Dr. E. M. Crowther, Dr. H. Greene, Mr. G. V. Jacks, Mr. C. G. T. Morison, Dr. A. Muir, Professor G. W. Robinson, Dr. A. B. Stewart and Sir Harold Tempany. The Sub-Committee took over the functions of the Soils Sub-Committee of the Colonial Advisory Council of Agriculture, Animal Health and Forestry. The Sub-Committee has met once during the year and has conducted business as far as possible by correspondence. The chief matters dealt with by the Sub-Committee were Colonial soil classification and nomenclature, West Indian regional soils research, and fertiliser experiments. At its first meeting, the Sub-Committee considered a summary of information received from Colonial soil workers in response to an enquiry initiated by the former Soils Sub-Committee. It decided that it was impossible to reach any generally accepted conclusion on questions of either soil classification or nomenclature until a representative conference of specialists engaged on these matters had met and discussed them. In view of the importance of establishing a recognised classification system the Sub-Committee recommended that such a conference should be called as soon as practicable and felt that the aim should be to hold a conference in 1948. It is proposed that this conference on tropical and sub-tropical soils should be a Specialist Conference of the Imperial Agricultural Bureaux. In preparation for the Conference, Colonial soil workers have been asked to prepare lists and descriptions of the commonly recognised soils of the areas in which they are working. In this connection, the Sub-Committee considered a suggestion that the Puerto Rico system of soil classification and nomenclature should be adopted for the soils of the British West Indian territories. It was unable to recommend giving effect to this suggestion in view of the fact that there is not unanimity among soil workers in the West Indies that this system is suitable, and that in the opinion of the Sub-Committee it is undesirable to try to fit West Indian or other Colonial soils into any rigid system at this stage in our knowledge.

17. During the year the Sub-Committee examined the proposals submitted by the Imperial College of Tropical Agriculture for West Indian regional soils research. It expressed its general concurrence with the scheme subject to certain observations. On the subject of surveys of Colonial fertiliser resources and fertiliser experiments which had been referred to it by the Committee, the Sub-Committee strongly endorsed both the need for surveys of fertiliser resources and the desirability of carrying out fertiliser experiments with different crops and through the sequence of cropping with the object of obtaining precise information on the response of crops to the different fertilisers and on the economics of application. At the request of the Sub-Committee, Dr. Crowther and Dr. Stewart, respectively, undertook to prepare memoranda on fertiliser experiments in Colonial agriculture and on the planning and conduct of fertiliser trials, for the information and guidance of Colonial Departments of Agriculture and research institutions.

Stored Products Research Sub-Committee

18. The Stored Products Research Sub-Committee was appointed in 1945 to consider the problems of the storage of agricultural products and the methods necessary for their solutions. The members of the Sub-Committee are Professor J. L. Simonsen (Chairman), Mr. G. F. Clay, Mr. W. McAuley Gracie, Mr. G. V. B. Herford, Mr. J. G. Hibbert, Mr. F. W. Irving, Professor J. W. Munro, Professor H. Raistrick, and Mr. J. J. S. Scouler. The Sub-Committee was of the opinion that an essential pre-requisite of any programme of infestation research was surveys of storage conditions in the more important Colonial territories. It felt, however, that in the first instance, particularly in view of the shortage of scientific officers, these surveys should be confined, in the main, to problems of exported products, with the object of securing freedom from infestation at the time of shipment. After considering a comprehensive note prepared by the Infestation Division of the Ministry of Food on the infestation of Colonial produce arriving in the United Kingdom, the Sub-Committee agreed that infestation conditions in the West African territories should first receive attention. It accordingly recommended that a survey should be carried out as soon as possible in these territories, to include the infestation problems of cocoa, groundnuts, palm kernels, and centrally-stored foodstuffs for local consumption, together with such other stored products as might be found necessary during the course of the survey. The Sub-Committee further recommended the immediate appointment of a leader of the survey team, to carry out a preliminary survey prior to preparing, in consultation with the Sub-Committee, a scheme for the complete survey. Mr. G. S. Cotterell was appointed as leader of the survey in May, 1946, and after making initial enquiries and investigations in the United Kingdom proceeded to West Africa in September. He returned in March, 1947 and his reports and proposals are to be considered by the Sub-Committee in April.

19. With a view to providing immediate guidance to Colonial Governments on the control of infestation, the Sub-Committee appointed a small Working Party under the Chairmanship of Professor Munro to prepare a memorandum on the subject. By the end of the year a memorandum entitled "The Infestation of Foodstuffs by Insects and Methods of Control" had been prepared and approved by the Sub-Committee. Copies have since been transmitted by the Secretary of State to Colonial Governments, who have been informed that local difficulties in connection with infestation problems may be referred to the Sub-Committee.

20. The Sub-Committee considered the provision of Entomologists and Chemists for infestation control work and suggested the award of scholarships under the Colonial Agricultural Scholarships Scheme for the post-graduate training of such officers. It also considered the use of the new synthetic insecticides in direct contact with stored foodstuffs. In view of the lack of knowledge of the cumulative toxic effect of these insecticides, it expressed its agreement with the official view that the use of D.D.T. and Gammexane in direct contact with foodstuffs cannot for the present be recommended. It also agreed that recommendations on the use of D.D.T. and Gammexane dusts, smokes and sprays with bagged grain must await the quantitative data which were being accumulated at the Pest Infestation Laboratory of the Department of Scientific and Industrial Research.

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