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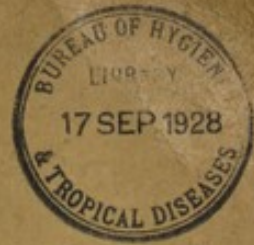
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NIGERIA.



ANNUAL
MEDICAL AND SANITARY
REPORT
FOR THE YEAR
1927.

LAGOS:
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1928.

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With the compliments of the

Director of Medical and Sanitary Service,

Nigeria.

MM



NIGERIA.

ANNUAL

MEDICAL AND SANITARY
REPORT

FOR THE

YEAR 1927.

NIGERIA.

ANNUAL

MEDICAL AND SANITARY

REPORT

FOR THE

YEAR 1927.

No. 368D/DMS.

DIRECTOR, MEDICAL & SANITARY SERVICE,

LAGOS, NIGERIA,

5th April, 1928.

ANNUAL MEDICAL AND SANITARY REPORT, 1927.

SIR,

I have the honour to submit for the information of His Excellency the Governor and for transmission to the Right Honourable the Secretary of State the Medical Report on the Health and Sanitary conditions of Nigeria for the year 1927, together with the Returns, etc., appended thereto.

I have the honour to be,

Sir,

Your obedient Servant,

D. ALEXANDER,

*Director of Medical and Sanitary Service,
Nigeria.*

THE HONOURABLE

THE CHIEF SECRETARY TO THE GOVERNMENT,

LAGOS.

2000-1918

Director, National Archives

Washington, D.C.

20 April 1952

ANNUAL REPORT AND BUDGET REPORT 1952

Dear Sir:

I have the honor to submit for the information of the
Executive Committee the report and for transmission to the High
Honorable the Secretary of State the report on the
Health and Safety conditions of the year 1951.
together with the financial statement attached thereto.

I have the honor to be,

Sir,

Very respectfully,
Your obedient servant,

W. A. R. R. R.

Enclosed for the Secretary of State are the following:

1. Report on the Health and Safety conditions of the year 1951.

2. Financial statement.

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Annual Medical and Sanitary Report on Nigeria for the Year ending 31st December, 1927.

I.—ADMINISTRATION.

A.—ESTABLISHMENT (including vacancies).

(a) EUROPEAN STAFF.

MEDICAL.

- Director of the Medical and Sanitary Service.
- Deputy Director of Medical and Sanitary Service.
- 1 Assistant Director of Medical and Sanitary Service.
- 5 Assistant Directors of Medical Service.
- 5 Specialist Medical Officers (one seconded).
- 11 Senior Medical Officers.
- 6 Pathologists (three appointed).
- 1 Alienist Medical Officer.
- 1 Research Medical Officer.
- 1 Superintendent of the Dispensers' Training School.
- 95 Medical Officers (sixteen vacancies).
- 3 Lady Medical Officers.
- 2 Government Dentists (one appointed).

CLERICAL.

- 1 Assistant Accountant.
- 1 Office Assistant.
- 3 Chief Dispenser Storekeepers.

NURSING.

- 9 Senior Nursing Sisters.
- 36 Nursing Sisters.

TSETSE INVESTIGATION. (TEMPORARY).

- 1 Investigator (Specialist Medical Officer seconded from Medical Staff).
- 1 Tsetse Investigator.
- 1 Entomologist.
- 2 Medical Officers (seconded from Medical Staff).

MEDICAL RESEARCH.

- 1 Director of Medical Research Institute.
- 2 Bacteriologists.
- 1 Entomologist (seconded to Tsetse Investigation).
- 2 Technical Assistants.

SANITATION.

- 1 Deputy Director of Sanitary Service.
- 1 Assistant Director of Sanitary Service.
- 5 Senior Sanitary Officers.
- 13 Medical Officers of Health (six appointed).
- 24 Sanitary Inspectors (twenty-two appointed).

SPECIAL PLAGUE STAFF.

- 2 Majors, R.A.M.C.
- 2 Captains, R.A.M.C.
- 4 R.A.M.C. Non-commissioned Officers.
- 30 Rodent Inspectors.

(b) AFRICAN STAFF.

MEDICAL.

- 6 Medical Officers (two vacancies).
- 2 Junior African Medical Officers (Temporary Appointments).
- 1 Chief Clerk.
- 3 Assistant Chief Clerks.
- 12 First Class Clerks.
- 34 Second Class Clerks and Probationers.
- 2 Chief Dispensers.
- 7 Senior Dispensers (six appointed).
- 19 First Class Dispensers.
- 58 Second Class Dispensers.
- 25 Dispensers-in-Training.
- 1 Chief Storekeeper.
- 2 Assistant Chief Storekeepers.
- 3 First Class Storekeepers.
- 4 Second Class Storekeepers.
- 3 Senior Wardens.
- 8 Wardens.
- 2 Assistant Wardens.
- 10 Senior Nurses (five provided for and five vacancies).
- 24 Charge Nurses (twenty provided for and four vacancies).
- 45 First Class Nurses (six vacancies).
- 120 Second Class Nurses (thirty-one vacancies).
- 170 Nurses-in-Training.
- 1 Senior Laboratory Attendant (unfilled).
- 3 First Class Laboratory Attendants (unfilled).
- 5 Second Class Laboratory Attendants (one vacancy).
- 10 Third Class Laboratory Attendants (five vacancies).
- 1 Charge Attendant, Lunatic Asylum.
- 24 Attendants, Lunatic Asylum.

SANITATION.

- 2 Chief Sanitary Inspectors (none appointed).
- 5 Senior Sanitary Inspectors (one appointed).
- 10 First Class Sanitary Inspectors (four appointed).
- 46 Second Class Sanitary Inspectors (twenty-five appointed).
- 33 Third Class Sanitary Inspectors (thirty-one appointed).
- 64 Vaccinators (sixty appointed).
- 2 Registrars of Vital Statistics.
- 1 Deputy Registrar of Vital Statistics.
- 1 Assistant Chief Clerk.
- 1 First Class Clerk.
- 9 Second Class Clerks and Probationers.
- 2 Second Class Dispensers.
- 1 Charge Nurse.
- 4 First Class Nurses (two appointed).
- 10 Second Class Nurses (three appointed).

B.—LIST OF ORDINANCES, REGULATIONS, ETC., AFFECTING PUBLIC HEALTH ENACTED DURING THE YEAR.

ORDINANCES.

Serial No	Date.	Short Title and Application.
15/1927	27.4.1927	Ordinance to regulate the Sale and Distribution of Drugs and Poisons. (b) Provide for the Registration and Licensing of Chemists, Druggists and Dispensers.
16/1927	..	Ordinance to regulate the Importation, Exportation, Manufacture, Sale and use of Opium and other Dangerous Drugs.

SUBSIDIARY LEGISLATION.

Serial No.	Date.	Ordinance made under.	Provision.
		ORDERS-IN-COUNCIL, 1927.	
18/1927	29.8.1927	Public Health Ordinance.	Ordering the application of certain portions of the Ordinance and Rules to the whole of Ijebu Province with the exception of Ijebu Ode.
24/1927	26.9.1927	Townships Ordinance.	Ordering the Local Authority to apply the Townships Ordinance to the Urban District of Abonema.
31/1927	6.12.1927	Public Health Ordinance.	Ordering the application of the Ordinance and Rules to certain localities in the Oyo and Abeokuta Provinces.
		REGULATIONS, 1927.	
7/1927	14.3.1927	Quarantine Ordinance.	Amending Regulation 36 of 1926. Increasing the powers of Port Sanitary Authority in dealing with small craft.
47/1927	13.12.1927	The Poisons and Pharmacy Ordinance, 1927.	Providing detailed and specific conditions under which Examination for Certificates and Diplomas can be awarded.
		RULES, 1927.	
4/1927	13.6.1927	Public Health Ordinance.	Construction of Stables.
		ORDERS, 1927.	
9/1927	25.3.1927	Town ships Ordinance.	Defining Township area of Lagos and Urban District.
23/1927	26.9.1927	ditto.	Defining Abonema Urban District.
27/1927	15.10.1927	ditto.	Defining Aba Urban District.

C.—FINANCIAL.

Revenue	...	...	...	...	£9,223
Expenditure	...	...	...	...	£409,970

The total Medical and Sanitary Expenditure for the year 1927 of £409,070 is about a sixteenth of the Estimated General Expenditure for 1927/28 £6,758,233.

(See also Table II under Returns, page 52).

II.—PUBLIC HEALTH.

A. GENERAL REMARKS.

The number of patients applying for treatment, both as in-patients and out-patients, still continues to increase steadily throughout the whole of Nigeria, as the following figures show :—

	1925.	1926.	1927.
European In-patients	1,203	1,272	1,315
Non-European In-patients	20,647	24,757	26,896
European Out-patients	5,395	6,635	6,456
Non-European Out-patients	197,655	228,966	272,483
Major Operations	2,640	1,418	3,227
Minor Operations	2,485	3,221	4,853

This has been particularly noticeable in certain parts of the Northern Provinces, where hitherto there has been a notable shyness in regard to modern medicine. Many patients now travel great distances for medical and surgical treatment but particularly for the latter.

The following figures from the Northern Provinces give an idea of this increase and do not include cases seen by Medical Officers in the Native Administration Dispensaries :—

	1925.	1926.	1927.
African In-patients	6,400	8,915	10,461
African Out-patients	39,109	47,121	71,816

The limit of capacity of the hospitals has been reached, as also the endurance of the staff, and if this rate of increase is to be maintained, further accommodation and staff are inevitable and large increases in expenditure on equipment must be anticipated.

The same applies to the Southern Provinces, as the following figures for 1927 from the hospitals of Calabar, Port Harcourt and Lagos show :—

	Calabar.	Port Harcourt.	Lagos.
Number of new Out-patients seen ...	12,996	21,709	18,988
Number of new In-patients admitted	1,317	2,460	2,159

The problem therefore, in the towns at any rate, is not how to encourage the African to take advantage of European medicine, but how to cope with the amount of work which goes on increasing steadily and will continue to do so. The extreme shortage of qualified medical staff has been a serious hindrance to the much needed extension of medical and sanitary work. The establishment has never yet been up to pre-war strength. There remain stations unopened since the war and medical officers in some cases are still working under the strained conditions which were brought about by the war, and the increase of work indicated above is a tribute to their keenness and their loyalty. It is unfortunate that at the very time when expansion is so very necessary in all branches of the work, recruitment should fail to produce an adequate supply of officers. Provision of medical officers for camps of exercise and for patrols has only been possible by the shutting down temporarily of other medical work, which, needless to add, is a very unsatisfactory arrangement.

The shortage of qualified Medical Staff extends also to the African Medical Officers and is due to retirements and invalidings. It has been found by experience that the newly qualified African suffers from the

lack of opportunity of the experience of a house appointment. During 1927, in order to meet this difficulty provision was made for such appointments at the larger hospitals in Nigeria. The holders are appointed for two years, and during this period they will have facilities for adding to their knowledge and extending their experience in Medicine, Surgery, Pathology and, if they desire it, in Public Health. They are not on the permanent establishment, but if at the end of two years their services have been satisfactory and they so desire it, the intention is that they will be taken on the establishment and given a further course of study in one of the medical schools in Britain before being posted for duty in Nigeria. The two such appointments that have been made are working satisfactorily and encourage the hope that the new arrangement will mark a definite advance in African Medical Service.

In order still further to gain the confidence of the people and extend medical treatment to outlying districts four travelling medical officers, with mechanical transport, have been arranged for. Three have been appointed and centred on Kano, Zaria and Maiduguri, the fourth will be centred on Sokoto.

During the last four years gradual but steady progress has been made in the provision of hospitals, European and African, in various centres. With the rapid advances in medical and surgical methods it is no longer possible to regard a hospital and dispensary of wattle and daub as suitable or practicable for medical work. The first departure (pre-war) from this primitive type was a plain brick ward with a cement floor. Windows and doors alternated opening on to a verandah on each side. This left much to be desired and a type plan was evolved, known as the Minna—Ilorin type, because the first units of this type were erected at Minna and at Ilorin. This type plan was subsequently used at Port Harcourt, Enugu, Kano and Jos. This type consisted of a dispensary block, two ward blocks and a kitchen block. One of these ward blocks included an operating theatre with ante-room, while the second block provided for women on the ground floor and in a second storey for clerks and better class patients.

These buildings proved unsuitable; they lacked storage accommodation, theatre provision was insufficient, they came short of modern requirements in many ways and the accessory rooms were all outside.

A new type plan has lately been evolved which provides for the building of a hospital in units as the demand may require. It is styled Type A., B., or C., etc., according to the number of units. The first unit is the out-patient block. This provides all the rooms necessary for dealing with out-patients, including a small operating theatre, and each room adapted to its purpose. It is so arranged that the flow of patients is in one direction only and that they are shut off from access to the hospital. In placing such an out-patient block in a new station a small ward of four beds is added; this provides a feeler and becomes an index of future in-patient requirements and when the hospital is completed becomes the isolation ward. The succeeding units provide for wards on the pavilion system. These can be built in one or two storeys as may be demanded by available site area. Provision is made for a reception and disinfection block, laundry, post-mortem room and mortuary, operation theatre block, warden's stores, etc., as and when such provision becomes necessary. The kitchen block is conveniently situated and can be turned to other purposes when its position has to be altered to suit extension. Where a water supply is available water is laid on and a septic tank sewage system is installed. The provision of laboratory and X-ray departments can be made if the development calls for it. The one outstanding problem is that of a suitable surface for the floors and walls, one which will be smooth and impervious, will not pit, crack or give off dust. It seems probable that this will be

accomplished by the use of a solution of silicate of sodium applied in several coats over the concrete face and smoothed with carburundum. Local brick is soft, pits and crumbles readily and is generally unsuited at least for the inside walls of wards.

The new European hospital and Nursing Sisters' quarters at Enugu have been completed, and those at Kano, Ibadan and Jos are nearing completion. The large African hospital at Port Harcourt is now completed and occupied, and those at Aba, Benin City, Ijebu Ode and Oshogbo are nearing completion, while the much needed extensions to the African hospitals at Kaduna, Calabar and Jos are being proceeded with. The work on the new African hospital in Lagos is progressing. Temporary African hospitals are nearly completed at Kumba, Mamfe and Bamenda in the Cameroons, and the buildings in connection with the hospital and medical training centre at Zaria will be commenced shortly. The Native Administration of the Oyo Province has built and opened an African hospital at Ibadan. At Maidugari, in the Bornu Province, the Native Administration are erecting a hospital with the assistance of Government, while plans have been got out for an up-to-date hospital to be erected by the Kano Native Administration in Kano City. At Katsina also a hospital on modern lines, to replace the old mud buildings, is contemplated.

Previous reports have not dealt with the important subject of the training of the African subordinate medical staff. In the early days and indeed until comparatively recent years it was the custom to appoint for nursing and other hospital and dispensary duties illiterates of various kinds—ex-steward boys, labourers, ex-cooks, ex-horse boys. As could be expected staff of this kind has been in the past a very heavy handicap to the medical officer in his work. In 1912 in the Southern Provinces, and 1922 in the Northern Provinces, it was recognised that a higher standard of education was required and it was then laid down that all applicants must have passed Standard VI. When it is understood that this is barely the equivalent of Lower School Form III in Britain the modesty of the demand will be appreciated. In the Northern Provinces there was the added difficulty that up to very recently English was not taught at all. Pupils for training as dispensers and sanitary inspectors were required to have a pass in Standard VII. In 1924 the subordinate medical staff was re-organised with better pay and prospects and the standard of training and efficiency raised. At the same time a serious effort was made to put the training on a more satisfactory basis. The commencement of the Pharmacy School and the equipment of the main hospitals for training of nurses, laboratory attendants, midwives, etc., have made possible a very marked advance.

To meet the increased demand and the undoubted need for extension of the benefits of European medicine, surgery and midwifery and instruction in simple measures of hygiene and child welfare, an increased staff with a higher standard of training and efficiency is required, but the great difficulty is the insufficient supply of candidates with the necessary standard of general education. An attempt has been made to overcome this difficulty by a system of scholarships, which aim at giving a course of post primary instruction of from three to four years. The three years' course is for dispensers, nurses, etc., and the four years' course is preparatory to training as medical assistants. In the Northern Provinces twelve such scholarships were commenced at Katsina College in September and will be augmented by twelve scholarships each year, maintaining a total of thirty-six. In the Southern Provinces twenty-five candidates were selected and commenced at King's College in January, 1928. Another twenty-five commence in 1929 and in 1930 none are taken, the aim being to maintain fifty students continuously at College. For the Northern Provinces a hospital and medical training school and hostel are planned to be erected at Zaria in order to be ready for the training of the first batch of these special students in 1930. Training

in the Southern Provinces will be centred in Lagos and proposals are under consideration for the extension of the Pharmacy School there in order to meet the needs of training of all classes of subordinate African medical staff, including medical assistants. It is intended that the medical assistants will be given a sound training in the elements of medicine, surgery and midwifery, and when trained they will take charge of sub-dispensaries under the supervision of a visiting Medical Officer.

In addition to the above which has for its object the extension of medical work in this vast territory of Nigeria, a scheme is under consideration for giving financial aid to medical missions to enable them to accomplish medical work over a larger area than at present. The whole question is, however, still in the early stages of enquiry and consideration.

The Pharmacy School in Lagos, which was organised in 1926 under a Medical Officer specially appointed as superintendent, is now in full working order and making the best of the present accommodation. With improved tuition and better facilities for gaining practical knowledge, competition for entrance to the school amongst schoolboys of good character has become very keen. The competitive examination for entrance is fully equivalent to the standard of the Senior Cambridge.

On the scientific side, the staff of the Medical Research Institute has been increased and provision has been made for a Biochemist and for a Protozoologist, and the increase in the work done can be gauged from the reports of the last three years.

The scope of the Tsetse Investigation has been widely extended so that all the important aspects of the problem are being surveyed by specially qualified workers.

It is a moot point, as yet, whether it is better to concentrate a number of workers, each a specialist in his subject, such as has been done in the Northern Provinces on Trypanosomiasis, and as is being done by the Rockefeller Commission on Yellow Fever, or to provide highly technical officers attached to the Research Institute where several different investigations can be carried on at the same time. There is room and indeed there is need for both. To the practical business mind it is results that count. In general research some results are obtained more or less quickly, but it is equally certain that the concentration of a staff of experts on all branches of one subject will sooner or later lead to the acquiring of valuable information and possibly to the complete elucidation of its problems.

Until comparatively recently no systematic pathology was done at the hospitals. Only occasional postmortems were done and these either in cases where enquiry was necessary or by keen Medical Officers. In 1925 a new departure was made and a pathologist appointed to the African Hospital, Lagos. This has been followed by appointments at Kaduna and Calabar. There are now three pathologists at work and one is appointed for April, 1928, and it is hoped that the whole establishment of six pathologists will be attained by 1930.

In this way the wealth of clinical material provided at the larger hospitals is being taken advantage of, with the result that not only is knowledge regarding the prevalent diseases increased, but diagnosis is speeded up and treatment becomes more scientific and more certain, thus enabling a larger number of patients to be dealt with. A diagnosis rapidly obtained benefits both the medical attendant and the patient. The need of a Biochemist to work in association with the Pathologist in the larger hospital centres such as Lagos is acutely felt. As development proceeds, the work of the research staff and of the pathologists will of necessity become more and more closely associated.

The development of the X-ray Department at Lagos was greatly hastened by the experience gained during the Great War. The inadequate apparatus which was used prior to 1918 was scrapped and a policy of gradual expansion embarked on. To-day the X-ray equipment of the African Hospital is probably the most complete in West Africa and every effort is made to keep pace with the demands of modern technique. The curative side of electro-therapeutics is well represented and the modern light treatment is available for suitable cases. Lack of space at present makes working somewhat difficult but on the completion of the new African Hospital this handicap will disappear, the new block being designed to meet all requirements for many years to come. Before long it is expected that X-ray Departments will be started at Kaduna, Port Harcourt and Calabar.

A gift of between 600 and 700 volumes of medical and surgical books and bound periodicals was made by Dr. G. M. Gray in 1924 and, together with the books already provided by Government, formed the nucleus for an up-to-date reference library. Accommodation for the library has been provided in the African Hospital now in course of erection and the new building should be ready for occupation some time in 1929. In the meantime accommodation is temporarily provided in a part of the building rented for medical offices, suitable books are being added, and the periodicals maintained. It is hoped that the library will be of service not only to Lagos but to Medical Practitioners throughout the country, arrangements are forecasted whereby an officer writing up any special case for the annual report or other publication will be provided with a bibliography of the literature on the subject and a summary of the main features.

During 1927 the West African Medical Journal made its appearance; it is entirely self-supporting and has been well commented on by the older established Medical Journals. Including as it does contributions from all the British West African Colonies, it should form a useful source for examination and discussion of problems common to the colonies and afford an opportunity for the publication of articles of interest that might not be considered of sufficient general interest for publication in other medical journals. The medical staff are indebted to the General Manager of the Nigerian Railway for his permission to have the journal printed by the Railway Printing Press on payment, and to the Superintendent of the Printing Press for the interest and care that he has taken in its production.

(i) GENERAL DISEASES.

The expansion of hospital service has brought about quite a notable increase in the number of patients attended. With every increase in the number of patients seen a nearer approach to the actual incidence of disease is attained. This year there are recorded 215 cases of cancer as against 115 in 1926, an increase greater in proportion than might result from the increased number of patients seen, as the incidence in 1926 is .46 per 1,000, while in 1927 it is .71. There is little doubt but that this disease will be found to be less rare than at one time it was assumed to be.

Rheumatism, especially chronic rheumatism, has a very large incidence and this year the numbers treated show a marked increase from 6,067 in 1926 to 11,714 in 1927, and incidence from 27.8 to 39.1. This diagnosis covers many cases of vague pain in joints and muscles which are so very common and probably are old cases of yaws, syphilis or gonorrhoea.

A few cases of beri-beri are recorded in the North, but there were probably many more unrecorded resulting from the famine in the early part of the year, in the period of the year between crops. The relief measures adopted by Government undoubtedly saved a great deal of

suffering. A report on an outbreak of beri-beri in Kano Native Administration Prison appears in Appendix G to this report.

It is perhaps worth drawing attention to that while seventeen cases of alcoholism were reported in Europeans in 1926 and ten in 1927, the corresponding figures among Africans were four and six respectively.

Neurasthenia has a somewhat high figure among Europeans and is a common cause of invaliding. It is much less seen among Africans, but neuritis is more common among them. The figures from 1927 are:—Europeans: Neuritis, 70; Neurasthenia, 121. Africans: Neuritis, 1,340; Neurasthenia, 273.

Although probably not of any real significance the increase from eight cases in 1926 to sixty cases in 1927 of trachoma in Africans should not be lost sight of. In the circulatory diseases, valvular disease of the heart is more commonly reported among Africans than Europeans, while the latter seem to suffer more from hæmorrhoids. Diseases of the respiratory and digestive systems account, as may be expected, for a large percentage of the total cases treated. Pneumonia is frequent during the harmattan season and at the height of the rains. There were 1,601 cases treated with twenty-six recorded deaths. This shows an increase of 427 cases on the record of 1926, but it should be observed that the cases of broncho-pneumonia in 1927 are 293, as against 759 in 1926.

Diseases of the skin and cellular tissue are also very common, ulcers forming the larger proportion of cases treated, and there has been a large increase in the number of skin diseases treated. Much work has yet to be done in distinguishing diseases that are truly skin diseases from those due to constitutional disease. Special attention is being paid to research on skin diseases as these are presented for treatment at the African Hospital, Lagos, and on ulcers by the Research Officer, Kano.

It is worthy of note that the fractures and dislocations are more than doubled—709 in 1926 and 1,584 in 1927. It is reasonable to suppose that this must be to some extent due to increased motor accidents.

The figures for the last four years show a steady and progressive increase, those for 1925 show an increase of 6% over 1924, while 1926 shows an increase of 14% over 1925, and 1927, with 307,150 cases treated, gives an increase of 17.4% over 1926.

The incidence of disease in 1926 and 1927 is shown in diagrammatic form. The notable feature of the diagrams is mainly in their essential similarity.

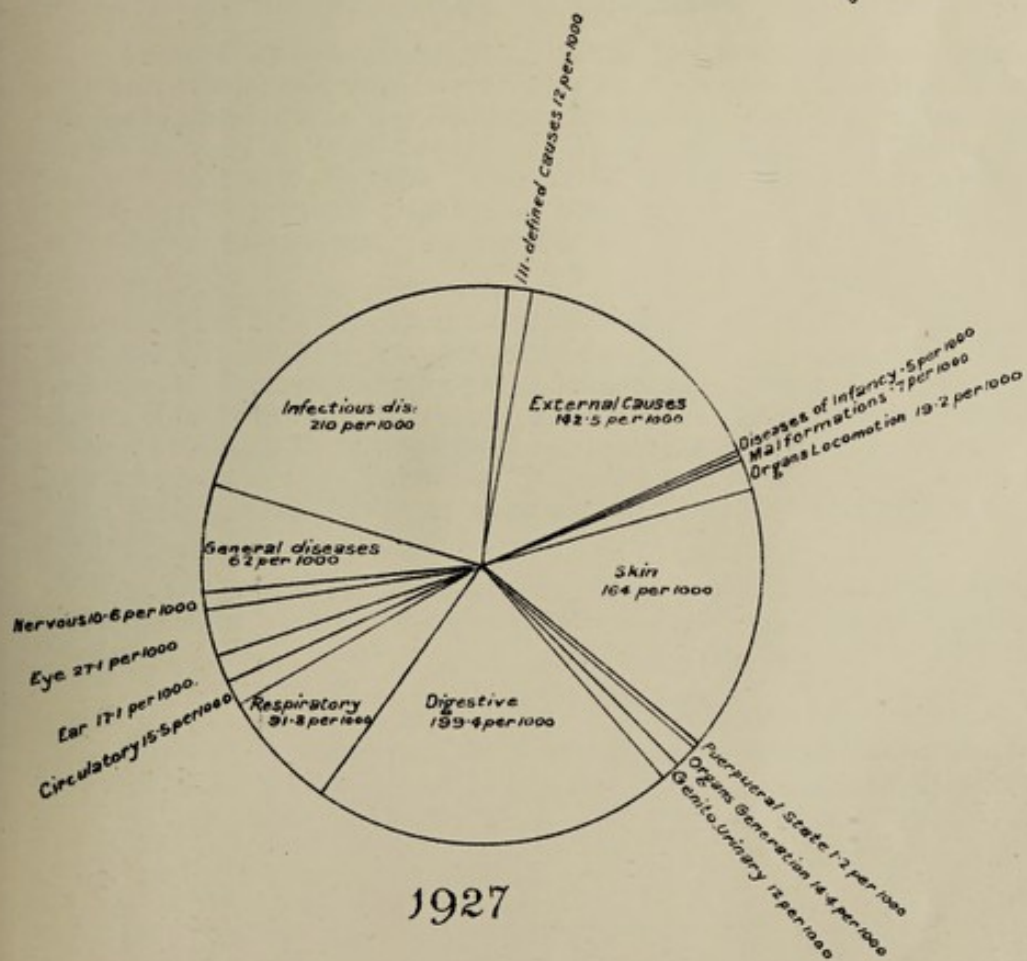
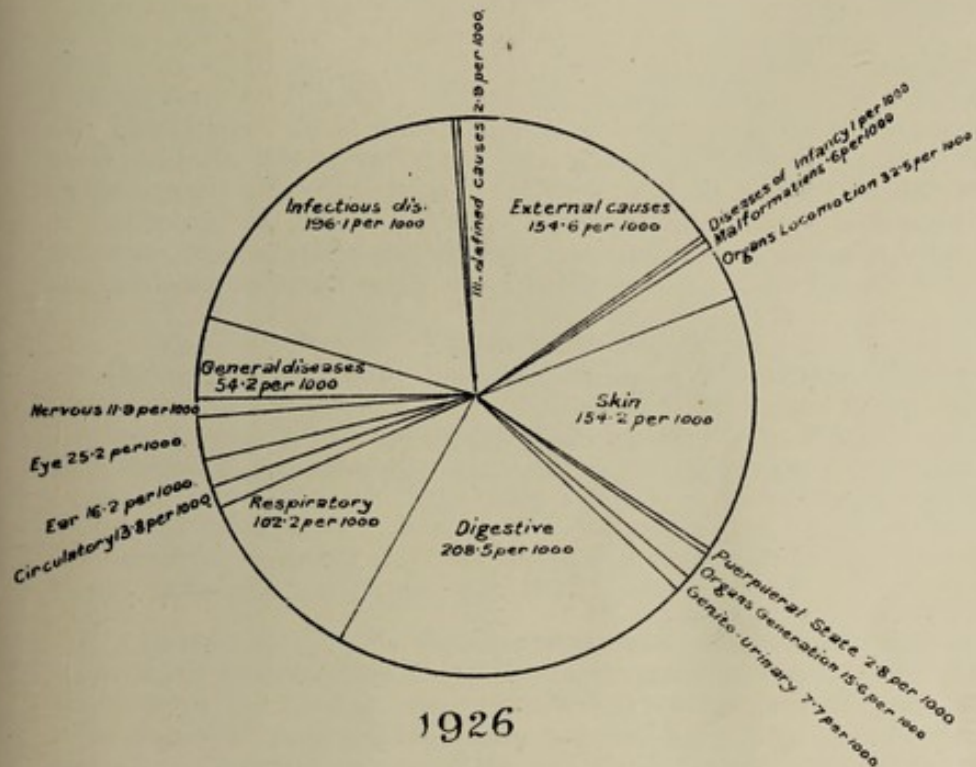
(ii) COMMUNICABLE DISEASES.

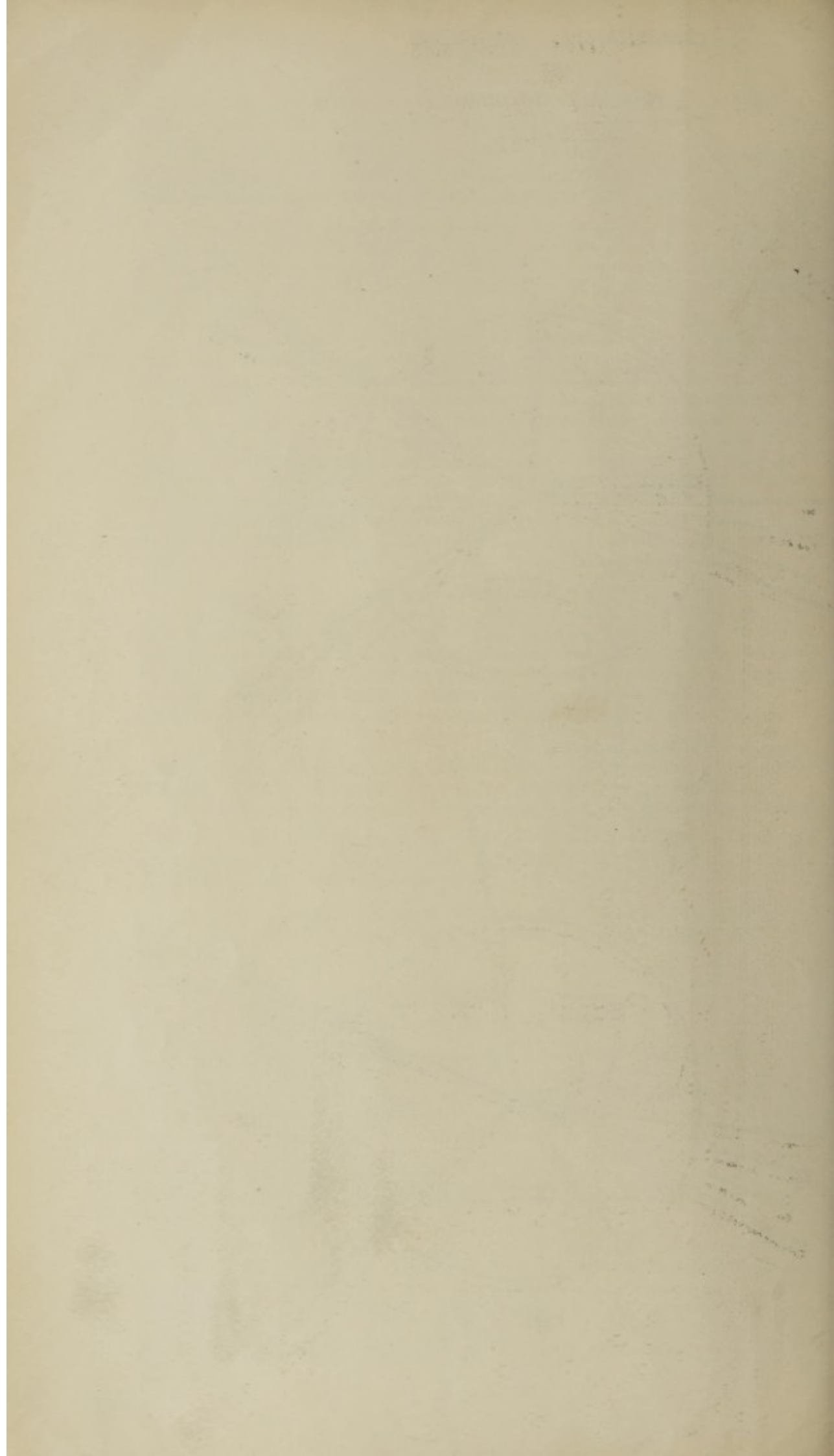
(a) *Mosquito or Insect borne.*

Malaria remains as usual one of the most important diseases to be dealt with and is responsible for a large proportion of illness in Europeans. The number of cases treated in Europeans amounted to 1,232, with one death, and accounted for thirty-five cases of invaliding, as compared with 1,327 cases in 1926, with five deaths and fifteen invalided. Among Africans 13,175 cases presented themselves for treatment and there were 29 deaths. The *Æstivo-Autumnal* type remains the most common form met with and accounted for 92% of the cases in Europeans and 93.6% of the cases in Africans.

Blackwater Fever.—In all, forty-six cases of blackwater fever came under observation, of which thirty-one were amongst Europeans, as against twenty-eight in 1926 and fifteen in non-Europeans, as compared with four cases in 1926. Thirty were reported from the Northern Provinces, fifteen from the Southern Provinces and one from the Cameroons. Of the European cases nine were officials and twenty-two

COMPARATIVE DIAGRAMS OF DISEASE GROUPS 1926 & 1927





non-officials. The European deaths were six (all non-officials) and the non-European three. A full and interesting discussion of thirty-five of these cases appears in the report of the Medical Research Institute, (Appendix A.)

Yellow Fever.—Four cases of yellow fever, two of which were fatal, were reported during the year. All the cases were in non-official Europeans. The usual anti-yellow fever measures have been observed during the year and in Lagos included a strict supervision of all floating craft in the harbour. The Yellow Fever Commission of the Rockefeller Foundation continued its investigations under the direction of Dr. Beeuwkes. It is gratifying to record that definite advances have been made in the knowledge of the disease during the year. With the deepest regret the untimely death of Professor Adrian Stokes, Professor of Pathology at Guy's Hospital, London University, is recalled. It is believed that while carrying out transmission experiments he became accidentally infected with the disease in a virulent form.

Trypanosomiasis.—There were 602 cases during the year as compared with 298 cases in 1926, but this gives no indication as to the prevalence of the disease. Unfortunately there seems to be little doubt but that trypanosomiasis is spreading in parts of the Northern Provinces. The sleeping sickness clinic at Sherifuri has been continued and in addition travelling medical officers have been specially detailed for treatment work. A full report of the work done during the year in investigation, control and treatment will be found in the Report of the Tsetse Investigation (Appendix B.)

Relapsing Fever.—Small outbreaks of relapsing fever were reported in various districts in the Northern Provinces, and in the Ondo province in the South. All the outbreaks were mild in type. No cases were reported among Europeans, but amongst Africans 303 cases were treated in Government hospitals and dispensaries, with six deaths.

Cerebro Spinal Meningitis.—While no real epidemic outbreak occurred, small outbreaks were reported from the Adamawa, Munshi and Kano provinces in the Northern Provinces. Sixty-three cases were treated in hospital, with twenty-nine deaths, as against 142 cases, with ninety-three deaths, in 1926. The actual number of cases that occurred is probably very much greater; all that can be said is that there was no epidemic manifestation of the disease.

Filariasis in its various forms is common. At Bamenda in the Cameroons the Medical Officer estimates that over 50% of all adults under the 2,000 feet altitude harbour microfilariae. These seem to be of all varieties, *M.F. perstans* being the most common, giving rise to transient attacks of fever usually lasting two days. Working in the Mamfe district of the Cameroons Dr. Dyce Sharp has established *Culicoides Austeni* as the vector of the *M.F. perstans*. As usual numbers of cases of guinea-worm and various forms of elephantiasis come to the hospitals for treatment.

Dengue.—Fourteen cases were diagnosed and treated as against twelve in 1926. All but one of the cases occurred in the Northern Provinces.

(b) Infectious Diseases.

Plague.—A full report on plague in Lagos and the mainland will be found in Appendix E, attached to this report. In Lagos the recrudescence which began in the middle of 1926 had begun to subside by the end of the year and during 1927 continued to diminish till the middle of the year. During July, August and September there was a slight increase in the number of cases as would be expected at that period of the year. How far the low incidence in 1927, which resembles that of

Why under
Inoculation

1925, is due to meteorological conditions similar to those in 1925, or is due to the de-ratting campaign begun late in 1926, is not yet clear. On the mainland, the only outbreak of importance was confined to the village of Ogere. Sir Edward Thornton's recommendations have been carried out continuously during the year both in Lagos and the mainland under the special Plague Staff. The progress of de-ratting Lagos has been considerably slower since the gang reached the highly congested parts and it has not been possible to complete the work in 1927 as was anticipated. The number of rodents dissected and examined is brought out in the Report of the Medical Research Institute and the special plague report. On the mainland the deratting of Ijebu Ode town has been completed and the larger outlying towns in the Ijebu Province are now being dealt with. The delivery of the motor fumigating barge *Galen* early in 1927 has greatly improved the facilities available in Lagos for dealing with infected shipping.

Influenza.—In the earlier part of the year a mild outbreak of influenza occurred, 178 cases were reported in Europeans, with no deaths, and 3,471 cases in non-Europeans, with nine deaths.

Enteric Group.—Little is known of the prevalence of the diseases of this group in Nigeria. Although reported for many years, cases have only been met with sporadically. There were eleven in Europeans with no deaths as against ten cases with three deaths in 1926, and seventeen cases in Africans with four deaths as compared with twelve cases and eight deaths in 1926.

Dysentery.—As will be seen from the following figures the number of cases of dysentery treated in Europeans and Africans shows an increase when compared with 1926, the percentage increase being rather larger in the case of Europeans. The increase in the number of cases of abscess of the liver is noteworthy.

			EUROPEAN.		AFRICAN.	
			1926.	1927.	1926.	1927.
Amoebic	Cases ...	...	95	122	2,254	2,614
	Deaths ...	...	—	—	102	120
Bacillary	Cases ...	...	6	3	39	240
	Deaths ...	...	—	—	4	21
Undefined	Cases ...	...	7	5	704	348
	Deaths ...	...	—	—	20	18
Abscess of Liver	Cases ...	...	1	13	55	102
	Deaths ...	...	—	1	5	6

Smallpox.—Smallpox has been prevalent during the year in the Northern Provinces, outbreaks being reported from Kano, Zaria, Plateau, Bauchi, Yola and Kabba Provinces. Preventive vaccination kept the disease in check in the settled townships, but in the vast outside areas vaccination could only be attempted where Medical Officers and vaccinators were available. Even where such were available, the apathy and indifference of the people limited the extent to which vaccination could be applied. A special vaccination campaign, under a Medical Officer, has been started in the Plateau Province, and it is hoped that with the assistance of Administrative Officers the natural prejudices of these isolated tribes will be overcome and vaccination thereby become more general in the north.

In the Southern Provinces a number of cases occurred in Lagos, but the outbreak never got a real hold as the Lagos population has the protection of vaccination. Small outbreaks also occurred in the provinces of Abeokuta, Ondo, Oyo and at Buea in the Cameroons, but were soon under control. Figures as to the number of vaccinations performed are given under Sanitation.

There were thirteen cases amongst Europeans, with one death. A second case had recovered from smallpox but died from blackwater fever supervening.

Venereal Diseases.—These diseases still remain common throughout both the Northern and Southern Provinces. The consensus of opinion of the medical officers is that gonorrhœa is more common than is usually realised, while the incidence of syphilis has been exaggerated. Under present conditions it is impossible to do more than guess. The serious nature of venereal disease is not appreciated by the African and as a consequence the cases are usually seen in the advanced stages.

Yaws.—This disease is extremely common in the Eastern area of the Southern Provinces and in the Cameroons below the 4,000 feet altitude. As one Medical Officer from that area reports: "It is rare to meet a person who has not had it". It would appear to be responsible for a large proportion of the disabilities so noticeable amongst the middle aged and aged inhabitants. The spectacular results obtained from N.A.B. and other preparations of organic arsenic have made the treatment popular and the numbers attending for treatment steadily increases.

Leprosy.—The problem of leprosy in Nigeria is a very large and a very difficult one. There are a number of voluntary settlements, but most of these are of doubtful value and such provision as they afford affects only a few hundred lepers in an advanced state of the disease. It has been estimated that there are 32,000 lepers in the Northern Provinces and the number in the Southern Provinces, though not known, is probably greater. In 1925 a branch of the Empire Leprosy Relief Association was formed, but owing to the difficulty of getting a suitable Medical Secretary the branch had not commenced to function in 1927. A Secretary has now been appointed and is pursuing a preliminary study of the work done for lepers in India. A change in the attitude of those affected is distinctly apparent in the Southern Provinces; this is partly due to the fact that they appreciate that when they come for treatment they are not confined in "Leper Prisons," the name given by them to Leper Asylums and Settlements, and also because the success of the treatment of yaws by injections has engendered the hope that injections may also cure leprosy.

At Itu and Port Harcourt in the Southern Provinces, lepers presented themselves in such numbers that immediate action had to be taken. At Itu land has been acquired and a camp and treatment centre erected. The work is being carried out by the United Free Church Mission, who provide the necessary staff at the expense of Government. There were 833 lepers under treatment at this camp. Similar measures are under consideration for dealing with lepers at Port Harcourt, where they number about 500. Moogrol injections and lately intravenous injections of Ethyl Hydriocarpate have been used. Some medical officers report good results from treatment by protein shock, but the number so treated is not sufficient to warrant more than a further trial of this method.

Tuberculosis.—806 cases were treated, with seventeen deaths, as against 785 cases with 124 deaths in 1926. The number of cases treated does not give a reliable idea of the incidence amongst Africans, as many cases not recorded in the returns are seen in the villages on tour and the natives do not seek treatment readily for this disease. The pulmonary form is the most common.

(c) *Helminthic Diseases.*

Ankylostomiasis.—This disease is undoubtedly common but the reports of its incidence vary widely. The most probable reason for this is that frequently the disturbance of health caused by the infection is insufficient to cause the individual to attend for treatment and the infection is only discovered in the course of routine examination when admitted for some other disease. Treatment is given at all dispensaries when the infection is discovered. At some of the plantations in the Cameroons arrangements have been made for mass treatment of their labourers annually and where possible twice annually.

Ascaris is perhaps the commonest intestinal parasite, the incidence of the infection seems practically universal. Though it does not usually cause very severe symptoms except an occasional case of obstruction, yet it is responsible for a considerable amount of mild bowel complaints, especially amongst children. One medical officer reports as many as forty ascarides removed from a child of three years old.

Cestoda.—Tapeworm is chiefly reported from the Northern Provinces; 4,577 cases were treated during 1927, as against 3,338 cases with one death in 1926.

B.—VITAL STATISTICS.

(1) GENERAL AFRICAN POPULATION.

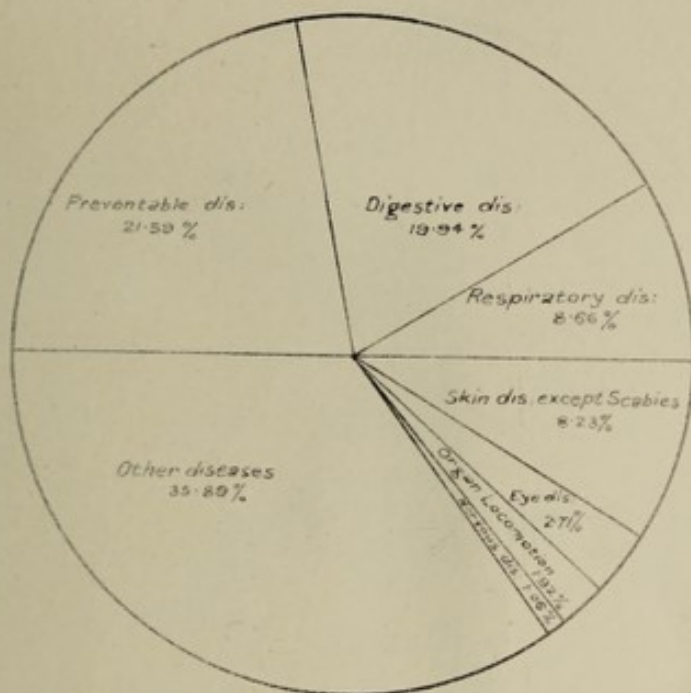
The estimated population for Nigeria, including the Mandated area of the Cameroons, is 18,760,490. It is not possible under present conditions to give, even approximately, figures of births and deaths or any indication of the infant mortality rates. Owing to the comparative absence of serious epidemics, the general health of Nigeria as a whole might be said to be probably better than in previous years. Registration is only compulsory in Lagos and Ebute Metta and the following table gives a summary of the Vital Statistics for that area.

SUMMARY OF VITAL STATISTICS FOR LAGOS AND EBUTE METTA
FOR THE YEAR 1927.

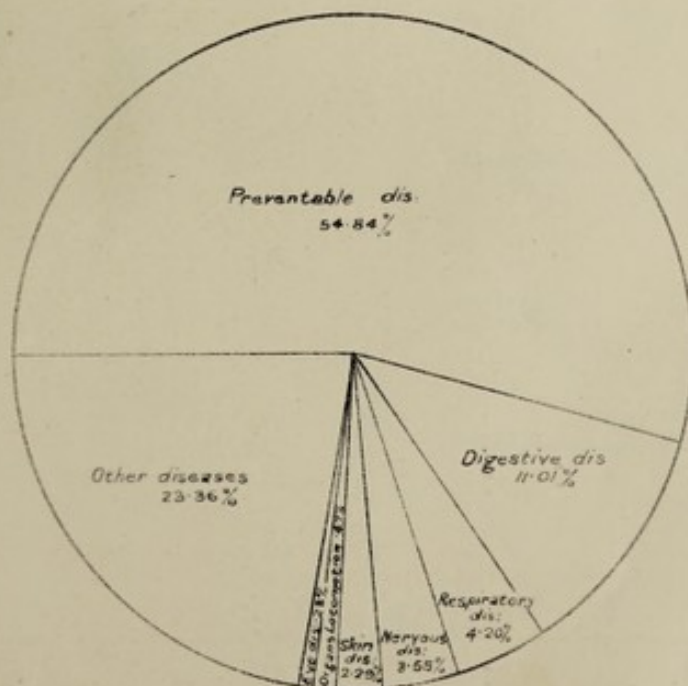
	1927.		
	Lagos.	Ebute Metta.	Total.
Estimated Population (Lagos and Ebute Metta)	—	—	114,500
Total Births	2,739	571	3,310
Birth Rate per 1,000 Population	—	—	28·9
Total Deaths	1,839	483	2,322
Death Rate per 1,000 Population	—	—	20·2
Deaths—Causation of—Certified by Medical Practitioners—number	1,722	108	1,830
Deaths—Causation of—Certified by Medical Practitioners—per cent.	—	—	78·8
Deaths—Infants under one year	419	160	579
Infantile Mortality per 1,000 births	—	—	174·9
Deaths under one year Certified by Medical Practitioners—number	307	18	325
Deaths under one year Certified by Medical Practitioners—per cent.	—	—	13·9
Deaths—Children under five years	592	223	815
Percentage of deaths of Children under five years to total deaths	—	—	35·09
Total Stillbirths	81	26	107
Stillbirths—proportion per cent. of the total Births Normal and Stillbirths	—	—	3·2
Deaths uncertified by Medical Practitioners—number	117	375	492
Deaths uncertified by Medical Practitioners—per cent.	—	—	21·2

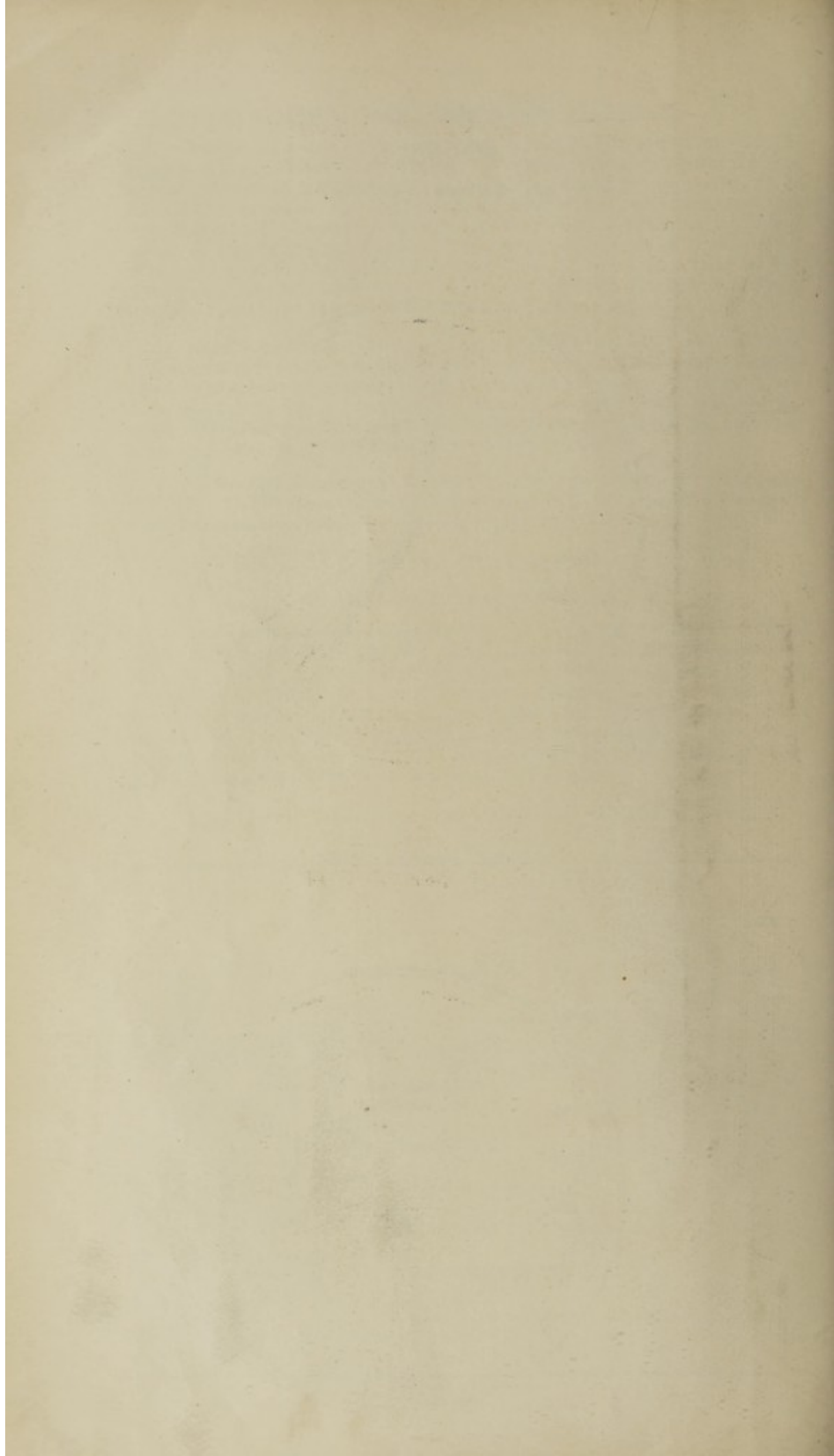
GENERAL SYSTEMIC AND PREVENTABLE DISEASES

Total Cases 307150



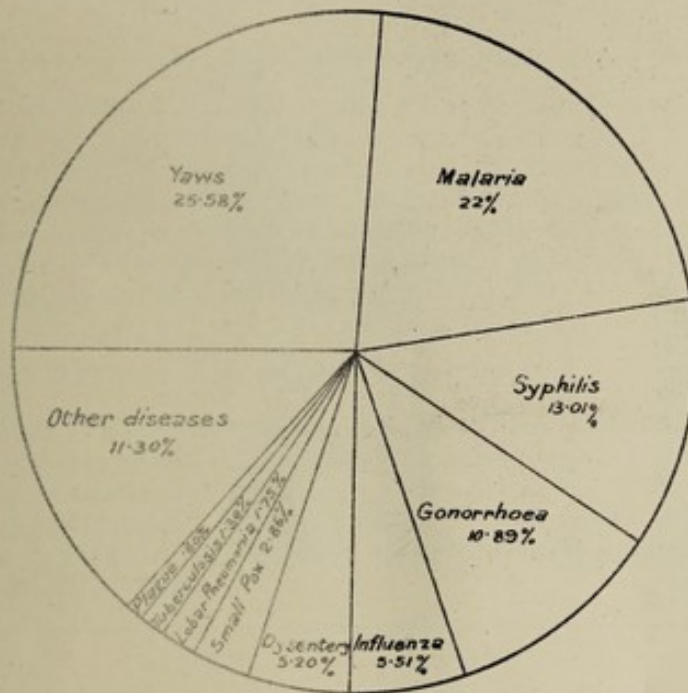
Total Deaths 2144



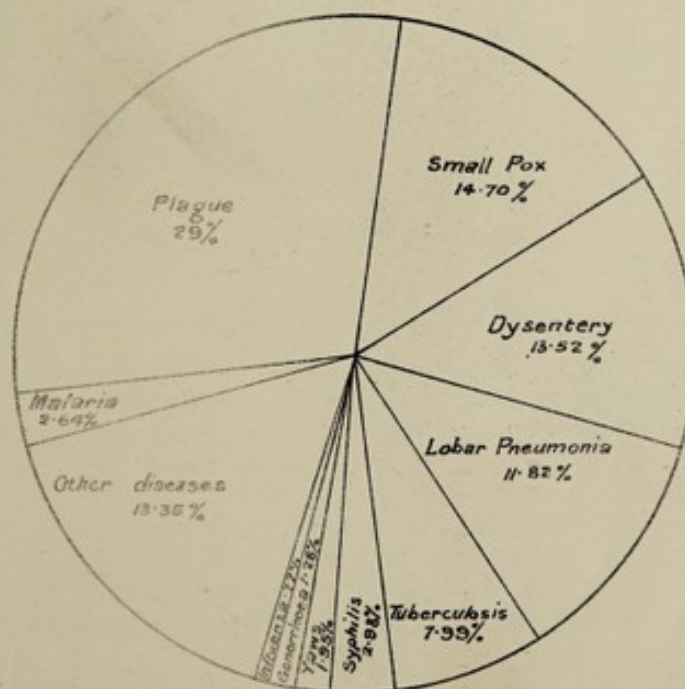


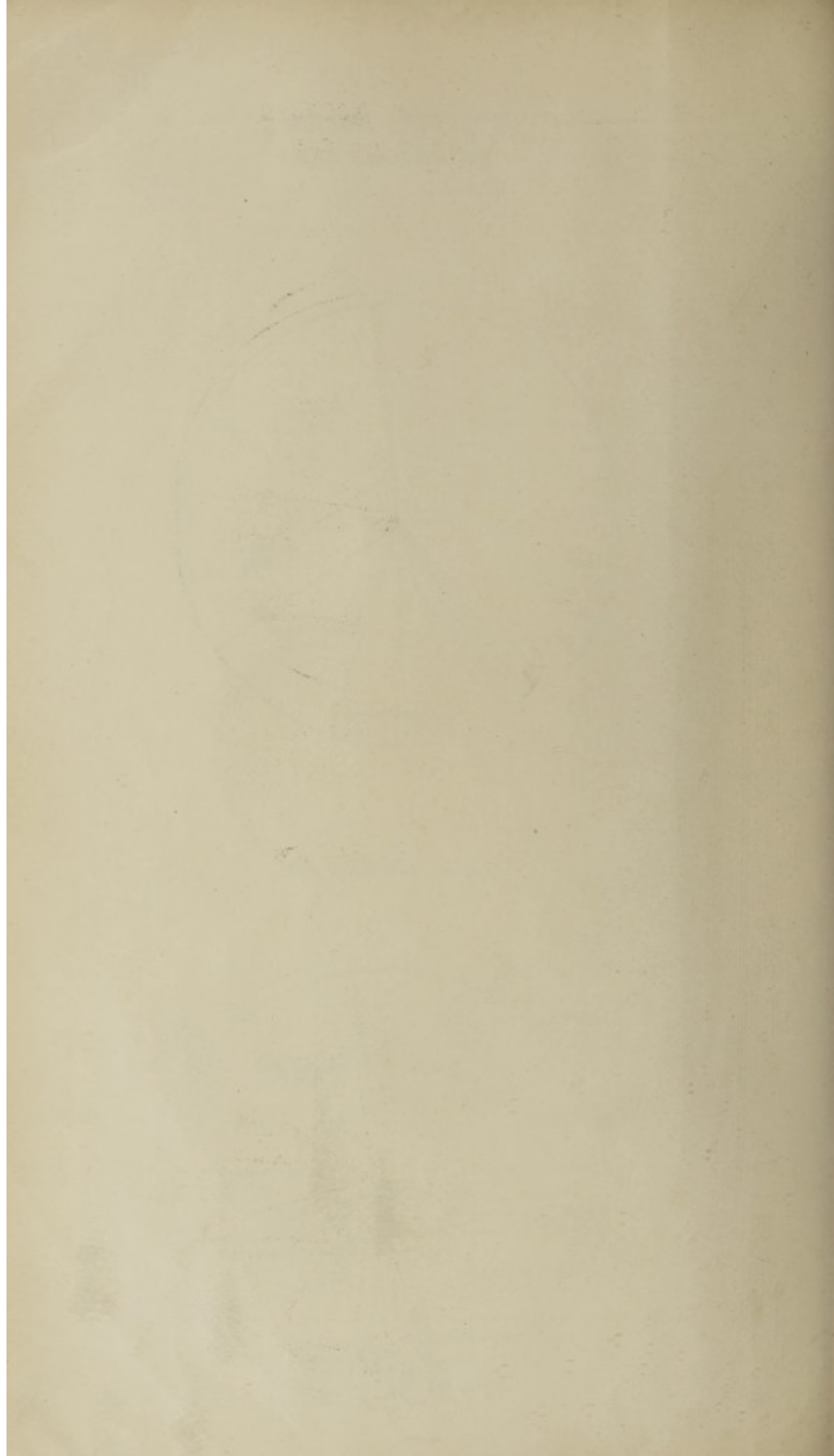
INFECTIVE DISEASES

Total Incidence 66317



Total Deaths 1176





The Registration of Births and Deaths in Lagos and Ebute Metta has been in operation since 1st August, 1867. Since 1909 there has been a gradual decline in the birth, death and infant mortality rates as the following figures show :—

Year.	Total Births.	Birth Rate.	Total Deaths.	Death Rate.	Infant Mortality.
1909	2,576	42.4	2,259	37.2	315
1919	2,517	30.2	2,256	27.0	296
1927	3,305	28.9	2,312	20.2	174.9

It is difficult to explain the fall in the average rates except it be that there has been a miscalculation of population in addition to slightly improved general health. It cannot be said that the conditions under which the people on Lagos Island live have improved to any great extent, if at all. While it is possible that there may be evasion of registration of births and infantile deaths, generally speaking it would be extremely difficult to evade registration of a death.

(2) GENERAL EUROPEAN POPULATION.

It is impossible to give accurate figures as to the total European population, but the figures given in the following table, which have been compiled from returns received from the Secretariat and the Police, can be considered as approximately correct and are of interest in showing the steady increase in population, the most noticeable being that of the official males and unofficial females :

	Official.		Unofficial.		Totals.
	Males.	Females.	Males.	Females.	
1925.					
Average monthly population ...	1,671	23	1,510	487	...
Remaining on 31/12/25 ...	1,968	31	1,474	577	4,050
Deaths during 1925 ...	17	...	27	4	48
1926					
Average monthly population ...	2,156	31	1,506	619	...
Remaining on 31/12/26 ...	2,377	33	1,715	708	4,833
Deaths during 1926 ...	15	...	22	5	42
1927					
Average monthly population ...	2,664	34	1,483	724	...
Remaining on 31/12/27 ...	3,017	40	1,582	854	5,493
Deaths during 1927 ...	14	...	23	3	40

Improved housing conditions have added considerably to the comfort and contributed to the improved health of officers. New types of bungalows were designed on the enquiry and advice of a Housing Committee appointed by the Governor and a large number of houses of these new types are now in use. Local leave presents many difficulties of arrangement and there is no evidence to show whether benefit accrues or not. Improved transport facilities eliminating many of the former hardships of travel may be considered as a factor making for improved health. No data are available on which to base any opinion as to the

influence of season on the incidence of disease, but it is generally held that the periods of change between the seasons are those in which sickness most readily occurs.

Statistics regarding the unofficial European population being incomplete, it is not possible to prepare a table showing sick, invaliding and death rates. The above figures, however, would appear to indicate that the health record was at any rate not any worse than previous years.

The invalidings of unofficial Europeans recorded in Government returns amounted to seventy-eight, the causes given being: Malaria thirteen, blackwater fever four, yellow fever two, anæmia four, debility four, neurasthenia six, dysentery two, abscess of liver one, colitis one, enteritis one, paratyphoid one, myocarditis six, cellulitis six, fracture five, dislocation one, appendicitis one, intestinal obstruction one, syphilis one, gonorrhœa one, cystitis two, renal calculus one, pyelitis one, pyonephritis one, tuberculosis three, iritis one, phlebitis one, insanity two, dog bite one, miscarriage one, amenorrhœa one, pyorrhœa one, P.U.O. one.

The deaths of unofficial Europeans as given by the Registrar amounted to twenty-six, the causes given being: Malaria A.A. one, blackwater fever six, fibrosis of lungs one, smallpox one, myocarditis one, hyperpyrexia one, wounds by firearm one, puerperal septicæmia one, embolism one, yellow fever two, drowning two, influenza one, abscess of liver one, alcoholism one, V.D. heart one, appendicitis one, septicæmia one, hæmorrhage and shock one, gastro enteritis one.

(3) EUROPEAN OFFICIALS.

The invalidings for 1927 show an increase of fifty over the figure for 1926. As against this, however, must be set the increase of 523 in the total number resident during the year.

TABLE OF INVALIDINGS ACCORDING TO LENGTH OF RESIDENCE.

Leave conditions.	Under 6 months.	Under 9 months.	Under 12 months.	Under 15 months.	Under 18 months.	Over 18 months.	Total.	Strength of European Government Officers.
New Regulations	18	21	14	35	47	...	135	1,892
Old Regulations	1	3	7	4	...	...	15	465
Totals ...	19	24	21	39	47	...	150	2,357

Not included in the above figures are thirty-nine officers whose health was such that they were recommended to see the Medical Adviser to the Colonial Office. Four of these had not completed their tour.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES OF EUROPEAN OFFICIALS FOR 1925, 1926, 1927.

	1925.	1926.	1927.
Total number resident ...	2,221	2,526	3,049
Average number resident ...	1,466	1,776	1,752
Total number on sick list ...	1,518	1,587	1,509
Total number of days on sick list ...	14,776	15,487	14,884
Average daily sick ...	40.46	42.43	40.78
Percentage of daily sick to average number resident ...	2.76	2.38	2.33
Average number of days on sick list to each patient ...	9.73	9.76	9.86
Average sick time to each resident ...	6.65	8.72	8.50
Total number invalided ...	129	100	150
Percentage of invalided to number resident ...	5.81	3.96	4.92
Percentage of invalided to average number resident ...	8.80	5.63	8.56
Total deaths ...	18	15	14
Percentage of deaths to number resident ...	.81	.59	.46
Percentage of deaths to average number resident ...	1.23	.84	.80

SUMMARY OF THE CAUSES OF INVALIDINGS AND DEATHS OF
EUROPEAN OFFICIALS, 1927.

Disease.	Invalidings.	Deaths.
Malaria	22	—
Blackwater Fever	7	—
Influenza	1	—
Dysentery	2	—
Tuberculosis Lungs	6	1
Cancer Stomach	—	1
Cancer Rectum	1	—
Malignant Abdominal Disease	1	—
Cancer Mouth	1	—
Rheumatism	6	—
Anæmia	7	—
Diseases of Spleen	1	1
Alcoholism	—	1
Pyæmia	1	—
Acute Anterior Poliomyelitis	1	—
Paralysis	1	—
Mental Alienation	2	—
Neurasthenia	23	—
Other disease of the eye	2	—
Otitis Media	2	—
Valvular disease of the Heart	2	—
Myocarditis	1	—
Dilatation Heart	1	—
Arterio-Sclerosis	1	—
Bronchitis	2	—
Pyorrhœa	1	—
Tonsillitis	1	—
Pharyngitis	1	—
Gastric Ulcer	2	—
Duodenal Ulcer	2	1
Gastritis	7	—
Dyspepsia	2	—
Diarrhœa	3	—
Enteritis	1	1
Appendicitis	5	—
Hepatitis	1	—
Cholecystitis	1	—
Jaundice	1	—
Acute Pancreatitis	—	1
Septic Peritonitis	—	1
Nephritis	1	—
Renal Colic... ..	2	—
Prostatitis	1	—
Boils	1	—
Carbuncle	1	—
Cellulitis	2	—
Arthritis	2	—
Suicide by fire-arm	—	1
Suffocation (Accidental)	—	1
Drowning	—	1
Gunshot Wound	1	—
Wounds (Railway Accident)	1	—
Dog bite	3	—
Fracture Skull	—	2
General Injuries	—	1
Asthenia	5	—
Hyperpyrexia	1	—
Tropical Debility	4	—
Insomnia	1	—
N.Y.D	2	—
Total	150	14

Malaria, blackwater fever and neurasthenia account for a large proportion of the invalidings, but none of the deaths can be classified as purely due to residence in West Africa.

(4) AFRICAN OFFICIALS.

The health of African Officials as indicated by invalidings and deaths was not so good as the previous two years though the number of days lost through illness shows a slight reduction. Out of a total of forty deaths no fewer than twelve were due to pneumonia.

The causes of invalidings were chiefly those associated with advancing years.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES
OF AFRICAN OFFICIALS.

	1925.	1926.	1927.
Total number resident	3,020	3,457	3,425
Average number resident	2,790	3,169	3,418
Total number on sick list	3,156	2,993	3,006
Total number of days on sick list	26,881	18,389	18,033
Average daily sick	73.6	50.3	49.4
Percentage of daily sick to average number resident	2.6	1.5	.23
Average number of days to each patient	8.5	6.1	5
Average sick time to each resident	8.9	5.3	5
Total number invalided... ..	41	52	63
Percentage of invalided to number resident	1.35	1.5	1.8
Percentage of invalided to average number resident	1.47	1.6	1.8
Total deaths	39	28	40
Percentage of deaths to number resident	1.29	.80	1.1
Percentage of deaths to average number resident	1.39	.88	1.1

SUMMARY OF THE CAUSES OF INVALIDINGS AND DEATHS.

Disease.	Invalidings.	Deaths.
Anæmia	1	—
Arterio-Sclerosis... ..	1	—
Arthritis	3	—
Blindness	3	—
Carcinoma of Liver	—	1
Cerebral Softening	2	—
Chronic valvular disease of the heart	2	—
Chronic disease of the eye	4	—
Chronic Bronchiectasis	1	—
Chronic Osteo-Periostitis	1	—
Delusions	2	—
Diabetes	1	—
Dysentery	—	2
Fatty Degeneration of the heart	1	—
Foreign body in the throat	—	1
General Debility	2	—
Heart Diseases	3	—
Hemiplegia	2	—
Hepatitis	—	1
Influenza	—	1
Intestinal Colic and Collapse	—	1
Intestinal Obstruction	—	1
Jaundice	—	1
Leprosy	1	—
Malarial Fever	—	1
Myocardial Degeneration	5	1
Mitral Disease	2	1
Nephritis	3	1
Neurasthenia	6	—
Neuritis	1	—
Paralysis	1	—
Peritonitis	—	1
Phthisis	—	3
Pleurisy	—	1
Pneumonia	—	12
Rheumatism	2	—
Senility	2	—
Septicæmic Plague	—	1
Stricture	—	1
Syphilis	—	2
Tuberculosis of the lungs	9	3
Tubercular disease of the ankle joint	1	—
Tumour Abdominal	1	—
Variola	—	3
Total	63	40

(5) SOLDIERS—NIGERIA REGIMENT, W.A.F.F.

The following figures show the health of the rank and file of the West African Frontier Force for 1927.

Average daily strength ...	...	3,212
Total number on sick list ...	...	5,427
Total number of days on sick list ...	...	24,339
Average daily sick ...	...	66
Total number of deaths ...	...	23
Death rate per thousand ...	...	7.1

(6)—POLICE FORCE.

The following figures show the health of the rank and file of the Police Force in Nigeria for 1927.

	Northern.	Southern.
Average daily strength ...	1,202	2,212
Total number on sick list ...	646	2,817
Total number of days on sick list ...	5,295	13,355
Average daily sick ...	14	36
Total number of deaths ...	17	25
Death rate per thousand ...	14.1	11.3

The above figures show a decrease in the average daily sick, total number of deaths and death rate per thousand as compared with 1926 in both soldiers and police, but comparison between them is not possible, for it must be borne in mind that troops are always directly under a Medical Officer, whereas police are in many cases posted where there is no Medical Officer. This makes the incidence of cases treated higher amongst soldiers than among police.

III.—HYGIENE AND SANITATION.

A.—GENERAL REVIEW OF WORK DONE AND PROGRESS MADE.

I.—PREVENTIVE MEASURES.

(1) MOSQUITO AND INSECT-BORNE DISEASES.

(a) *Malaria*.—The usual measures to prevent the breeding of mosquitoes have been carried out in all stations during the year.

In Lagos special work was carried out in an attempt to reduce mosquito breeding in the low-lying swamps of Ikoyi and Apapa.

Many of these swamps are tidal; some are not more than eighteen inches above low-water level and can only be effectively dealt with by general raising of the areas by reclamation.

With the assistance of the Public Works Department a preliminary survey of the swamps was made in order to estimate to what extent drainage could reduce the area suitable for mosquito breeding. The Medical Officer of Health is now carrying out what drainage is possible by means of contour and herring-bone drains, and such reclaiming of small swamps and isolated pools as can be done with sand by head loads. It is hoped by these means to reduce to a certain extent mosquito breeding until such time as effective reclamation by pumping can be carried out.

In order to estimate to what extent malaria prevails among school children in Lagos a survey was made and the children examined for

splenic enlargement. The Medical Officer of Health, Lagos, in his report gives the percentage of children infected as varying from .9% to 25.6% according to the school and points out that schools situated in those parts of Lagos where water is liable to collect and give rise to mosquito breeding, gave the higher percentages of infection.

At Maidugari, the headquarters of the Province of Bornu in the Northern Provinces, a considerable amount of work has been done in digging earth drains through the large low-lying swamp area in the neighbourhood of the Government station. During the rains this area is a persistent mosquito breeding ground.

(b) *Trypanosomiasis*.—Special work in the treatment of Trypanosomiasis and for dealing with certain "fly" infested areas is being carried out by the Tsetse Fly Investigation Branch of the Medical Department, with headquarters at Sherifuri in Bauchi Province.

Most of the cases reported have occurred in the Northern Provinces, particularly Azare and Sherifuri and Matyoro Lakes. An outbreak reported from Rano, about forty miles from Kano, was investigated by one of the Tsetse Fly Investigation staff and about fifty cases reported.

Owing to the prevalence of tsetse fly in certain parts of Kaduna, the Government headquarters, Northern Provinces, funds were provided to clear the dense bush from certain parts of the banks of the Kaduna river and its tributaries. The Senior Sanitary Officer reports that the clearing has been fairly successful in reducing the numbers of tsetse fly.

(c) *Yellow Fever*.—During the year only four cases of Yellow Fever were reported. All were Europeans.

- (1) A fatal case occurred in Lagos in January.
- (2) A non-fatal case was reported from Badagry in May. This case was removed to Lagos Hospital for treatment.
- (3) A non-fatal case occurred in Lagos in September.
- (4) The fatal case of Dr. Adrian Stokes occurred at Yaba (Lagos) in September.

In addition to the ordinary anti-mosquito work carried out daily by the Sanitary Inspector staff, six African Sanitary Inspectors were detailed by the Medical Officer of Health, Lagos, to make special inspections for mosquito breeding places in that area of Lagos extending from Five Cowrie Creek along the southern part of the island to the end of Alakoro Marina. Past records show that in this area, which is about 600 yards wide, and on floating craft in the lagoon the majority of cases of yellow fever have occurred. There is also a very strict supervision of all craft in Lagos Harbour and Lagoon by staff working under the direction of the Port Medical Officer of Health. The disinfection of vessels and craft in the Harbour and Lagoon of Lagos has been greatly facilitated and improved since the arrival of the Clayton motor disinfecting barge *Galen*. This motor barge was delivered in Lagos in February, 1927, and was regularly engaged in the disinfecting of shipping until the gas pipes, owing to corrosion and consequent loss of flexibility, became useless. A new set of pipes are however being obtained from England.

Full particulars of the Port and Harbour sanitary activities at Lagos are contained in the report of the Medical Officer of Health, Port of Lagos, which is attached as Appendix H.

As the wells in Lagos are not only polluted but also provide breeding places for mosquitoes, the Medical Officer of Health took steps to close down the worst wells and others have been stocked with fish.

TABLE SHOWING INCIDENCE OF YELLOW FEVER IN NIGERIA FROM
1914-1927.

- 1914—One fatal case at Jebba.
- 1915—One fatal case at Kaduna.
- 1916—One fatal case at Lagos.
- 1917—Four cases were reported in the Southern Provinces and several were stated to have occurred along the River Benue.
- 1918—Two cases at Forcados and Benin.
- 1919—One fatal case at Warri.
- 1920—One fatal case at Lagos.
- 1921—Nil.
- 1922—Two cases at Warri.
- 1923—None reported.
- 1924—Three isolated cases.
- 1925—Twenty-one cases.
- 1926—Eleven cases.
- 1927—Four cases.

During the year outbreaks of yellow fever were reported from the following places outside Nigeria: Gold Coast, Senegal, Monrovia, Togo (French) Dahomey, Ivory Coast.

(d) *Filariasis* occurs in Africans in many parts of Nigeria. The Senior Sanitary Officer, Northern Provinces, reports it as prevalent among the pagans in Kabba Province. It is also reported that cases come for treatment to the Medical Officer, Ibi, from Bafun in the Cameroons, and cases have been reported from Ilorin Province.

In the Southern Provinces it is prevalent particularly in the coastal belt.

(2) EPIDEMIC DISEASES.

(a) *Plague*.—A full report by the Senior Sanitary Officer in charge of Plague in Nigeria during 1927 and the measures taken during the year to carry out the recommendations of Sir Edward Thornton, is attached as Appendix E.

The special staff recommended by Sir Edward Thornton arrived in November and December, 1926.

This staff consisted of two R.A.M.C. majors, two R.A.M.C. captains, with thirty non-commissioned officers and privates as rodent inspectors. In addition to these two Medical Officers, W.A.M.S., and several European Sanitary Inspectors were also employed. As practically all the staff had no previous experience of plague the organisation of the anti-plague measures was a task of some magnitude.

The monthly expenditure at first amounted to about £4,000 and as temporary clerks employed had little previous experience, very strict supervision was necessary to ensure accurate records of the details of expenditure.

During the whole year (1927) the special measures advocated by Sir E. N. Thornton in his report have been vigorously applied, but it has not been found possible to de-rat Lagos in the period of under twelve months as suggested by Sir Edward Thornton in paragraph 352 of his report. The delay has been due to the densely congested state of the greater part of the town on the western half of Lagos Island.

In Lagos the gangs engaged in rat destruction commenced operations in the eastern and less congested section of the island. In this area progress was fairly rapid. Advancing westwards, towards the middle of the year, they had reached that part of the town where both

the population and the site congestion were very much greater. On account of this congestion the progress of the deratting gangs was very considerably slowed. Early in the progress of deratting it was found that in addition to the elimination of rat runs and holes it was absolutely necessary to deal, at the same time, with certain other constructional features in the houses—bamboo linings of wall and grass roofs which provided ideal protection for rats and facilitated reinfestation. These defects have been removed as far as practicable and although reinfestation of houses already dealt with by the rat destruction gangs has taken place, yet these minor housing improvements have made it more difficult for the rat to find cover and have made recleansing easier and more certain.

On the mainland in Ijebu Province most of the villages in which plague had occurred, including the town of Ijebu Ode, were deratted during the year. In order to keep the sanitary state of the larger villages satisfactory the general sanitary supervision of all villages over 2,000 inhabitants was instituted. Towards the end of the year there were indications that plague infection in rats was spreading towards Abeokuta. Ultimately infected rats were found in Abeokuta town and a small outbreak in human beings occurred in the southern part of Abeokuta Province. The energies of the Plague Staff are now being directed towards these areas.

In Lagos during the year 155 cases of plague were reported and of these 151 died. The majority of the cases, namely, 126 occurred during the months of January, February, March, September, October, November and December. Only twenty-nine occurred during the period April to August.

On the mainland 242 cases of plague were reported, of which 190 died.

(b) *Smallpox, including Vaccination.*—Smallpox is endemic in Nigeria, particularly in the Northern Provinces. During the early months of the year it was epidemic in the Plateau, Bauchi and Kano Provinces, and was particularly severe among the pagan tribes in these provinces. Smaller but considerable outbreaks occurred in Yola, Zaria, Bornu, Ilorin, Kabba and other provinces.

In the Southern Provinces small outbreaks were reported in the provinces of Abeokuta and Oyo, and at Ossidinge and Buea in the Cameroon Mandated Territory.

During the year 34 cases occurred in Lagos.

Nowhere in the Southern Provinces did the smallpox outbreaks become so extensive as they did in the Northern Provinces.

The principal reasons for this are delayed notification of early cases, particularly in the larger towns under Native Administration, and in consequence the disease has usually got well spread in the community before action can be taken. Vaccination is not compulsory in the Northern Provinces and except in the presence of a severe outbreak the people do not readily come up for vaccination.

Owing to the extensive outbreaks of smallpox in Plateau Province a Medical Officer was lent to the sanitary branch to carry out vaccination among the pagan tribes in that province. This officer started work in November with headquarters at Bukuru, and it was arranged with the Resident that a Political Officer would, when available, accompany the vaccinating Medical Officer for the first few days in each new district till the vaccination got started. It is hoped that by this arrangement the natural timidity of these simple people will to a certain extent be overcome. So far the vaccination campaign has been progressing satisfactorily and from the time of starting operations in November to the 31st December, about 1½ months, 5,210 vaccinations were performed.

When most of the pagans in Plateau Province have been vaccinated it is proposed to continue the campaign into the neighbouring province of Bauchi where smallpox has been epidemic during the year.

Lanolinated lymph prepared by the Lister Institute has been imported and used during the year.

VACCINATIONS.

SOUTHERN PROVINCES.

	1925.	1926.	1927.
Total vaccinated ...	285,763	330,209	296,988
Number inspected ...	236,614	273,792	235,172
Number successful ...	186,561	216,610	185,218
Percentage successful of those inspected ...	78%	75.4%	78.7%

NORTHERN PROVINCES.

	1925.	1926.	1927.
Total vaccinated ...	45,063	39,367	107,146
Number inspected ...	31,477	25,281	62,271
Number successful ...	26,267	20,109	49,058
Percentage successful of those inspected ...	83.4%	79.5%	78.7%

(c) *Cholera*.—This disease has not yet been reported in Nigeria.

(d) *Dysentery*.—During the year a total of 702 cases, with 99 deaths, was reported; 236 of the cases occurred in the Southern Provinces and 466 in the Northern Provinces, the majority being from Kano and Katsina.

Most of the cases were reported during the rainy months of June, July and August.

During the period June to September, seventy-three cases of dysentery occurred in the Lagos and Ikoyi prisons, of these eight died.

This outbreak occurred during a period when there was a great shortage of yams. At the same time there was an increase of dysentery in the general population of the town, particularly among the Yorubas, whose staple diet is yams.

The outbreak was investigated and in the opinion of the medical investigators the outbreak was attributed to the substitution of rice for yams during this period. The organism found was *bacillus dysenteriae*.

(e) *Enteric*.—Sixteen cases were reported during the year from medical stations in Southern Provinces, of these seven were reported from Cameroon stations. Four of the cases proved fatal.

(f) *Tuberculosis*.—Fifty-two cases with twelve deaths were reported from Northern Provinces.

The deaths from tuberculosis registered at Lagos totalled 160, of which 139 were medically certified.

The following table gives the deaths in Lagos medically certified as due to tuberculosis from 1923 to 1927.

TUBERCULOSIS IN LAGOS (CERTIFIED DEATHS).

	1923.	1924.	1925.	1926.	1927.
Pulmonary Tuberculosis ...	85	69	72	82	99
Tuberculosis, other parts ...	6	23	10	23	40
Total ...	91	92	82	105	139

(g) *Relapsing Fever*.—There was no very serious outbreak of relapsing fever during the year. A total of 264 cases, with forty-three deaths, were reported; 205 of these cases occurred in Northern Provinces and were reported mainly from Makurdi area, Bornu and Plateau Provinces. All the cases (fifty-nine) reported from Southern Provinces occurred in Ondo Province. This is the province in which a considerable outbreak occurred in 1925 and continued into 1926.

Routine measures of destruction of lice and bugs are carried out as a preventive measures at most of the Government and Native Administration prisons. Treatment with Neo Salvarsan is carried out.

(h) *Cerebro-Spinal Fever*.—There was no serious outbreak during the year. Sixty-five cases, with fifty-three deaths, were reported from Northern Provinces and five cases, with one death, from Southern Provinces.

The majority of the cases in the Northern Provinces occurred in Kano, Ibi and Minna. Sporadic cases occurred at Jos, Kontagora, Yola, Maidugari and Gusau.

The table below gives the number of cases of yellow fever, plague and smallpox which have been reported in Nigeria during the years 1925, 1926 and 1927.

						Yellow Fever.	Plague.	Smallpox.
1925	...	...	...	...	...	21	671	1,932
1926	...	...	...	...	...	11	1,330	847
1927	...	...	...	...	...	4	397	4,483

(3) HELMINTHIC DISEASES.

Ankylostomiasis.—Infection with ankylostomes is common all over the country particularly in the more northern and drier parts.

The Senior Sanitary Officer, Northern Provinces, states that the Medical Officer of Health, Kano, reports that 60% of the people are infected with ankylostomes, and one of the principle sources of infection is the use of cesspits (salgas) as latrines, the soil round which gets contaminated.

In many parts the bush is the common public latrine.

Tæniasis is very prevalent particularly among the Hausa speaking tribes in Northern Provinces, due mainly to the custom of eating meat insufficiently cooked.

Schistosomiasis.—The Medical Officer, Katsina, reports that this disease is endemic in Kankeya and Jibiya. The Medical Officer of Health, Kano, states that this infection is very common among the children in Kano City, but that it is rarely fatal. Cases have also been reported from Minna and Lokoja.

Guinea-worm is very prevalent in certain parts of the Northern Provinces.

It is also reported as prevalent at Abakaliki and occurs in other parts of Southern Provinces.

II.—GENERAL MEASURES OF SANITATION.

As mentioned in previous reports the general methods of sewage disposal in native villages and towns are primitive.

In the townships the pail system is used.

In Lagos, which is a first-class township, public pail latrines are provided. The pails are removed by labourers at night to depots where they are placed on a tramway and taken out to Wilmot Point on the east side of the entrance to Lagos Harbour and emptied into the lagoon in the early hours of the morning. Normally with ebb tide the pail contents get carried out to sea, but if the flood tide is running at the time of emptying considerable quantities of faecal matter are carried back into the lagoon and up Five Cowrie Creek. Both the public latrines and the system of disposal of the sewage in Lagos are unsatisfactory. It is under consideration, however, to install a water-borne sewage system concurrently with the Town Planning of the various areas in Lagos Island.

At Ebute Metta district of Lagos latrine pails are emptied into the lagoon at a dejection jetty built over the lagoon.

The main Lagos slaughter house for cattle and sheep is built on the margin of the lagoon at Ebute Metta and the offal and blood is discharged into the lagoon.

A few years ago a causeway to carry the railway was built across the arm of the lagoon between Ebute Metta and Ijora Island. This causeway has practically stopped the normal tidal currents in this part of the lagoon. The Medical Officer of Health of Lagos in his report states that "the dejection jetty at Ebute Metta is still functioning unsatisfactorily owing to the interference with the normal currents by the construction of Denton causeway. The matter has been discussed from time to time but no satisfactory solution has yet been found."

In the European residential area the latrine pail contents are disposed of by incineration.

A small automatic flush latrine system is in operation at the Electric Power Station and Public Works Department Store and Sawmills in Ijora Island.

A water-borne sewage system is being installed at the new European Hospital at Jos. This will deal with the sullage and sewage from the Hospital, and from the residential quarters of the European and African Hospital Staff. The sewage will be treated in a septic tank.

Scavenging and Refuse Disposal.—In the larger Native Administration towns and in the townships refuse is disposed of by burning in simple types of incinerators or by dumping into pits.

A large modern forced draft incinerator is being built by Messrs. Heenan and Froude in Lagos Island at Epetedo. This incinerator could not be completed by the end of the year but should be ready for use by the middle of 1928. A European erector sent out by the contractors is in charge of the building operations.

Drainage.—Surface drainage by earth drains is the usual form of drainage. Earth drains require constant supervision and repair, particularly during the rainy season. In some of the larger townships the principal drains have been strengthened with cement. In Lagos the drains are of cement but in some areas where the fall is very little the drains are unable to carry off the storm water and flooding occurs.

Water Supplies.—Lagos has had a treated pipe-borne water supply for many years.

There still remain large numbers of wells in Lagos. Many of these have been examined, the water analysed and found to be polluted.

Action has been taken to close down all wells found after analysis to be polluted and which are within 100 yards of a public water standpipe.

Progress is being made with the building of the waterworks at Kaduna for the water supply of Kaduna, the headquarters of the administration in Northern Provinces. This supply is taken from the Kaduna river and will be treated by filtration and chlorination.

Water supplies for Jos, Zaria and Kano are being considered.

Offensive Trades.—Practically the only offensive trade is hide curing which is carried on extensively at Kano and Zaria, in the Northern Provinces.

Clearing of bush and undergrowth.—In Government stations this is taken in a routine manner by labour paid from Sanitary funds.

Where tsetse fly haunts exist near Government stations clearing of bush and undergrowth is carried out by the Tsetse Investigation branch of the Medical Department.

Sanitary Inspections.—Routine Sanitary Inspections are carried out daily in practically all Government stations by African Sanitary Inspectors or Sub-Inspectors responsible, in medical stations, to a Medical Officer of Health or Medical Officer. In small stations to which no Medical Officer is posted the Sanitary Inspector, if there is one, is responsible to the local Political Officer. At the larger stations a European Sanitary Inspector is posted. In Lagos, which comprises Lagos Island and Ikoyi, Ebute Metta, Yaba and Apapa and the Port of Lagos, seven European Sanitary Inspectors are stationed and work under the Medical Officer of Health to the Town Council and the Port Health Officer of the Port of Lagos.

The great majority of the African Inspectors employed in Lagos are in the service of the Lagos Town Council. During the year the Deputy Director of Sanitary Service visited the following places:—Ibadan, Minna, Kaduna (three times), Zaria (twice), Funtua (twice), Gusau, Sokoto, Katsina, Kano, Jos (twice) and Kafanchan.

III.—SCHOOL HYGIENE.

The routine inspection of school children has not yet commenced in Nigeria.

Government schools and assisted schools are subject to supervision by the Education Department, and certain standards as regards cubic capacity and floor area of class rooms are required. Medical Officers in stations periodically visit schools and attend to the school children when required.

With regard to schools in Lagos the Medical Officer of Health in his report states that fifty-eight schools have been visited during the year:—

“ Many have very poor latrine accommodation and many none.

“ With the exception of malaria, skin conditions, such as tinea, scabies and intestinal worms, the school children are fairly healthy.”

IV.—LABOUR CONDITIONS.

Labour in Nigeria is employed mainly by the Government, trading firms, mining companies, and in connection with plantations and ordinary farming. Practically all labour is engaged on a daily or monthly basis.

Indentured labour or contract labour does not exist.

In the tin mining areas in Plateau Province the housing of the labourers is as a rule good, though there is in some cases, as is characteristic of Africans, a tendency to overcrowding.

The great majority of the labourers employed on the mines are not natives of the Plateau Province but come from the neighbouring provinces of Zaria, Kano, Bauchi, etc. The local production of food by the resident pagan population is insufficient for the large population of imported labourers, and most of the food supply for the mine labourers is imported from the agricultural provinces of the Hausa plain.

Casual labourers find their own food and huts.

The new Labour Ordinance is at present under consideration.

V.—HOUSING AND TOWN PLANNING.

There is no Town Planning Ordinance in Nigeria but a Town Planning Ordinance for Lagos is at present under consideration.

The Townships Ordinance which provides a certain amount of control over buildings, roads, etc., only applies to townships.

A guide to the laying out of new towns and townships and to extensions of existing ones has been drawn up in the form of a memorandum and distributed to all Political, Medical and Sanitary, and other departmental authorities. The procedure outlined in the memorandum permits of the initial proposals and steps in the preparation of a lay-out being taken by the local Political, Medical and Sanitary, and Public Works authorities, with the safeguard that senior officers of these or other departments may be required to assist. Before the plan of the lay-out is submitted for final approval by the Lieutenant-Governor, the proposed lay-out is scrutinised by a senior officer of the Sanitary branch of the Medical Department.

Mr. Thompson, the Town Planner, who came to Nigeria in January, 1927, in connection with the town planning of Lagos, has gone very carefully into the problem presented by that part of the town on Lagos Island. In addition he has been dealing with the lay-out of the new development areas at Ebute Metta, Yaba, and Apapa.

A beginning has been made with the preparation of an area at Yaba for a large market. The streets in Lagos Island constitute the existing markets, a very unsatisfactory state of affairs from the health point of view. The town planning of Lagos will include provision for markets on the island, at Yaba and at Apapa.

VI.—FOOD IN RELATION TO HEALTH AND DISEASE.

In all Government stations the routine inspection of foodstuffs, local and imported, and which are exposed for sale, is carried out by the sanitary staff. Animals for slaughter are inspected before slaughter and the carcase after slaughter, and meat on sale is again subject to inspection in the meat markets. The commonest diseased conditions found in cattle are flukes and lung affections; tuberculosis is uncommon. During a part of the year prior to the harvest there was a shortage of foodstuffs in the Northern Provinces and of yams in the Southern Provinces.

An outbreak of beri-beri in Kano Native Administration Prison, Northern Provinces, was reported in August by the Medical Officer of Health, Kano. There were twelve cases. In his report the Medical Officer of Health, Kano, stated that:—

“ The prison was overcrowded and the prisoners lately had not been getting the full ration of food they usually get.”

Owing to the food shortage the main ingredients in the diet had been reduced and trade rice substituted. Some items such as beans and groundnut oil had been omitted altogether.

Action was taken immediately and when the overcrowding was reduced and the food ration of essential ingredients augmented the bere-beri disappeared.

In Section II (Epidemic Diseases) of this report, paragraph (d) Dysentery, reference is made to the outbreak of dysentery in Lagos and Ikoyi Prisons which was attributed to the substitution of rice for yams during this period.

The Medical Officer of Health, Lagos, in his report states that :—

“ Fifty-seven bakehouses were registered and kept under constant supervision. Two were closed owing to non-compliance with sanitary requirements.

“ There were twenty-seven cornmills in Lagos and Ebute Metta. They are not registered but are kept under supervision.

“ Three aerated water factories were registered during the year.”

During the year steps have been taken to control the importation of low grade teas. Samples from several consignments have been analysed by the Public Analyst and found to contain arsenic, in some samples, as high as 2 to 2½ grs. (expressed as arsenious oxide) per pound. Action has been taken to prevent sale to the public of tea adulterated with arsenic.

Markets.—Every African town or village of any size has a market. In villages and many large towns the market is usually just an open space on which a few grass or bamboo shelters have been erected to protect users from sun and rain. The majority have no protection and sell their goods in the open.

In the larger Government stations more accommodation is provided and in some cases the stalls are constructed of more permanent materials, particularly for the sale of meat.

In Lagos there are no properly constructed markets for general traders of the petty class and in consequence the sides of the streets are the usual marketing places and to these no market regulations are applicable. In consequence of this large quantities of refuse suitable as food for rats remain scattered in the streets at the end of the day and remain there till the scavengers come round in the morning.

One of the most important items in the town planning of Lagos will be the provision of definite markets in the island of Lagos, controlled by regulations under the Markets Ordinance.

At present in Lagos there are four meat markets with cement floors and iron roofs. The meat markets have been declared markets and come under the provisions of the Markets Ordinance.

Dairies.—There are no dairies in Nigeria.

Slaughter Houses.—At the majority of Government stations the slaughtering place is a large cement slab. The offal and blood is removed and buried. At Lagos there are two covered slaughter houses, one for cattle and one for pigs. Both are built over the lagoon into which they drain.

B.—MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

Hygiene and Sanitation is included as a subject in the curriculum of every Government and Assisted School. When opportunity occurs simple lectures are given by Medical Officers of Health, Medical Officers, and European Sanitary Inspectors to the police and pupils of various schools. The subjects treated are elementary hygiene and the dangers incurred by such insects as flies, fleas, lice and mosquitoes.

As the great majority of schools are day schools the teaching of hygiene is mainly theoretical.

Until the children are required to put into practice the theories taught at school, progress in hygiene and healthy living must necessarily be slow.

INFANT, CHILD AND MATERNAL WELFARE.

Only in Lagos has any definite attempt been made to deal with this important aspect of personal sanitation. Since 1925, the Lagos Town Council has employed women Health Visitors (Africans) who are under the supervision and control of the Medical Officer of Health. At present the Town Council have in their employment eight Health Visitors—four of whom were appointed during the year. The Senior of the Health Visitors holds the Diploma of the Central Midwives Board, England.

The following table taken from a report by the Medical Officer of Health, Lagos, gives the birth rate, infant mortality, death rate and still births for Lagos Township for the year 1909 and also for the years 1922-1927 :—

Year.	Birth Rate.	Infant Mortality Rate.	Maternal Mortality Rate per 1,000 Births.	Death Rate.	Still-Births.
1909 	42.4	315	...	37	...
1922 	31.9	290	8	25.8	5
1923 	32.7	263	10	24	5
1924 	32.7	235	9	31.2	4.6
1925 	29.8	238	9	25.1	4.1
1926 	30	198	10	27.5	6.1
1927 	28.9	174.9	7	20.2	3.2

In his report the Medical Officer of Health states :

“ That a noticeable feature of the Vital Statistics in Lagos during the past few years has been the marked reduction in the general death rate and infantile mortality. This decrease is undoubtedly associated with the work which has been undertaken in the improvement of housing, the improved medical facilities and their wider appeal to the people and in the case of infantile mortality to a regular system of health visiting which was instituted in 1925.”

Among the more important causes of infantile mortality are included malaria, tetanus, convulsions, syphilis. The maximum infant mortality follows the rainfall closely and occurs in the months of June to August.

An examination of the causes of infant deaths show that many are preventable. Much can be done by well-organised health visiting, but the education of women, particularly of the future mothers, is of the first importance if a permanent improvement in the hygiene of the home is to be attained.

C. TRAINING OF SANITARY PERSONNEL.

At present Sanitary Inspectors-in-training are given a three years course of training. The class tuition which extends over two years is undertaken by the Assistant Medical Officer of Health, at Lagos, working under the Medical Officer of Health. No proper class rooms are yet available and the classes meet in one of the rooms of the office of the Medical Officer of Health. During the first and second year, in addition to the class work, the students get practical outdoor training and in their third year are posted to stations where they are under the supervision of a Medical Officer or Medical Officer of Health. Examinations are held each year. The following is the syllabus of work drawn up by the Assistant Medical Officer of Health, Lagos.

1. Elementary Meteorology and Mensuration.
2. Elementary Parasitology and Entomology.
3. Simple lectures on the most important Infectious Diseases including preventive measures, quarantine, isolation, etc.
4. Disinfectants and disinfection.
5. Disposal of refuse, nightsoil, drainage.
6. Water, air and ventilation. Housing.
7. Meat, food and general inspection.
8. Rat destruction and anti-mosquito measures.
9. Vaccination technique.
10. Local legislation affecting public health and elementary vital statistics.

During the year correspondence has taken place with the Royal Sanitary Institute, London, with a view to establishing a Board of Examiners for conducting the examinations of the Institute in British West Africa. So far as Nigeria is concerned the Board of Examiners has been appointed. It will, however, be some time yet before it will be possible to get suitable African candidates able to sit the examination. It is proposed to revise the present syllabus of subjects for Sanitary Inspectors-in-training in order to bring it up to the standard of that required for the Institute examinations.

D.—RECOMMENDATIONS FOR FUTURE WORK.

- (1) Water Supplies for Kano and Ibadan and Zaria.
- (2) Improved control of sanitation in the large towns under Native Administration.
- (3) Infant and Maternal Welfare particularly in the larger towns.
- (4) Medical Inspection of school children at first in the larger centres.

G. J. PIRIE,
Deputy Director of Sanitary Service.

Sanitary Office,
Lagos, 5th March, 1928.

IV.—PORT HEALTH WORK AND ADMINISTRATION.

The principal ports in Nigeria are Lagos, Forcados (including Burutu), Warri, Sapele, Bonny, Port Harcourt, Degema, Opobo, Calabar, and in the Mandated Cameroon Territory, Victoria.

At the Port of Lagos the Sanitary authority is a whole time Medical Officer of Health, with a subordinate staff employed under him solely in port work. There is a port office and disinfecting station at the Customs Wharf on Lagos Island and a new additional disinfecting station is nearing completion at Apapa to deal with the shipping at the Apapa Wharves. In addition the port of Lagos is equipped with a motor disinfecting Clayton barge, and has the necessary equipment for cyanide fumigation of vessels.

At Port Harcourt the Senior Sanitary Officer or Medical Officer of Health is also the Sanitary authority in charge of the port work. A new disinfecting station for this port is now in course of erection and a quarantine station has been provided.

At both Lagos and Port Harcourt launches are provided for the port Medical Officers of Health.

With regard to the smaller ports of Forcados, Warri, Sapele, Degema, Opobo, Calabar, Victoria, the Medical Officer undertakes the port work in addition to his ordinary duties.

At Bonny where no Medical Officer is stationed the Customs authority undertakes, so far as he can, the duties of port Sanitary authority.

At all ports the masters of vessels on arrival are required to fill up the questionnaire set out in the Schedule to the Quarantine Ordinance. Vessels departing are provided with a bill of health in the same form as that issued at Lagos. A copy of this form is attached to the report of the Port Medical Officer of Health, Lagos, which appears as Appendix H.

V.—MATERNITY AND CHILD WELFARE.

The close of 1927 marked the first anniversary of the opening of the clinic for maternity work and child welfare at Massey Street, Lagos, and the results so far have been extremely gratifying. At first there was a certain amount of shyness and suspicion at being treated by a Lady Medical Officer, but this was gradually overcome and confidence gained. Patients returned bringing their relatives and friends with them for treatment and the out-patient Department has become a popular institution.

It is noteworthy that not only do mothers bring newly born infants for advice and attention but expectant mothers also come to seek help; over 100 of these attended the out-patient department for advice and treatment. As was to be expected indoor maternity work is not yet popular, it will take many years to break down the old prejudices, habits and customs of the people in this respect. The fact that twenty-two labours have been conducted in the labour ward during the first year is satisfactory and encourages the hope that soon people will begin to realise the advantages of modern methods. In addition, at the Massey Street clinic, African girls of good education and character are being trained to become qualified midwives and carry on the work outside in the homes of the people. They are given lectures on the theory and practice of obstetrics and nursing and gain experience by practical work in the ward and out-patient department under the supervision of the Lady Medical Officer and the Sister in charge. A record is kept of each pupil's progress and frequent examinations are held. At the end of three years, if the records of work and conduct are good and if the nurse satisfies the examiners in the final examination that she has acquired

an all round knowledge of the subject, a certificate of proficiency will be given. It is hoped that in this way in a few years skilled assistance will be available to the people.

Similar work to that done in Massey Street has been continued during the year at the Sacred Heart Hospital at Abeokuta. The twenty beds equipped by Government and under the charge of a Lady Medical Officer, assisted by a European Nursing Sister, have been fully occupied during the year. While difficult or abnormal labours still form the majority of admittances, abnormal labours are increasing in number and a few mothers have been induced to come in before labour. The Lady Medical Officer in her report states "the native woman appears to have a greater tendency towards hæmorrhage than the European." The training of midwives at this hospital is now fairly established and during the year two pupils obtained certificates as midwives, having had a satisfactory pass at the Government examination.

In addition to the maternity work at the Sacred Heart Hospital, and entirely separate from it, is a centre for child welfare work and health visitors. This was opened at the end of the year and has a fully equipped ward with four beds under the charge of the Lady Medical Officer with African assistants. It is to be hoped that this institution will become as popular as the Sacred Heart section, when the inhabitants of Abeokuta learn its object and their confidence is gained.

The general return of diseases shows that an ever increasing number of diseases peculiar to women are treated at all Government Hospitals. Maternity and infant welfare work is carried out at all the larger Mission Hospital centres, Ogbomosho, Ilesha, Iyi-enu, Uburu, Itu, Itinan and Umuahia, and at some of these an effort has been made to include medical inspection of neighbouring schools in their activities. Twins and unwanted infants are now being brought to the Hospitals, both Government and Missions, in increasing numbers. This is an encouraging sign of the breaking down of the native custom of twin and unwanted infant murder.

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINICS.

Reference has already been made to the increase in hospital accommodation under general remarks, but it will be realised that there is still a great lack of in-patient accommodation for the general African population; the proportion of beds in Government hospitals to the African population is 1 to 14,000. This deficiency is met to a small extent by in-patient accommodation in Native Administration and missionary hospitals but it is apparent that the bulk of the population are not provided for, more especially in the Northern and Eastern Provinces.

In the Central Provinces new hospitals are being erected at Lagos, Ibadan, Oshogbo, Benin City and Ijebu Ode. These, with the exception of Lagos hospital, should be ready to receive patients during 1928. Equipment for these hospitals has already been ordered.

Hospitals under Native Administrations were equipped and opened at Ado Ekiti and Ibadan, and in both cases are already working to their full capacity.

Comparative figures of patients attended in the Central Provinces :—

			1925.	1926.	1927.
European In-patients	...	...	174	198	199
" Out-patients	...	...	1,222	1,432	1,500
African In-patients	...	...	2,528	2,992	3,504
" Out-patients	...	...	32,427	36,980	41,837

No new Government hospitals were opened in the Northern Provinces during the year but extensions and improvements have been carried out at Kaduna, Kano and Jos hospitals and their equipment largely augmented.

The following table shows the increase in cases treated at Government institutions in the Northern Provinces:—

			1925.	1926.	1927.
European In-patients	...	...	315	365	420
" Out-patients	...	...	1,550	1,962	2,275
African In-patients	...	...	6,400	8,915	10,461
" Out-patients	...	...	39,109	47,121	71,816

In the Eastern Province a new European hospital with quarters for Nursing Sisters and African Staff was opened at Enugu. New hospitals are nearing completion at Aba, Bamenda, Kumba and Mamfe. Extensions and improvements are being made at Calabar and Port Harcourt.

There has been a large increase in Africans treated at all the hospitals in the Eastern Provinces, but comparative figures are not available.

There are no unusual features to comment on with regard to the diseases treated in Europeans.

The principal diseases treated amongst Europeans are malaria, influenza, dysentery, arthritis, anæmia, gastritis, and enteritis.

The principal diseases treated amongst Africans are malaria, influenza, bronchitis, gastro intestinal diseases, leprosy, yaws, ulcers, and wounds.

There has been a marked increase in the number of cases treated for leprosy, notably at Port Harcourt and Itu. At Port Harcourt good results which were quickly apparent were obtained with intravenous injections of alepol (*sodium hydnocarpate*). There has also been a large increase in the cases of yaws treated due to the effective and immediate results of treatment with arsenical preparations.

Special modern facilities for the treatment of gonorrhœa are provided at Massey Street Dispensary and at the main hospitals, but are not fully made use of. The average African will not undertake a complete course of irrigations in order to become cured.

Venereal treatment rooms with irrigators are provided for the Nigeria Regiment and venereal cases are treated at all Government hospitals and dispensaries.

A method of treatment by intravenous injections of 10 c.c. of a 2% solution of acriflavine reported on by the Medical Officer, Ibadan, and included in Appendix G would largely help to solve the problem of the treatment of gonorrhœa if the same results are obtained by other medical officers, as the African prefers intravenous medication to other forms of treatment.

Railway construction was proceeded with chiefly in the Zaria-Gusau section during the year but work was also started on the Kano-Hadejia section.

The Medical Staff consisted of the following:—

European.			African.		
Chief Construction Medical Officer	1		Dispensers	...	2
Construction Medical Officers	2		Nurses	...	4
Male Nurses	...	3	Sanitary Inspectors	...	2
			Daily paid Dressers	[Variable]	

The main construction hospital for Europeans was transferred from Makurdi to Zaria during the year. The main hospital for Africans was situated at Funtua and will be transferred to Gusau. In addition dressing stations have been maintained at Kakuri and Kaduna Junction. The health has been good in both Europeans and Africans. There were no serious accidents and no serious outbreak of epidemic disease.

The following are the main diseases treated at the Railway Construction hospitals and dressing stations:—

Disease.	Total.	Deaths.
Malaria	830	—
Dysentery	110	7
Smallpox	128	30
Cerebro Spinal Meningitis...	9	4
Tuberculosis	20	4
Syphilis (e)	85	—
Gonorrhœa	330	1
Chronic Rheumatism	776	—
Bronchitis Acute	201	—
Bronchitis Chronic	789	4
Pneumonia	238	8
Enteritis	488	—
Constipation	1,042	—
Dracunculus	244	—
Ulcers	2,253	—
Local Injuries	2,656	—
	10,249	58

The Government Dentist was on leave for the first three months of the year.

There has been an increase in the number of European officials who have availed themselves of dental treatment during the year. The following centres were visited to facilitate the dental treatment of officials, Jos, Zaria, Kano, Kaduna and Ibadan.

The appointment of a second dentist will enable more visiting of the provinces to be done and ensure the services of a Government Dentist continuously in Lagos.

The following tables give an indication of the work done during the nine months:—

(a) NUMBERS TREATED.

	1925.	1927.
European Officials	400	420
African Officials	190	170
Wives and children	197	100

(b) OPERATIONS PERFORMED.

Synthetic Fillings	153
Amalgams	320
Copper Amalgams	50
Gutta Percha (temporary fillings)	362
Gutta Percha (permanent fillings)	17
Root fillings and dressings	60
Sealings	450
Pyorrhœa Alveolaris (general suppurative cervical periodontitis)	210
Extractions	372
Dentures and repairs	120

SURGICAL OPERATIONS.

There has been a decided increase in the number of operations performed during the year, the figures being 8,080 in 1927, as against 4,639 in 1926. The following list gives the operations performed in detail:—

	Total.	Cured.	Relieved.	Unrelieved.	Died.
A. GENERAL.					
Amputations ...	138	117	5	...	16
Aneurism ...	2	...	1	...	1
Appendectomy ...	38	35	2	...	1
Arthrectomy ...	10	8	1	...	1
Fractures Plated, etc. ...	12	5	4	...	3
Coloplicopexy ...	1	1	...	...	...
Herniotomy ...	876	825	2	2	47
Hepatic Abscess (Drainage, etc.) ...	6	...	2	...	4
Laparotomy ...	27	2	11	2	12
Perforated Gastric Ulcer (Suture) ...	1	1	...	...	...
Perforated Duodenal Ulcer (Suture) ...	1	...	...	...	1
Hæmorrhoids (Radical Cure)...	31	28	2	...	1
Acute Pancreatitis (Colostomy) ...	1	...	...	...	1
Colotomy ...	8	...	8	...	...
Ligature Popliteal Artery ...	1	1	...	...	...
Excision, Benign Tumours and Cysts ...	339	334	3	...	2
Excision, Malignant Tumours ...	30	12	9	4	5
Excision Glands ...	38	26	9	1	2
Excision Breast ...	3	3	...	...	...
Nephrotomy ...	2	2	...	...	...
Enterectomy ...	3	...	...	...	3
Sequestromy ...	82	74	5	...	3
Osteotomy ...	12	12	...	...	...
Thyroidectomy ...	3	3	...	...	...
Trephining ...	5	2	...	1	2
Splenectomy ...	4	2	1	...	1
Other operations ...	90	57	18	...	15
B. EYES.					
Cataract ...	7	6	...	1	...
Enucleation ...	14	14	...	...	...
Other operations ...	10	9	...	1	...
C. EAR.					
Mastoid Schwartze operation ...	5	4	1	...	...
Other operations ...	1	1	...	...	...
D. GENITO URINARY, MALE.					
External Urethrotomy ...	40	37	2	1	...
Dilation of Stricture ...	297	82	206	4	5
Elephantiasis of Scrotum ...	99	87	6	1	5
Hydrocœle (Radical Cure) ...	116	111	1	...	4
Varicocœle ...	3	3	...	...	...
Circumcision ...	584	584	...	...	...
Cystotomy ...	6	4	1	...	1
Orchidectomy ...	10	9	...	...	1
Other operations ...	10	4	6	...	...
GENITO URINARY, FEMALE.					
Abdominal Hysterectomy ...	9	7	1	...	1
Elephantiasis ...	32	29	2	...	1
Ovariectomy ...	5	4	...	...	1
Salpingectomy ...	8	5	1	...	2
Hysteropexy ...	19	18	1	...	...
Perineoplasty ...	9	9	...	...	...
Endometritis (Curettage) ...	117	97	13	7	...
Colporrhaphy ...	9	4	5	...	...
E. OBSTETRICAL.					
Forceps Extraction ...	35	26	2	1	6
Podalic Version ...	3	1	...	...	2
Craniotomy ...	3	...	...	...	3
Ectopic Gestation ...	1	1	...	...	...
Cæsarian Section ...	2	1	...	...	1
Other operations ...	9	8	1	...	...
F. MINOR SURGICAL OPERATIONS.					
Abscesses General Injuries, etc.	4,853	4,464	323	31	35
Totals ...	8,080	7,179	655	57	189

VII.—PRISONS AND ASYLUMS.

There is an increase in the average daily number in prison in the Southern Provinces and a decrease in the number in Northern Provinces. An increase in the average daily sick, total number of deaths and death rate per thousand is shown for the Northern Provinces and an increase in the total number of deaths and death rate per thousand is shown for the Southern Provinces. The increase in deaths in the Southern Provinces is due to pneumonia, dysentery and enteritis and in the Northern Provinces to phthisis pulmonalis.

The following figures give an indication of the general health of prisoners in Government Prisons.

	Northern Provinces.		Southern Provinces.	
	1926.	1927.	1926.	1927.
Average daily number in Prison ...	775	758	7,313	7,512
Total number on sick list ...	592	632	4,951	5,556
" " of days on sick list ...	7,505	8,488	70,966	47,197
Average daily sick ...	20	23	194	129
Total number of deaths ...	27	33	156	199
Death rate per thousand ...	34·8	43·5	21·3	26·4

The following table shows the causes of deaths :—

Southern.				Northern.			
Pneumonia ...	...	...	56	Phthisis Pulmonalis ...	...	...	6
Dysentery ...	...	...	23	Nephritis ...	...	...	5
Enteritis ...	...	...	30	Toxaemia ...	...	...	1
Cardiac Disease ...	...	...	12	Uræmia ...	...	...	1
Bronchitis ...	...	...	1	Dysentery ...	...	...	4
Strangulated Hernia ...	...	...	4	Atrophy of the Liver ...	...	...	1
Rheumatism ...	...	...	2	Cardiac Disease ...	...	...	6
Smallpox ...	...	...	1	Peritonitis ...	...	...	1
Natural Causes ...	...	...	20	Pneumonia ...	...	...	1
Pericarditis ...	...	...	1	Arterio-Sclerosis ...	...	...	1
Polio-myelitis ...	...	...	1	Smallpox ...	...	...	1
Septicaemia ...	...	...	1	Enteritis ...	...	...	1
Malaria ...	...	...	4	Natural Causes ...	...	...	1
Phthisis Pulmonalis ...	...	...	3	Senile decay ...	...	...	1
Meningitis ...	...	...	9	Natural death ...	...	...	1
Hæmorrhage ...	...	...	1	Meningitis ...	...	...	1
Liver Abscess ...	...	...	1				
Cirrhosis of Liver ...	...	...	1				
Ankylostomiasis ...	...	...	2				
Acute Splenitis ...	...	...	1				
Peritonitis ...	...	...	1				
Suicide ...	...	...	2				
Nephritis ...	...	...	4				
Syphilitic Aortitis ...	...	...	1				
Arterio-Sclerosis ...	...	...	1				
Cerebral Abscess ...	...	...	1				
Tubercular Meningitis ...	...	...	1				
Gastritis ...	...	...	1				
Leprosy ...	...	...	1				
Asphyxiation by accident in borrowpit ...	...	...	6				
Stabbing ...	...	...	1				
Typhoid Fever ...	...	...	1				
Cerebro-spinal meningitis ...	...	...	1				
Cirrhosis of lungs ...	...	...	1				
Paralysis ...	...	...	1				
Cerebral Malaria ...	...	...	1				
Total ...	...	...	199	Total ...	...	...	33

Native Administration Prisons.—No reliable statistics are available for the Native Administration Prisons. These prisons are only visited at intervals by medical officers. No epidemic diseases in prisoners or undue mortality has been reported.

Yaba Asylum, near Lagos, is the principal lunatic asylum in Nigeria. An alienist medical officer assumed duty in October, 1927, and is making a survey of Nigeria in order to determine the amount of lunacy and methods of dealing with lunatics with a view to the establishment of asylums where they may be required. There were 118 patients in residence at Yaba Asylum, with ten deaths. Calabar Asylum has accommodation for twenty lunatics and is practically always full, vacancies arising on the rare occasions of patients being discharged cured or on the death of a patient. There were five deaths during the year. The general health in both asylums has been good, the physical condition of lunatics invariably improves on admission to an asylum.

VIII.—METEOROLOGY.

Southern Provinces.—The rainfall over the Southern Provinces showed considerable variation from the preceding year and while the comparative total rainfalls of sixteen stations only varied by 24.85 inches, a difference of 85.05 inches was recorded at Calabar, with 105.19 inches in 1926 and 190.24 inches in 1927. A decrease of 37.51 inches was recorded at Afikpo, the readings being 133.80 inches in 1926 and 96.29 inches in 1927.

The mean average rainfall over the Southern Provinces was 87.4 inches in 1927 and 85.8 inches in 1926, rainfall being recorded on an average of 120 days in the former year and 123 days in the latter. Apart from the variation mentioned the rainfall is, generally speaking, consistent over the Southern Provinces.

The highest mean maximum temperature recorded in the Southern Provinces was at Abeokuta with 96.2° in 1927 and 94.5° in 1926. The lowest mean minimum temperature was at Bamenda in the Cameroons Provinces, where 60.1° was recorded in 1927 and 61.6° in 1926, for Lagos a comparative table of monthly rainfall over the period 1917-1927 is given on page 44.

Northern Provinces.—Considerably more rainfall was recorded in the Northern Provinces over fifteen stations than in the previous year. The greatest increase was recorded at Lokoja, where the rainfall was 35.53 inches in excess of 1926. Only three stations reported a decrease in rainfall as compared with the previous year, *viz.*, Jos, Kaduna and Yola.

The mean average rainfall in the Northern Provinces was 45.8 inches in 1927 as against 38.6 inches in 1926, rain falling on an average of eighty-three days in 1927 and sixty-four days in 1926. The highest mean maximum temperature recorded in the Northern Provinces was at Maidugari, where 97.2° was recorded in 1927 and 98.7° in 1926. The lowest mean minimum temperature was recorded at Hadeija, where 50.1° was recorded in 1927 and 53.7° in 1926.

A summary of records at ten representative stations is given in Table III. Fuller meteorological data from all stations will be found in the annual reports of the Survey Department.

IX.—SCIENTIFIC.

The annual reports from the Director of the Medical Research Institute, the Tsetse Investigators, the Pathologists, Lagos and Kaduna Hospitals, the Senior Sanitary Officer in charge of Anti-Plague Measures, the Radiologist, the Port Health Officer, Lagos, the Superintendent of the Pharmacy School, and reports of interesting cases contributed by Medical Officers appear as Appendices.

D. ALEXANDER,

Director of Medical and Sanitary Service.

Lagos.

5th April, 1928.

COMPARATIVE MONTHLY RAINFALL—LAGOS—1917-1927.

Month.	YEAR.										
	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.
January	0.23	Nil.	0.12	0.37	0.31	0.59	0.89	1.94	1.50	Nil.	2.49
February	2.97	3.66	2.74	0.11	0.02	0.81	1.22	1.12	0.40	3.01	2.35
March	3.22	7.86	5.98	3.78	3.42	1.50	2.60	5.28	6.61	2.74	2.78
April	6.18	4.15	3.96	5.71	4.81	7.42	6.43	7.55	7.00	12.76	3.37
May	12.32	7.85	8.58	8.91	21.55	8.13	13.55	3.45	12.16	13.69	8.19
June... ..	19.34	18.13	8.31	14.97	15.34	26.36	25.08	5.53	20.40	13.06	7.08
July	29.36	1.03	0.86	9.55	16.86	2.75	10.44	2.48	15.22	10.07	8.57
August	22.77	1.32	0.20	1.36	3.53	5.73	0.12	0.10	1.28	0.26	0.25
September	9.93	3.71	2.74	0.45	7.94	11.32	3.15	4.10	5.98	11.05	3.04
October	4.94	4.11	8.96	5.06	3.74	15.40	5.36	15.62	2.98	3.79	13.33
November	2.63	2.05	4.66	2.79	3.35	3.51	2.72	0.83	2.87	5.47	2.38
December	1.60	0.02	1.28	0.04	2.35	0.85	Nil.	1.92	Nil.	0.07	1.17
Totals	115.49	53.89	48.39	53.10	83.22	84.37	71.56	49.92	76.40	75.97	50.50

RETURNS.

(a).—STAFF OF THE DEPARTMENT.

Title.	Name.	On Leave.		REMARKS.
		From.	To.	
Director of the Medical and Sanitary Service	D. Alexander, C.M.G.	28-1-27	31-8-27	
Deputy Director of the Medical and Sanitary Service	T. B. Adam ...	—	—	
Assistant Director of the Medical and Sanitary Service	H. T. Palmer ...	17-6-27	10-11-27	Northern Provinces.
MEDICAL.				
Assistant Director of Medical Service	F. H. Storey ...	1-1-27	—	Retired 4-1-27.
Do. do.	J. C. S. McDouall	8-4-27	—	Transferred to Sierra Leone on promotion as D.M. and S.S.
Do. do.	T. M. R. Leonard, D.S.O.	—	—	
Do. do.	J. M. W. Pollard	—	—	
Do. do.	T. L. Craig ...	—	—	
Do. do.	M. W. Fraser ...	28-1-27	1-7-27	Promoted 4-1-27.
Do. do.	S. Goodbrand ...	25-2-27	20-9-27	Promoted 18-3-27.
Specialist	E. E. Maples ...	28-1-27	27-8-27	
Do.	H. H. Stewart ...	26-8-27	21-12-27	
Do.	E. C. Braithwaite	15-7-27	21-12-27	
Do.	F. Ross ...	—	—	
Alienist	B. F. Home ...	—	—	Appointed 6-10-27.
Senior Medical Officer	H. M. Newport ...	22-4-27	—	Retired 6-7-27.
Do. do.	T. H. Rankin ...	5-8-27	—	Retired 19-10-27
Do. do.	C. W. Okeefe ...	—	—	
Do. do.	G. F. Forde ...	1-1-27	10-4-27	
Do. do.	L. H. Booth ...	25-2-27	20-9-27	
Do. do.	A. J. M. Crichton	1-1-27	19-1-27	
Do. do.	L. W. Davies, O.B.E.	9-9-27	21-12-27	
Do. do.	H. R. M. Ferguson	16-12-27	21-12-27	
Do. do.	J. W. Thomson	17-6-27	18-11-27	
Do. do.	R. H. Nolan ...	25-2-27	12-10-27	
Do. do.	J. S. Pearson ...	1-1-27	30-3-27	} Invalided
Do. do.	K. K. Grieve ...	16-12-27	21-12-27	
Pathologist	G. G. Butler, M.B.E.	1-1-27	2-2-27	
Do.	H. Morrison ...	22-4-27	28-9-27	
Do.	G. W. St. Clair Ramsay	25-3-27	12-10-27	
Research Medical Officer ...	R. F. McColl Burnie	—	—	
Superintendent Dispenser	G. Taylor ...	—	—	
Training School	S. L. G. D. Mac-laine ...	11-2-27	28-9-27	
Medical Officer	J. Lindsay ...	21-1-27	28-6-27	
Do. do.	G. H. Gallagher	3-6-27	17-11-27	
Do. do.	W. A. Nicholson	—	—	
Do. do.	C. G. Grey ...	10-9-26	2-3-27	
Do. do.	J. P. B. Snell ...	15-7-27	31-12-27	
Do. do.	R. H. Brierley ...	1-1-27	14-4-27	
Do. do.	B. J. Courtney ...	—	—	
Do. do.	W. I. Martyn-Clark ...	21-10-27	31-12-27	
Do. do.	B. A. Fetherston-Dilke ...	27-10-27	31-12-27	
Do. do.	E. J. J. Quirk ...	1-1-27	26-4-27	
Do. do.	W. G. Cobb, D.S.O.	28-1-27	—	Died in England 24-3-27.
Do. do.	C. Kelsall ...	18-11-27	31-12-27	
Do. do.		1-1-27	25-5-27	

Title.				Name.	On leave.		REMARKS.
					From.	To.	
Medical Officer	...	...	...	E. B. L. Anderson	20-5-27	12-10-27	Retired 6-4-27. Transferred to Sierra Leone on promotion.
Do.	do.	...	...	J. C. C. Hogan	1-1-27	—	
Do.	do.	...	...	D. T. Birt	2-9-27	—	
Do.	do.	...	...	B. W. F. Wood	11-3-27	24-8-27	Tranferred to Sierra Leone on promotion.
Do.	do.	...	...	H. North	25-3-27	12-10-27	
Do.	do.	...	...	W. E. Glover	16-12-27	31-12-27	
Do.	do.	...	...	W. E. S. Digby	6-5-27	26-10-27	
Do.	do.	...	...	J. W. B. Hanington	1-1-27	8-6-27	
Do.	do.	...	...	R. H. Miller	9-6-27	10-11-27	
Do.	do.	...	...	E. Gibson, M.C.	9-9-27	31-12-27	
Do.	do.	...	...	C. Mackey	1-1-27	7-6-27	
Do.	do.	...	...	J. T. Watt	1-1-27	3-2-27	
Do.	do.	...	...	J. R. C. Stephens	1-7-27	31-12-27	
Do.	do.	...	...	L. N. Lee	15-7-27	23-11-27	
Do.	do.	...	...	M. Morrison	8-4-27	21-10-27	
Do.	do.	...	...	W. J. McClintock	8-4-27	14-9-27	
Do.	do.	...	...	G. D. K. Waldron, M.C.	9-9-27	31-12-27	
Do.	do.	...	...	J. B. Steven	1-1-27	22-6-27	
Do.	do.	...	...	N. A. Dyce Sharp	23-9-27	31-12-27	
Do.	do.	...	...	Q. Stewart	2-4-27	—	
Do.	do.	...	...	D. G. F. Moore	—	—	
Do.	do.	...	...	C. J. Sharp	—	—	
Do.	do.	...	...	E. W. Adcock	1-1-27	6-5-27	
Do.	do.	...	...	R. P. Crawford	14-1-27	12-10-27	
Do.	do.	...	...	W. E. McCulloch	—	—	
Do.	do.	...	...	H. B. Lee, D.S.O., M.C.	27-10-27	31-12-27	Invalided.
Do.	do.	...	...	E. G. A. Don	—	—	
Do.	do.	...	...	P. J. Caffrey	—	—	
Do.	do.	...	...	F. McGrath	—	—	
Do.	do.	...	...	J. Naudi	—	—	
Do.	do.	...	...	E. J. Crawford	1-1-27	1-6-27	
Do.	do.	...	...	C. E. Sharp	11-2-27	26-9-27	
Do.	do.	...	...	A. Robertson	1-1-27	25-5-27	
Do.	do.	...	...	W. Nelson	11-3-27	17-8-27	
Do.	do.	...	...	C. Wilson	11-3-27	27-8-27	
Do.	do.	...	...	J. R. H. Pasqual	8-4-27	26-10-27	
Do.	do.	...	...	F. H. King	{ 6-1-27 21-10-27	{ 20-7-27 31-12-27	
Do.	do.	...	...	H. C. E. Chantler	31-1-27	28-9-27	
Do.	do.	...	...	H. B. Boucher	26-8-27	31-12-27	
Do.	do.	...	...	W. H. Cowper	6-11-27	31-12-27	
Do.	do.	...	...	T. James	31-5-27	7-12-27	
Do.	do.	...	...	N. S. Williams	29-7-27	31-12-27	
Do.	do.	...	...	G. Clark	9-9-27	31-12-27	
Do.	do.	...	...	D. M. Mackay	—	—	
Do.	do.	...	...	T. Cullen	—	—	
Do.	do.	...	...	H. P. Fowler	—	—	
Do.	do.	...	...	E. H. L. Le Clezio	—	—	
Do.	do.	...	...	G. Sanders	—	—	
Do.	do.	...	...	I. G. MacGregor	—	—	
Do.	do.	...	...	J. C. Paisley	—	—	
Do.	do.	...	...	C. S. J. Kearney	—	—	
Do.	do.	...	...	T. O'Carrol	—	—	
Do.	do.	...	...	T. B. McAleer	—	—	
Do.	do.	...	...	J. S. Robinson	—	—	
Do.	do.	...	...	G. Simpson	—	—	
Do.	do.	...	...	J. S. Oliphant	—	—	
Do.	do.	...	...	W. S. Ormiston	—	—	
Do.	do.	...	...	C. F. McCon	—	—	
Do.	do.	...	...	J. H. Horsburgh	—	—	
Do.	do.	...	...	A. J. Murray	—	—	
Do.	do.	...	...	W. C. Smith	—	—	
Do.	do.	...	...	L. H. Thomas	—	—	
Do.	do.	...	...	G. G. Brander	—	—	
Do.	do.	...	...	F. L. G. Selby	—	—	
Do.	do.	...	...	A. E. Forbes	—	—	

Title.	Name.	On leave.		REMARKS.
		From.	To.	
Medical Officer	B. G. T. Elmes	—	—	
Do. do.	R. K. Phillips ...	—	—	
Do. do.	G. V. Fiddian ...	—	—	
Do. do.	R. N. Hall ...	—	—	
Lady Medical Officer ...	Miss H. S. Keer	14-1-27	31-5-27	
Do. do.	Miss M. J. Farrell ...	20-5-27	31-12-27	
Do. do.	Miss B. E. Ebdon	—	—	
Medical Officer	O. O. Sapara, I.S.O.	1-7-27	31-12-27	
Do. do.	K. Faderin ...	—	—	
Do. do.	I. G. Cummings	7-7-27	17-11-27	
Do. do.	A. B. W. Smart	—	—	
Junior Medical Officer ...	S. L. A. Manuwa	—	—	Non-pensionable.
Do. do.	R. G. A. Savage	—	—	Non-pensionable.
Dentist	C. N. Pearson ...	1-1-27	30-3-27	
TSETSE INVESTIGATION.				
Tsetse Investigator	W. B. Johnson ...	3-6-27	23-11-27	
(Specialist)				
Tsetse Investigator	Ll. Lloyd ...	—	—	
Assistant Investigator ...	P. H. Rawson, M.C.	17-6-27	23-11-27	
Do. do.	H. M. O. Lester	16-12-27	31-12-27	
Entomologist	A. W. Taylor ...	—	—	
MEDICAL RESEARCH.				
Director Medical Research Institute	A. Connal ...	23-9-27	31-12-27	
Assistant Bacteriologist ...	E. C. Smith ...	28-1-27	14-9-27	
Do. do.	J. A. Young ...	12-8-27	31-12-27	
SANITARY.				
Deputy Director of Sanitary Service	G. J. Pirie ...	—	—	
Assistant Director of Sanitary Service	W. S. Clark ...	1-1-27	27-4-27	
Senior Sanitary Officer ...	W. Allan ...	22-4-27	11-11-27	
Do. do.	T. A. Dowse ...	30-12-27	31-12-27	
Do. do.	G. C. M. Davies, M.C.	—	—	
Do. do.	J. A. A. Duncan	—	—	Arrived in Nigeria 11-11-27.
Do. do.	G. B. Walker ...	1-1-27	20-7-27	
Medical Officer of Health ...	G. R. Waller ...	16-12-27	31-12-27	
Do. do.	J. Cauchi ...	11-3-27	14-9-27	
Do. do.	J. MacDonald ...	1-1-27	14-9-27	
Do. do.	N. S. Turnbull ...	9-9-27	31-12-27	
Do. do.	J. G. S. Turner ...	—	—	
SPECIAL PLAGUE STAFF.				
Senior Sanitary Officer ...	Major W. J. E Bell, D.S.O., R.A.M.C.	—	—	Seconded from R.A.M.C.
Do. do.	Major R. E. Price, D.S.O., R.A.M.C.	—	—	Seconded from R.A.M.C.
Plague Medical Officer ...	Major R. G. Martyn, R.A.M.C.	—	—	Seconded from R.A.M.C.
Do. do.	Capt. T. H. Twigg, R.A.M.C.	—	—	Seconded from R.A.M.C.
NURSING STAFF.				
Senior Nursing Sister ...	F. M. Single ...	5-2-27	12-10-27	
Do. do.	F. A. King ...	5-7-27	17-12-27	
Do. do.	E. O'Hara ...	16-12-27	31-12-27	
Do. do.	L. Mernagh ...	5-8-27	31-12-27	
Do. do.	W. Norwood ...	7-10-27	31-12-27	

Title.	Name.	On leave.		REMARKS.
		From.	To.	
Senior Nursing Sister ...	B. Hulme ...	29-7-27	31-12-27	
Do. do. ...	E. N. Price ...	5-8-27	31-12-27	
Do. do. ...	M. Slaney ...	—	—	
Do. do. ...	M. MacDonald ...	—	—	
Nursing Sister ...	A. E. Blakemore ...	1-1-27	3-2-27	
Do. ...	E. Cordiner ...	14-1-27	20-7-27	
Do. ...	E. M. Scammell ...	25-2-27	14-9-27	
Do. ...	M. A. L. Gummow ...	1-1-27	5-1-27	
Do. ...	E. Williams ...	1-1-27	19-1-27	
Do. ...	V. M. Gillespie ...	1-1-27	5-1-27	
Do. ...	I. W. Dron ...	1-1-27	30-3-27	
Do. ...	F. Roche ...	1-1-27	25-5-27	
Do. ...	G. M. Caulfield ...	6-5-27	10-11-27	
Do. ...	J. M. Garvey ...	6-5-27	12-10-27	
Do. ...	E. Patchell ...	6-5-27	12-10-27	
Do. ...	E. Walker ...	24-4-27	28-9-27	
Do. ...	L. S. Buist ...	8-4-27	14-9-27	
Do. ...	R. Baldock ...	30-8-27	31-12-27	
Do. ...	W. C. Evans ...	2-9-27	31-12-27	
Do. ...	B. Skerrett ...	2-9-27	31-12-27	
Do. ...	A. V. Butcher ...	18-11-27	31-12-27	
Do. ...	E. Taylor-Smith ...	—	—	
Do. ...	K. E. Jones ...	—	—	
Do. ...	A. MacDonald ...	—	—	
Do. ...	A. F. McTavish ...	—	—	
Do. ...	B. M. Thomas ...	—	—	
Do. ...	K. W. Storrier ...	—	—	
Do. ...	H. K. Donaldson ...	—	—	
Do. ...	M. Lancaster ...	—	—	
Do. ...	C. A. Maude ...	—	—	
Do. ...	M. G. Duke ...	—	—	
Do. ...	M. Earl ...	—	—	
Do. ...	K. L. Cowan ...	—	—	
Do. ...	M. Butler ...	—	—	
Do. ...	V. S. McAndrew ...	—	—	
Do. ...	A. V. Marke ...	—	—	
Do. ...	F. M. Harmer ...	—	—	
Do. ...	M. P. Steele ...	—	—	

(b) PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF.

		(1) EUROPEAN.		
MEDICAL.				
Assistant Accountant ...	W. J. Bocking ...	—	—	
Office Assistant ...	C. G. Hearn ...	17-6-27	23-11-27	
Chief Dispenser and Store-keeper ...	E. G. Stoneham ...	5-1-27	1-7-27	
Do. do. ...	G. H. Green ...	—	—	
Do. do. ...	E. M. Cragg ...	2-9-27	31-12-27	
Sergeant ...	W. A. Mayman ...	—	—	Railway Construction Staff.
Do. ...	S. A. Stowe ...	—	—	
Male Nurse ...	A. G. Coker ...	—	—	
RESEARCH.				
Technical Assistant ...	E. F. Hines ...	7-3-27	25-7-27	
Do. do. ...	F. W. Randall ...	15-3-27	14-12-27	
SANITARY.				
Sanitary Inspector, Grade I, and 21 Sanitary Inspectors, Grade II ...	N. W. J. Turnbull ...	—	—	
SPECIAL PLAGUE STAFF.				
Four Sanitary Inspectors and 30 Rodent Inspectors				
MEDICAL.		(2) AFRICAN.		
Chief Clerk ...	J. C. Foresythe ...	—	—	

Title.	Name.	On leave.		REMARKS.
		From.	To.	
Chief Dispenser	J. J. Nicol ...	—	—	
Do.	S. J. Coker ...	27-10-27	31-12-27	
Chief Storekeeper	J. T. C. Robbin	—	—	
Assistant Chief Storekeeper	T. D. Clarkson-Williams ...	22-12-27	31-12-27	
Do. do.	W. D. Green ...	—	—	
Senior Dispenser	T. J. Watson ...	1-1-27	1-3-27	
Do.	A. O. L. Asolo	—	—	
Do.	J. Bara Hart ...	—	—	
Do.	A. da Silva ...	19-4-27	18-6-27	
Do.	I. N. Anthony ...	15-8-27	14-11-27	
Do.	F. E. I. Leigh ...	22-3-27	21-9-27	
Assistant Chief Clerk ...	T. R. Mullen ...	—	—	
Do. do.	S. P. Yanyi Akofur	1-7-27	30-9-27	
Do. do.	P. A. Welsing ...	—	—	
SANITARY.				
Registrar of Vital Statistics.	E. J. Martins ...	—	—	
Assistant Chief Clerk ...	E. B. Beckley ...	6-6-27	5-9-27	
Senior Sanitary Inspectors	E. E. Henshaw	—	—	

(c).—PRINCIPAL APPOINTMENTS, PROMOTIONS AND CHANGES
DURING THE YEAR 1927.

The following European Officers retired on pension :—

- Dr. F. H. Storey, Assistant Director of Medical Service.
- „ J. C. C. Hogan, Medical Officer.
- „ H. M. Newport, Senior Medical Officer.
- „ T. H. Rankin, Senior Medical Officer.
- „ A. Crawford, Medical Officer of Health (Invalided from the Service).

The following Officers were transferred to other Colonies on promotion during the year :—

- Dr. J. C. S. McDouall, promoted Director of Medical and Sanitary Service and transferred to Sierra Leone.
- „ D. T. Birt, promoted Senior Medical Officer and transferred to Sierra Leone.
- „ Q. Stewart, promoted Specialist and transferred to Sierra Leone.

The following Officers were promoted during the year.

- Dr. H. T. Palmer, Assistant Director of Medical Service, promoted Assistant Director of Medical and Sanitary Service.
- „ M. W. Fraser, Senior Medical Officer, promoted Assistant Director of Medical Service.
- „ S. Goodbrand, Senior Medical Officer, promoted Assistant Director of Medical Service.
- „ F. Ross, Senior Medical Officer, promoted Specialist in place of the late Dr. W. R. Parkinson.
- „ R. H. Nolan, Medical Officer, promoted Senior Medical Officer.

- Dr. K. K. Grieve, Medical Officer, promoted Senior Medical Officer.
 „ G. B. Walker, Medical Officer of Health, promoted Senior Sanitary Officer.
 „ J. A. A. Duncan, from Gold Coast, to be Senior Sanitary Officer.
 „ J. G. S. Turner, Medical Officer, to be Medical Officer of Health.
 „ W. C. Smith, Medical Officer, to be Medical Officer of Health.
 Mr. N. W. J. Turnbull, Sanitary Inspector, Grade II, to Grade I.

NEW APPOINTMENTS.

- 18 Medical Officers were appointed during the year; one was transferred as Medical Officer of Health.
 1 Alienist Medical Officer.
 1 Research Medical Officer.
 1 Pathologist.
 1 Entomologist (seconded to Tsetse Investigation).
 8 Sanitary Inspectors, Grade II.

DEATH.

- Dr. E. J. J. Quirk, died in England on 24th March, 1927.

TABLE II.

FINANCIAL.

I. *Expenditure.*

(a).—PERSONAL EMOLUMENTS.

(1) MEDICAL.

	£
Administrative Officers	13,220
Specialists	6,176
Senior Medical Officers	13,026
Medical Officers (European and African) ...	74,166
Dental Surgeon	1,014
European Nursing Staff	12,690
Clerical Staff	5,675
Dispensers and African Nursing Staff ...	30,049
Other items under Personal Emoluments ...	17,571
	<u>£173,587</u>

(2) SANITATION.

	£
Administrative Officers	3,655
Health Officers	10,370
European Sanitary Inspectors	8,227
African Sanitary Inspectors	6,937
Other items under Personal Emoluments ...	7,035
	<u>£36,224</u>

(3) MEDICAL RESEARCH.

	£
European Staff	4,320
African Staff	172
	<u>£4,492</u>

(b)—OTHER CHARGES.

(1) MEDICAL.

	£
Medical, Surgical, Dental and X Ray Equipment and Supplies	25,501
Diets, Provisions and Necessaries	14,579
Other items	35,139
	<u>£75,219</u>

SPECIAL EXPENDITURE.

	£
Tsetse Fly Investigation	13,086
Hospital Equipment	2,051
Other Items	3,978
	<u>£19,115</u>

(2) SANITATION.

	£
General Sanitary	23,784
Plague Expenses	41,190
Special Expenditure	15,067
Other Items	17,207
	<u>£84,681</u>

(3) MEDICAL RESEARCH.

Other Charges, Miscellaneous	<u>£3,185</u>
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TOTAL, MEDICAL AND SANITARY EXPENDITURE ...	<u>£409,070</u>
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II.—Receipts.

	£
Hospital and Medical Receipts	9,193
Births and Deaths	30
	<u>£9,223</u>

The total expenditure for the year amounting to £409,070 is about a sixteenth part of the estimated General Expenditure for 1927-28 £6,758,233.

INTER DEPARTMENTAL SERVICES.

RECEIPTS AND EXPENDITURE MEDICAL DEPARTMENT FOR THE YEAR 1927

RECEIPTS.			EXPENDITURE.		
	£	s. d.		£	s. d.
Hospital and Medical Receipts for the year 1927	9,223	0 0	Marine Services to Medical and Sanitary Department	1,751	0 11
Medical charges against the Nigerian Railway ...	18,496	1 2	Electric Light ...	2,426	2 8
Sanitary charges against the Nigerian Railway ...	1,125	16 8	Railway Services ...	5,789	1 11
Excess of Expenditure over Receipts ...	384,402	5 9	Total Personal Emoluments (Medical, Sanitary and Research) ...	214,303	0 0
			Other Charges (Medical, Sanitary and Research)	188,977	18 1
	£413,247	3 7		£413,247	3 7

TABLE III.

METEOROLOGICAL RETURNS FOR 1927.

STATION.	Absolute Shade Max.	Absolute Shade Min.	Average Max.	Average Min.	Relative Humidity.	Rainfall inches.
	°	°	°	°	%	
Ilorin ...	99·2	57·6	92·3	67·0	87·1	53·99
Kaduna ...	93·4	55·6	86·9	60·1	68·3	55·66
Maiduguri ...	109·5	56·4	97·4	68·6	44·5	27·58
Kano ...	104·3	53·6	95·8	70·5	47·7	30·32
Lokoja ...	97·9	55·7	91·2	69·4	74·6	73·67
Yola ...	102·2	63·4	94·1	70·6	69·8	48·66
Lagos ...	89·0	72·3	85·8	74·8	79·4	55·0
Ibadan ...	98·3	68·4	92·2	71·8	89·3	48·28
Calabar ...	89·7	66·8	87·1	71·8	83·7	190·24
Enugu ...	93·6	64·1	88·6	72·4	76·1	49·82

The figures generally approximate to those of 1926, the only notable differences being the rainfall recorded at Lokoja, which is 35·53 inches more than in 1926 and that at Calabar, which is 85·05 inches more than 1926, while Lagos was 20 inches less than the previous year.

TABLE IV.
RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
I.—Epidemic, Endemic, and Infectious Diseases.								
1. Enteric Group—								
(a) Typhoid Fever ...	...	2	...	2	...	1	...	...
(b) Paratyphoid A. ...	1	3	...	4	...	1	...	...
(c) Paratyphoid B. ...	...	...	...	...	...	2	...	...
(d) Type not defined ...	...	...	...	...	...	1	...	...
2. Typhus ...	...	...	...	...	...	...	...	...
3. Relapsing Fever ...	...	...	...	...	...	...	...	...
4. Undulant Fever ...	...	...	...	...	...	...	...	...
5. Malaria—								
(a) Tertian ...	1	6	...	7	...	46	1	...
(b) Quartan ...	...	3	...	3	...	5	...	...
(c) Aestivo-autumnal ...	3	364	1	367	7	729	51	...
(d) Cachexia ...	...	8	...	8	1	13	2	...
(e) Blackwater ...	1	23	3	24	2	7	1	2
6. Smallpox—	...	5	...	5	...	8	...	1
Alastrim ...	...	...	...	...	...	...	...	...
7. Measles ...	...	...	...	...	...	3	...	...
8. Scarlet Fever ...	...	...	...	...	...	...	...	...
9. Whooping Cough ...	...	...	...	...	...	...	...	...
10. Diphtheria ...	...	...	...	...	...	...	...	...
11. Influenza ...	...	29	...	29	1	142	7	...
12. Miliary Fever ...	...	...	...	...	...	...	...	...
13. Mumps ...	...	...	...	...	...	1	...	...
14. Cholera ...	...	...	...	...	...	...	...	...
15. Epidemic diarrhoea ...	...	1	...	1	...	2	...	...
16. Dysentery—								
(a) Amœbic ...	...	50	...	50	3	68	4	...
(b) Bacillary ...	...	3	...	3	...	...	...	...
(c) Undefined or due to other causes ...	...	2	...	2	...	3	...	...
17. Plague—								
(a) Bubonic ...	...	1	...	1	...	...	...	...
(b) Pneumonic ...	...	...	...	...	...	...	...	...
(c) Septicaemic ...	...	...	...	...	...	...	...	...
(d) Undefined ...	...	...	...	...	...	...	...	...
18. Yellow Fever ...	...	4	2	4	...	...	...	...
19. Spirochaetosis ictero-hæmorrhagica ...	...	...	...	...	...	...	...	...
20. Leprosy ...	...	...	...	...	...	...	...	...
21. Erysipelas ...	...	1	...	1	...	...	...	...
22. Acute Poliomyelitis ...	...	1	...	1	...	...	...	...
23. Encephalitis Lethargica ...	...	...	...	...	...	...	...	...
24. Epidemic Cerebro-spinal Fever ...	...	...	...	...	...	...	...	...
25. Other Epidemic Diseases—								
(a) Rubeola (German Measles) ...	...	1	...	1	...	11	...	...
(b) Varicella (Chicken-pox) ...	...	...	...	...	...	1	...	...
(c) Kala-azar ...	...	...	...	...	...	...	...	...
(d) Phlebotomus Fever ...	...	...	...	...	...	2	...	...
(e) Dengue ...	1	5	...	6	...	5	4	...
Carried forward ...	7	512	6	519	14	1,051	70	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.				Remaining in Hospital at end of 1927.	OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.		Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	7	512	6	519	14	1,051	70	3
I.— <i>Epidemic, Endemic, and Infectious Diseases</i> —contd.								
(f) Epidemic Dropsy ...	...	...	...	...	...	...	...	...
(g) Yaws ...	...	...	...	...	...	...	...	...
(h) Trypanosomiasis ...	...	...	...	...	...	...	...	...
26. Filariasis ...	...	...	...	...	...	1	1	...
27. Anthrax ...	...	...	...	...	...	...	...	...
28. Rabies ...	...	...	...	...	...	...	...	...
29. Tetanus ...	...	...	...	...	...	...	...	...
30. Mycosis ...	...	...	...	...	...	5	...	...
31. Tuberculosis, Pulmonary and Laryngeal ...	...	11	1	11	...	2	...	...
32. Tuberculosis of the Meninges or Central Nervous System ...	...	...	...	...	...	...	...	...
33. Tuberculosis of the Intestines or Peritoneum ...	...	...	...	...	...	...	...	...
34. Tuberculosis of the Vertebral Column ...	...	...	...	...	...	...	...	...
35. Tuberculosis of Bones and Joints ...	...	...	...	...	...	...	...	...
36. Tuberculosis of other organs—								
(a) Skin or Subcutaneous Tissue (Lupus) ...	...	...	...	...	...	...	...	...
(b) Bones ...	...	...	...	...	...	1	...	...
(c) Lymphatic System ...	...	...	...	...	...	...	...	...
(d) Genito-urinary ...	...	...	...	...	...	...	...	...
(e) Other Organs ...	...	...	...	...	...	...	...	...
37. Tuberculosis disseminated—								
(a) Acute ...	...	...	...	...	...	...	...	...
(b) Chronic ...	...	1	...	1	...	...	...	...
38. Syphilis—								
(a) Primary ...	1	6	...	7	...	42	...	...
(b) Secondary ...	...	1	...	1	...	9	...	...
(c) Tertiary ...	...	3	...	3	1	2	...	...
(d) Hereditary... ..	...	...	...	...	...	...	...	...
(e) Period not indicated ...	...	...	...	...	...	...	...	...
39 Soft Chancre ...	...	5	...	5	...	23	...	...
40. A.—Gonorrhœa and its complications ...	...	10	...	10	...	163	...	...
B.—Gonorrhœal Ophthalmia ...	...	...	...	...	...	...	...	...
C.—Gonorrhœal Arthritis ...	...	...	...	...	...	4	...	...
D.—Granuloma Venereum ...	...	...	...	...	...	1	...	...
41. Septicæmia ...	...	1	...	1	...	...	...	...
42. Other Infectious Diseases—Trypanosomiasis ...	...	...	...	...	...	...	...	...
II.— <i>General Diseases not mentioned above.</i>								
43. Cancer or other malignant Tumours of the Buccal Cavity ...	...	1	1	1	...	...	...	...
Carried forward ...	8	551	8	559	15	1,304	71	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	8	551	8	559	15	1,304	71	3
II.—General Diseases not men- tioned above—contd.								
44. Cancer or other malignant Tumours of the Stomach or Liver	...	1	...	1	...	...	...	...
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum	...	1	...	1	...	...	...	...
46. Cancer or other malignant Tumours of the Female Geni- tal Organs	...	...	...	...	...	...	...	...
47. Cancer or other malignant Tumours of the Breast	...	...	...	...	...	...	...	...
48. Cancer or other malignant Tumours of the Skin	...	2	...	2	1	1	...	...
49. Cancer or other malignant Tumours of Organs not specified	...	...	...	...	...	1	...	...
50. Tumours non-Malignant	...	1	...	1	...	10	...	...
51. Acute Rheumatism	1	8	...	9	...	50	2	...
52. Chronic Rheumatism	...	5	...	5	...	134	5	...
53. Scurvy (including Barlow's Disease)	...	...	...	...	...	...	...	...
54. Pellagra	...	...	...	...	...	...	...	...
55. Beri-Beri	...	...	...	...	...	...	...	...
56. Rickets	...	...	...	...	...	...	...	...
57. Diabetes (not including Insi- pidus)	...	1	...	1	...	4	...	...
58. Anæmia— (a) Pernicious	...	2	...	2	...	13	4	...
(b) Other Anæmias and Chlo- rosis	...	12	...	12	1	157	17	...
59. Diseases of the Pituitary Body	...	...	...	...	...	2	..	...
60. Diseases of the Thyroid Gland— (a) Exophthalmic Goitre	...	1	...	1	...	...	...	...
(b) Other diseases of the Thyroid Gland, Myxœ- dema	...	...	...	...	...	...	...	...
61. Diseases of the Para-Thyroid Glands... ..	...	1	...	1	...	...	...	...
62. Diseases of the Thymus	...	...	...	...	...	...	...	...
63. Diseases of the Supra-Renal Glands	...	...	...	...	...	...	...	...
64. Diseases of the Spleen	...	2	...	2	...	5	...	...
65. Leukæmia— (a) Leukæmia	...	...	...	...	...	...	...	...
(b) Hodgkin's Disease	...	...	...	...	...	2	...	...
66. Alcoholism	1	5	1	6	...	4	...	...
67. Chronic poisoning by mineral substances (lead, mercury, &c.)	...	...	...	...	...	...	...	...
68. Chronic poisoning by organic substances (Morphia, Cocaine, &c.)	...	...	...	...	...	1	...	...
Carried forward	10	593	9	603	17	1,688	99	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	10	593	9	603	17	1,688	99	3
II.— <i>General Diseases not men- tioned above—contd.</i>								
69. Other General Diseases—								
Auto-intoxication	...	...	...	...	...	5	...	...
Purpura Haemorrhagica	...	...	...	...	...	...	...	...
Haemophilia	...	...	...	...	...	...	...	...
Diabetes Insipidus	...	...	...	...	...	...	...	...
III.— <i>Affections of the Nervous System and Organs of the Senses.</i>								
70. Encephalitis (not including Encephalitis Lethargica)	...	...	...	...	...	1	...	...
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis)	...	...	...	...	...	...	...	...
72. Locomotor Ataxia	...	...	...	...	...	...	...	...
73. Other affections of the Spinal Cord	...	...	...	...	...	...	...	...
74. Apoplexy—								
(a) Haemorrhage	...	...	...	...	...	1	...	1
(b) Embolism	...	...	...	...	...	...	...	...
(c) Thrombosis	...	...	...	...	...	...	...	...
75. Paralysis—								
(a) Hemiplegia	...	...	...	...	...	...	...	...
(b) Other Paralysees	...	1	...	1	...	1	...	...
76. General Paralysis of the Insane	...	...	...	...	...	...	...	...
77. Other forms of mental Alienation	...	5	1	5	...	6	...	...
78. Epilepsy	...	2	...	2	...	3	...	...
79. Eclampsia, Convulsions (non- puerperal) 5 years or over	...	...	...	...	...	...	...	...
80. Infantile Convulsions	...	...	...	...	...	...	...	...
81. Chorea	...	...	...	...	...	...	...	...
82. A.—Hysteria	...	...	...	...	...	13	1	...
B.—Neuritis	...	10	...	10	...	56	4	...
C.—Neurasthenia	...	32	...	32	...	83	6	...
D.—Neuralgia	...	1	...	1	...	...	...	...
83. Cerebral Softening	...	...	...	...	...	2	...	...
84. Other affections of the Ner- vous System, such as Paralysis Agitans	...	1	...	1	...	11	1	...
85. Affections of the Organs of Vision—								
(a) Diseases of the eye	...	1	...	1	...	13	...	...
(b) Conjunctivitis	...	1	...	1	...	51	2	...
(c) Trachoma	...	1	...	1	1	...	...	...
(d) Tumours of the Eye	...	1	...	1	...	...	...	...
(e) Other affections of the Eye	...	5	...	5	...	45	3	...
86. Affections of the Ear or Mastoid Sinus	...	6	...	6	...	264	7	...
Carried forward	10	660	10	670	18	2,243	123	4

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—continued.

Diseases.		IN-PATIENTS.					OUT-PATIENTS.		
		Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
			Admis- sions.	Deaths.					
Brought forward	...	10	660	10	670	18	2,243	123	4
IV.—Affections of the Circulatory System									
87. Pericarditis	...	...	...	...	...	...	1	...	...
88. Acute Endocarditis or Myo- carditis	...	...	3	...	3	...	1	...	...
89. Angina Pectoris	...	...	1	...	1	...	...	1	...
90. Other Diseases of the Heart—	...	...	...	...	...	...	...	...	...
(a) Valvular—	...	...	6	1	6	1	2	...	...
Mitral	...	...	1	...	1	1	4	...	...
Aortic	...	...	2	...	2	1	...	...	...
Tricuspid	...	...	...	...	...	...	...	...	...
Pulmonary	...	...	...	...	...	...	...	...	...
(b) Myocarditis	...	...	9	1	9	...	12	...	...
91. Diseases of the Arteries—	...	...	...	...	...	...	...	...	...
(a) Aneurism	...	...	...	...	...	...	...	...	...
(b) Arterio-Sclerosis	...	...	2	1	2	...	7	...	...
(c) Other diseases	...	...	1	1	1	...	1	...	...
92. Embolism or Thrombosis (non- cerebral)	...	...	...	...	...	...	...	...	...
93. Diseases of the Veins—	...	...	...	...	...	...	...	...	...
Hæmorrhoids...	...	1	5	...	6	...	46	...	...
Varicose Veins...	...	...	1	...	1	...	2	1	...
Phlebitis	...	...	3	...	3	...	2	1	1
94. Diseases of the Lymphatic System—	...	...	...	...	...	...	...	...	...
Lymphangitis...	...	...	4	...	4	...	7	...	...
Lymphadenitis, Bubo (non- specific)	...	3	17	...	20	...	49	1	...
95. Hæmorrhage of undetermined cause	...	...	1	...	1	...	3	...	...
96. Other affections of the Circula- tory System	...	...	2	...	2	...	6	...	...
V.—Affections of the Respiratory System.									
97. Diseases of the Nasal Passages—	...	...	...	...	...	...	...	...	...
Adenoids	...	...	...	...	...	...	3	...	...
Polypus	...	...	...	...	...	...	...	...	...
Rhinitis	...	...	1	...	1	...	39	3	...
Coryza	...	...	6	...	...	1	114	8	...
98. Affections of the Larynx—	...	...	...	...	...	...	...	...	...
Laryngitis	...	...	2	...	2	...	22	4	...
99. Bronchitis—	...	...	...	...	...	...	13	...	...
(a) Acute	...	1	11	...	12	...	152	9	...
(b) Chronic	...	...	1	...	1	...	20	9	...
100. Broncho-Pneumonia	...	...	1	...	1	...	2	...	...
101. Pneumonia—	...	...	...	...	...	...	...	...	...
(a) Lobar	...	...	...	...	...	...	...	...	...
(b) Unclassified	...	...	...	...	...	...	1	...	...
102. Pleurisy, Empyema	...	...	1	...	1	...	2	...	...
103. Congestion of the Lungs	...	...	...	...	...	...	1	...	...
104. Gangrene of the Lungs	...	...	...	...	...	...	...	...	...
105. Asthma	...	...	4	...	4	...	24	...	...
106. Pulmonary Emphysema	...	...	...	...	...	...	1	...	...
107. Other affections of the Lungs—	...	...	1	1	1	...	...	...	...
Pulmonary Spirochaetosis	...	...	...	...	...	...	2	...	...
Carried forward	...	15	746	15	761	22	2,782	160	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	15	746	15	761	22	2,782	160	5
VI.— <i>Diseases of the Digestive System.</i>								
108. A.—Diseases of Teeth or Gums—								
Caries, Pyorrhœa, &c.	...	7	...	7	...	189	10	...
B.—Other affections of the Mouth—								
Stomatitis	...	2	...	2	...	15	...	...
Glossitis, &c.	...	...	...	...	...	12	1	..
109. Affections of the Pharynx or Tonsils—								
Tonsillitis	...	21	...	21	...	109	8	...
Pharyngitis	...	1	...	1	...	76	5	...
110. Affections of the Esophagus	...	...	...	...	...	1	...	...
111. A.—Ulcer of the Stomach	...	3	...	3	...	...	...	...
B.—Ulcer of the Duodenum	...	3	1	3	...	16	...	...
112. Other affections of the Stomach—								
Gastritis	1	34	...	35	1	205	16	...
Gastro-enteritis	...	1	1	1	...	...	...	...
Dyspepsia, &c.	...	12	...	12	2	228	56	...
113. Diarrhœa and Enteritis—								
Under two years	...	3	...	3	...	25	7	...
114. Diarrhœa and Enteritis—								
Two years and over	1	40	...	41	...	207	21	...
Colitis	1	9	...	10	...	22	5	...
Ulceration	...	1	...	1	...	...	1	...
114a. Sprue	...	...	...	...	...	1	...	...
115. Ankylostomiasis	...	1	...	1	...	...	...	...
116. Diseases due to Intestinal Parasites—								
(a) Cestoda (Tænia)	...	1	...	1	...	6	...	...
(b) Trematoda (Flukes)	...	...	...	...	...	1	...	...
(c) Nematoda (other than Ankylostoma)—								
Ascaris	...	...	...	...	...	1	...	...
Trichocephalus dispar	...	...	...	...	...	6	...	...
Trichina	...	...	...	...	...	...	...	...
Dracunculus	...	...	...	...	...	...	...	...
Strongylus	...	...	...	...	...	...	...	...
Oxyuris	...	...	...	...	...	...	...	...
(d) Coccidia	...	...	...	...	...	1	...	...
(e) Other parasites	...	...	...	...	...	4	...	...
(f) Unclassified	...	...	...	...	...	5	...	...
117. Appendicitis	3	36	1	39	1	12	..	...
118. Hernia	...	...	...	...	...	16	...	...
119. A.—Affections of the Anus, Fistula, &c.	...	4	...	4	...	18	...	...
B.—Other affections of the Intestines—								
Enteroptosis	1	7	...	8	1	2	...	...
Constipation	...	5	...	5	...	85	8	...
120. Acute Yellow Atrophy of the Liver	...	...	...	...	...	...	...	...
121. Hydatid of the Liver	...	...	...	...	...	...	...	...
Carried forward	22	937	18	959	27	4,045	298	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	22	937	18	959	27	4,045	298	5
VI.— <i>Diseases of the Digestive System—continued.</i>								
122. Cirrhosis of the Liver—								
(a) Alcoholic	...	...	...	...	...	1	...	...
(b) Other forms	...	1	...	1	...	...	...	...
123. Biliary Calculus	...	...	...	...	...	1	...	...
124. Other affections of the Liver—								
Abscess	...	8	1	8	...	5	...	...
Hepatitis	...	10	...	10	...	21	1	...
Cholecystitis	...	2	...	2	...	6	...	...
Jaundice	...	13	...	13	...	11	2	...
125. Diseases of the Pancreas	...	1	1	1	...	2	...	...
126. Peritonitis (of unknown cause)	...	...	...	...	...	...	...	...
127. Other affections of the Digestive System	...	2	...	2	...	14	3	...
VII.— <i>Diseases of the Genito-urinary System (non-Venereal).</i>								
128. Acute Nephritis	...	1	...	1	...	7	...	...
129. Chronic	...	...	...	...	...	3	...	...
130. A.—Chyluria	...	...	...	...	...	1	...	...
B.—Schistosomiasis	...	...	...	...	...	...	...	...
131. Other affections of the Kidneys—								
Pyelitis, &c.	...	3	...	3	...	9	2	...
132. Urinary Calculus	...	10	...	10	...	8	...	...
133. Diseases of the Bladder—								
Cystitis	...	20	...	20	...	42	1	...
134. Diseases of the Urethra—								
(a) Stricture	...	1	...	1	...	20	...	...
(b) Other	...	7	...	7	...	20	...	...
135. Diseases of the Prostate—								
Hypertrophy	...	1	...	1	...	1	...	...
Prostatitis	...	...	...	...	...	13	...	...
136. Diseases (non-Venereal) of the Genital Organs of Man—								
Epididymitis	...	5	...	5	...	10	...	...
Orchitis	...	3	...	3	...	10	...	...
Hydrocele	...	1	...	1	...	25	...	...
Ulcer of Penis	...	3	...	3	...	...	...	...
137. Cysts or other non-malignant Tumours of the Ovaries	...	1	...	1	...	...	...	...
138. Salpingitis—								
Abscess of the Pelvis	...	...	...	...	...	...	1	...
139. Uterine Tumours (non-malignant)	...	...	...	...	...	...	...	...
140. Uterine Hæmorrhage (non-puerperal)	...	1	...	1	...	...	2	...
141. A.—Metritis	...	1	...	1	...	...	2	...
B.—Other affections of the Female Genital Organs								
Displacements of Uterus	...	1	...	1	...	...	...	...
Amenorrhœa	...	2	...	2	...	...	9	...
Dysmenorrhœa	1	1	...	2	...	...	9	...
Leucorrhœa	...	1	...	1	...	...	3	...
Carried forward	23	1,038	20	1,061	27	4,275	33	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	23	1,038	20	1,061	27	4,275	334	5
VII.—Diseases of the Genito-urinary System (non-Venereal)—contd.								
142. Diseases of the Breast (non- puerperal)	...	...	...	...	...	...	...	...
Mastitis	...	1	...	1	...	...	1	...
Abscess of Breast	...	...	...	...	...	...	...	...
VIII.—Puerperal State								
143. A.—Normal Labour	...	...	...	...	...	...	...	...
B.—Accidents of Pregnancy	...	...	...	...	...	...	...	...
(a) Abortion	...	4	...	4	...	...	5	...
(b) Ectopic Gestation	...	...	...	...	...	...	...	...
(c) Other accidents of Preg- nancy	...	...	...	...	...	...	...	...
144. Puerperal Hemorrhage	...	...	...	...	...	...	...	...
145. Other accidents of Parturition	...	...	...	...	...	...	...	...
146. Puerperal Septicæmia	...	...	...	...	...	...	1	1
147. Phlegmasia Dolens	...	...	...	...	...	...	...	...
148. Puerperal Eclampsia	...	...	...	...	...	...	...	...
149. Sequelæ of Labour	...	...	...	...	...	...	...	...
150. Puerperal affections of the Breast	...	...	...	...	...	...	...	...
IX.—Affections of the Skin and Cellular Tissues.								
151. Gangrene	...	1	...	1	...	6	...	...
152. Boil—	...	15	...	15	1	142	2	...
Carbuncle	...	9	...	9	...	50	...	...
153. Abscess—	...	16	...	16	...	70	...	...
Whitlow	...	4	...	4	...	23	1	...
Cellulitis	2	31	...	33	2	88	5	...
154. A.—Tinea	...	...	...	...	...	183	7	...
B.—Scabies	...	1	...	1	...	33	1	...
155. Other Diseases of the Skin—	...	...	...	...	...	...	...	...
Erythema	...	2	...	2	...	27	...	...
Urticaria	...	5	...	5	...	23	4	...
Eczema	1	5	...	6	...	97	2	...
Herpes	...	1	...	1	...	24	...	...
Psoriasis	...	...	...	...	...	7	...	...
Dermatitis	...	2	...	2	...	...	...	...
Pediculosis	...	...	...	...	...	13	1	...
Myiasis	...	...	...	...	...	1	...	...
Chigoes	...	...	...	...	...	5	...	...
Cutaneous Leishmaniasis	...	...	...	...	...	6	2	...
Others	...	...	...	...	...	29	...	...
X.—Diseases of Bones and Organs of Locomotion (other than Tuberculous).								
156. Diseases of Bones—	...	...	...	...	...	3	...	...
Osteitis	...	...	...	...	...	...	...	...
157. Diseases of Joints—	...	...	...	...	...	...	...	...
Arthritis	...	4	1	4	1	24	...	...
Synovitis	...	2	...	2	...	16	1	...
158. Other Diseases of Bones or Organs of Locomotion	...	2	...	2	...	38	...	...
Carried forward	26	1,143	21	1,169	31	5,183	367	6

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	26	1,143	21	1,169	31	5,183	367	6
XI.— <i>Malformations.</i>								
159. Malformations	...	4	...	4	...	1	...	...
Hydrocephalus	...	...	...	...	...	...	...	...
Hypospadias... ..	...	...	...	...	...	...	...	...
Spina Bifida, etc.	...	...	...	...	...	...	...	...
Hallus valgus	...	...	...	...	...	1	...	...
XII.— <i>Diseases of Infancy.</i>								
160. Congenital Debility	...	...	...	...	...	...	...	...
161. Premature Birth	...	...	...	...	...	...	...	...
162. Other affections of infancy	...	...	...	...	...	...	...	...
163. Infant neglect (infants of three months or over)	...	...	...	...	...	...	...	...
XIII.— <i>Affections of Old Age.</i>								
164. Senility	...	...	...	...	...	...	...	...
Senile Dementia	...	...	...	...	...	...	...	...
XIV.— <i>Affections produced by External Causes.</i>								
165. Suicide by Poisoning	...	...	...	...	...	...	...	...
166. Corrosive Poisoning (Inten- tional)	...	...	...	...	...	...	...	...
167. Suicide by Gas Poisoning	...	...	...	...	...	...	...	...
168. Suicide by Hanging or Stran- gulation	...	...	...	...	...	...	...	...
169. Suicide by Drowning	...	...	...	...	...	...	...	...
170. Suicide by Firearms	...	...	...	...	...	2	...	2
171. Suicide by cutting or stabbing instruments	...	...	...	...	...	...	...	...
172. Suicide by jumping from a height	...	...	...	...	...	...	...	...
173. Suicide by crushing	...	...	...	...	...	...	...	...
174. Other Suicides	...	...	...	...	...	...	...	...
175. Food Poisoning	...	1	...	1	...	10	1	...
Botulism	...	1	...	1	...	1	...	...
176. Attacks of poisonous animals	...	...	...	...	...	...	...	...
Snake Bite	...	...	...	...	...	6	1	...
Insect Bite	...	1	...	1	...	24	5	...
177. Other accidental Poisonings	...	4	...	4	...	5	...	...
178. Burns (by Fire)	...	1	...	1	...	14	...	...
179. Burns (other than by Fire)	...	3	...	3	...	13	1	...
180. Suffocation (accidental)	...	...	...	...	...	...	...	...
181. Poisoning by Gas (accidental)	...	...	...	...	...	...	...	...
182. Drowning (accidental)	...	...	...	...	...	1	...	...
183. Wounds (by Firearms, war excepted)	...	4	...	4	1	3	...	...
184. Wounds (by cutting or stabbing instruments)	...	4	...	4	...	24	1	...
185. Wounds (by Fall)	1	18	1	19	...	133	3	1
186. Wounds (in Mines or Quarries)	...	...	...	...	...	5	...	...
187. Wounds (by Machinery)	...	...	...	...	...	3	...	...
188. Wounds (crushing, <i>e.g.</i> railway accidents, &c.)	...	7	1	7	...	27	...	...
Carried forward	27	1,191	23	1,218	32	5,456	379	9

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEANS)
FOR THE YEAR 1927—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	27	1,191	23	1,218	32	5,456	379	9
XIV.— <i>Affections produced by External Causes—contd.</i>								
189. Injuries inflicted by Animals, Bites, Kicks, &c.	...	4	...	4	...	47	2	...
190. Wounds inflicted on Active Service	...	...	...	...	...	2	...	...
191. Executions of civilians by belligerents	...	...	...	...	...	...	...	...
192. A.—Over fatigue	...	...	...	...	...	5	...	...
B.—Hunger or Thirst	...	...	...	...	...	...	...	...
193. Exposure to Cold, Frost bite, &c.	...	...	...	...	...	2	...	...
194. Exposure to Heat—								
Heatstroke	...	2	...	2	...	6	...	...
Sunstroke	...	2	...	2	...	8	1	...
195. Lightning Stroke	...	...	...	...	...	1	...	...
196. Electric Shock	...	...	...	...	...	...	...	...
197. Murder by Firearms	...	...	...	...	...	...	...	...
198. Murder by cutting or stabbing instruments	...	...	...	...	...	...	...	...
199. Murder by other means	...	...	...	...	...	...	...	...
200. Infanticide (Murder of an infant under one year)	...	...	...	...	...	...	...	...
201. A.—Dislocation	...	9	...	9	...	24	...	...
B.—Sprain	...	5	...	5	...	67	1	...
C.—Fracture	...	27	1	27	1	35	2	...
202. Other External Injuries	...	20	...	20	1	229	10	...
203. Deaths by Violence of un- known cause	...	...	...	...	...	...	...	...
XV.— <i>Ill-Defined Diseases.</i>								
204. Sudden Death (cause unknown)	...	...	...	...	...	...	...	...
205. A.—Diseases not already speci- fied or ill-defined—								
Ascites	...	...	...	...	...	6	...	...
Edema	...	...	...	...	...	6	2	...
Asthenia	...	9	...	9	...	20	...	...
Shock	...	...	...	...	...	35	1	...
Hyperpyrexia	...	...	...	...	...	1	...	...
P.U.O.	...	9	...	9	...	3	...	...
B.—Malingering	...	...	...	...	...	2	...	...
XVI.— <i>Diseases, the total of which have not caused 10 Deaths</i>								
Ulcers	...	5	...	5	...	27	5	...
Total	27	1,288	24	1,315	34	6,047	409	9

TABLE V.

RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1927.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
I.—Epidemic, Endemic, and Infectious Diseases.								
1. Enteric Group—								
(a) Typhoid Fever	...	12	2	12	...	1	...	...
(b) Paratyphoid A.	...	4	2	4	...	...	...	...
(c) Paratyphoid B.	...	...	...	...	...	...	...	...
(d) Type not defined	...	3	2	3	...	1	...	...
2. Typhus	...	...	...	...	...	...	...	...
3. Relapsing Fever	1	204	6	205	10	68	31	...
4. Undulant Fever	...	...	...	...	...	...	...	...
5. Malaria—								
(a) Tertian	...	74	...	74	1	523	102	...
(b) Quartan	...	4	...	4	...	78	55	...
(c) Aestivo-autumnal	19	1,241	29	1,260	32	7,999	3,099	...
(d) Cachexia	...	5	1	5	...	137	19	...
(e) Blackwater	...	10	3	10	...	5	...	...
6. Smallpox	1	1,188	147	1,189	...	458	237	24
Alastrim	1	12	...	13	4	26	7	...
7. Measles	...	46	1	46	...	99	30	...
8. Scarlet Fever	...	1	...	1	...	...	...	...
9. Whooping Cough	...	4	1	4	...	65	51	...
10. Diphtheria	...	...	...	...	...	1	1	...
11. Influenza	8	288	9	296	2	2,666	517	...
12. Miliary Fever	...	...	...	...	...	2	...	...
13. Mumps	...	27	...	27	...	115	22	...
14. Cholera	...	...	...	...	...	...	...	...
15. Epidemic diarrhoea	...	8	...	8	...	77	8	...
16. Dysentery—								
(a) Amœbic	11	835	115	846	13	1,436	343	5
(b) Bacillary	1	114	17	115	3	114	12	4
(c) Undefined or due to other causes	3	133	18	136	7	215	100	...
17. Plague—								
(a) Bubonic	...	7	4	7	...	162	83	194
(b) Pneumonic	...	4	4	4	...	10	6	16
(c) Septicæmic	...	7	7	7	...	80	37	116
(d) Undefined	...	...	...	...	...	...	...	...
18. Yellow Fever	...	...	...	...	...	...	...	...
19. Spirochaetosis ictero-hæmorrhagica	...	...	...	...	...	...	...	...
20. Leprosy	202	414	32	616	244	1,102	328	...
21. Erysipelas	...	4	1	4	...	3	2	...
22. Acute Poliomyelitis	2	18	3	20	...	5	1	...
23. Encephalitis Lethargica	...	3	...	3	...	3	...	...
24. Epidemic Cerebro-spinal Fever	...	45	27	45	...	15	3	2
25. Other Epidemic Diseases—								
(a) Rubeola (German Measles)	...	1	...	1	...	1	...	...
(b) Varicella (Chicken-pox)	23	982	8	1,005	14	1,020	117	...
(c) Kala-azar	...	1	...	1	...	...	...	...
(d) Phlebotomus Fever	...	3	...	3	...	3	...	...
(e) Dengue	...	1	...	1	...	...	...	...
(f) Epidemic Dropsy	...	2	...	2	...	...	...	...
(g) Yaws	22	441	23	463	39	8,630	7,881	...
(h) Trypanosomiasis	3	48	4	51	5	31	18	...
Carried forward	297	6,194	466	6,491	374	25,151	13,110	361

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	297	6,194	466	6,491	374	25,151	13,110	361
<i>I.—Epidemic, Endemic, and Infectious Diseases (contd.)</i>								
26. Glanders	...	...	...	...	...	7	...	...
27. Anthrax	...	...	...	...	...	...	...	...
28. Rabies	...	...	...	...	...	4	...	...
29. Tetanus	1	46	25	47	1	16	4	...
30. Mycosis	...	14	...	14	1	9	3	...
31. Tuberculosis, Pulmonary and Laryngeal	6	224	76	230	10	280	65	...
32. Tuberculosis of the Meninges or Central Nervous System	...	4	4	4	...	...	1	...
33. Tuberculosis of the Intestines or Peritoneum	2	7	1	9	...	4	3	...
34. Tuberculosis of the Vertebral Column	1	21	1	22	4	32	9	...
35. Tuberculosis of Bones and Joints	4	22	1	26	4	23	8	...
36. Tuberculosis of other organs—								
(a) Skin or Subcutaneous Tissue (Lupus)	...	4	2	4	...	29	16	...
(b) Bones	1	10	...	11	...	2	...	...
(c) Lymphatic System	...	...	...	...	...	5	2	...
(d) Genito-urinary	...	1	...	1	...	1	1	...
(e) Other Organs	2	8	2	10	1	19	5	...
37. Tuberculosis disseminated—								
(a) Acute	...	8	4	8	...	4	4	...
(b) Chronic	2	6	2	8	...	1	...	...
38. Syphilis—								
(a) Primary	5	217	4	222	21	761	312	...
(b) Secondary	26	236	18	262	22	2,314	1,428	...
(c) Tertiary	15	232	11	247	15	657	321	...
(d) Hereditary	1	15	1	16	...	62	51	...
(e) Period not indicated	...	24	1	24	3	1,128	758	...
39. Soft Chancre	2	55	2	57	...	357	5	...
40. A.—Gonorrhoea and its complica- tions	24	613	13	637	24	5,402	459	...
B.—Gonorrhoeal Ophthalmia	1	24	1	25	3	55	28	...
C.—Gonorrhoeal Arthritis	2	75	1	77	1	259	72	...
D.—Granuloma Venereum	...	12	...	12	...	14	1	...
41. Septicæmia	2	30	17	32	...	17	4	...
42. Other Infectious Diseases— Trypanosomiasis	13	132	13	145	34	307	66	...
<i>II.—General Diseases not mentioned above.</i>								
43. Cancer or other malignant Tumours of the Buccal Cavity	...	3	...	3	...	2	1	...
44. Cancer or other malignant Tumours of the Stomach or Liver	...	16	10	16	...	2	1	...
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum	...	1	...	1	...	1	1	...
46. Cancer or other malignant Tumours of the Female Genital Organs	...	5	...	5	...	...	7	...
47. Cancer or other malignant Tumours of the Breast	...	7	2	7	1	1	3	...
48. Cancer or other malignant Tumours of the Skin	1	20	1	21	1	73	15	...
Carried forward	408	8,286	679	8,694	520	36,999	16,764	361

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	408	8,286	679	8,694	520	36,999	16,764	361
II.—General Diseases not mentioned above—continued.								
49. Cancer or other malignant Tumours of Organs not specified	1	12	2	13	...	30	11	...
50. Tumours non-Malignant	12	222	7	234	12	491	175	...
" Malignant	...	...	...	...	...	...	...	...
51. Acute Rheumatism	1	181	12	182	6	3,020	576	...
52. Chronic Rheumatism	15	295	1	310	16	7,578	2,048	...
Debility	...	...	...	...	...	...	...	...
53. Scurvy (including Barlow's Disease)	...	1	1	1	...	2	1	...
54. Pellagra	...	...	...	...	...	...	...	...
55. Beri-Beri	1	36	10	37	1	4	1	...
56. Rickets	...	...	...	...	...	41	4	...
57. Diabetes (not including Insipidus)	...	6	1	6	1	18	5	...
58. Anæmia :—								
(a) Pernicious	...	6	2	6	...	21	8	...
(b) Other Anæmias and Chloro- sis	2	93	15	95	5	1,448	580	1
59. Diseases of the Pituitary Body ...	...	...	...	...	...	1	...	...
60. Diseases of the Thyroid Gland :—								
(a) Exophthalmic Goitre	...	4	2	4	...	10	14	...
(b) Other diseases of the Thy- roid Gland, Myxœdema	4	8	1	12	...	61	129	...
61. Diseases of the Para-Thyroid Glands	...	...	...	...	...	...	...	...
62. Diseases of the Thymus	...	...	...	...	...	...	...	...
63. Diseases of the Supra-Renal Glands	...	...	...	...	...	...	...	...
64. Diseases of the Spleen	2	38	5	40	2	500	283	...
65. Leukæmia :—								
(a) Leukæmia	...	4	1	4	...	4	3	...
(b) Hodgkin's Disease	...	1	1	1	...	1	...	...
66. Alcoholism	...	1	...	1	...	4	1	...
67. Chronic poisoning by mineral sub- stances (lead, mercury, &c.)	...	...	...	...	...	...	...	...
68. Chronic poisoning by organic sub- stances (Morphia, Cocaine, &c.)	...	...	...	...	...	...	...	...
Chronic poisoning by organic sub- stances (Unknown origin)	...	...	...	...	...	...	...	...
69. Other General Diseases :—								
Auto-intoxication	...	1	...	1	...	17	1	...
Purpura Hæmorrhagica	...	...	...	...	...	...	...	...
Hæmophilia	...	...	...	...	...	...	...	...
Diabetes Insipidus	...	...	...	...	...	2	1	...
III.—Affections of the Nervous System and Organs of the Senses.								
70. Encephalitis (not including En- cephalitis Lethargica)	1	14	2	15	...	8	2	...
71. Meningitis (not including Tuber- culous Meningitis or Cerebro- spinal Meningitis)	1	22	6	23	4	7	...	...
72. Locomotor Ataxia	...	10	2	10	1	25	2	...
73. Other affections of the Spinal Cord	...	20	4	20	5	25	6	...
Carried forward	448	9,261	754	9,709	573	50,317	20,615	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1927—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total Cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	448	9,261	754	9,709	573	50,317	20,615	362
III.— <i>Affections of the Nervous System and Organs of the Senses—(contd.)</i>								
74. Apoplexy:—								
(a) Hæmorrhage	...	6	4	6	...	9	...	...
(b) Embolism	...	1	1	1	...	1	...	...
(c) Thrombosis	...	5	3	5	1	3	2	...
75. Paralysis:—								
(a) Hemiplegia	5	36	9	41	5	23	4	...
(b) Other Paralysis	6	38	11	44	2	54	12	...
76. General Paralysis of the Insane	1	...	...	1	...	8	2	...
77. Other forms of mental Alienation	136	55	23	191	139	110	14	...
78. Epilepsy	2	40	4	42	1	133	41	...
79. Eclampsia, Convulsions (nonpuer- peral) 5 years or over	...	6	2	6	...	...	1	...
80. Infantile Convulsions	...	10	2	10	...	12	5	...
81. Chorea	...	3	...	3	...	4	3	...
82. A.—Hysteria	...	12	...	12	...	17	18	...
B.—Neuritis	2	53	...	55	...	1,076	209	...
C.—Neurasthenia	...	18	1	18	1	177	78	...
Neuralgia	...	...	...	...	...	48	15	...
83. Cerebral Softening	...	5	1	5	...	2	3	...
84. Other affections of the Nervous System, such as Paralysis Agitans	1	10	...	11	...	280	65	...
85. Affections of the Organs of Vision:—								
(a) Diseases of the eye	9	113	1	122	2	1,614	140	...
(b) Conjunctivitis	2	149	4	151	3	4,026	1,344	...
(c) Trachoma	...	14	...	14	...	32	14	...
(d) Tumours of the Eye	...	5	1	5	...	20	8	...
(e) Other affections of the Eye	7	89	...	96	5	865	358	...
86. Affections of the Ear or Mastoid Sinus	1	57	...	58	4	3,445	1,169	...
IV.— <i>Affections of the Circulatory System.</i>								
87. Pericarditis	...	18	8	18	...	11	2	...
88. Acute Endocarditis or Myocarditis	...	16	3	16	1	38	26	...
89. Angina Pectoris	...	3	...	3	...	1	1	...
90. Other Diseases of the Heart:—								
(a) Valvular	...	6	...	6	1	24	11	...
Mitral	3	73	9	76	3	248	75	...
Aortic	...	37	14	37	...	75	13	...
Tricuspid	...	...	...	...	...	1	...	...
Pulmonary	...	2	...	2	...	7	2	...
(b) Myocarditis	4	72	18	76	5	186	36	...
91. Diseases of the Arteries:—								
(a) Aneurism	1	13	3	14	1	13	1	...
(b) Arterio-Sclerosis	...	8	1	8	...	23	5	...
(c) Other diseases	1	2	2	3	1	50	5	...
92. Embolism or Thrombosis (non- cerebral)	...	1	1	1	...	...	...	...
Carried forward	629	10,237	880	10,866	748	62,353	24,297	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	629	10,237	880	10,866	748	62,353	24,297	362
IV.—Affections of the Circulatory System—(contd.)								
93. Diseases of the Veins:—								
Hæmorrhoids	...	48	1	48	2	373	85	...
Varicose Veins	...	...	...	...	...	13	2	...
Phlebitis	...	9	...	9	...	9	2	...
94. Diseases of the Lymphatic System—								
Lymphangitis	...	26	...	26	2	182	31	...
Lymphadenitis, Bubo (non-specific)	13	388	1	401	20	1,482	257	...
95. Hæmorrhage of undetermined cause	...	5	1	5	...	9	9	...
96. Other affections of the Circulatory System	...	9	1	9	...	46	7	...
V.—Affections of the Respiratory System.								
97. Diseases of the Nasal Passages—								
Adenoids	...	1	...	1	...	20	15	...
Polypus	...	5	...	5	...	10	4	...
Rhinitis	1	22	...	23	...	112	46	...
Coryza	...	17	...	17	...	2,263	869	...
Others	...	4	...	4	4	4	...	...
98. Affections of the Larynx—								
Laryngitis	...	18	3	18	...	186	140	...
99. Bronchitis—								
(a) Acute	6	341	15	347	10	12,277	3,974	...
(b) Chronic	3	130	7	133	4	3,217	604	...
100. Broncho-Pneumonia	6	164	22	170	7	172	48	...
101. Pneumonia—								
(a) Lobar	8	659	139	667	21	447	43	...
(b) Unclassified	16	91	20	107	5	279	57	...
102. Pleurisy, Empyema	7	200	15	207	15	447	56	...
103. Congestion of the Lungs	...	14	...	14	...	13	...	...
104. Gangrene of the Lungs	...	7	1	7	...	1	...	...
105. Asthma	...	29	3	29	2	113	32	...
106. Pulmonary Emphysema	...	10	1	10	...	8	...	...
107. Other affections of the Lungs— Pulmonary Spirochaetosis	...	19	2	19	...	57	21	...
VI.—Diseases of the Digestive System.								
108. A.—Diseases of Teeth or Gums—								
Caries, Pyorrhœa, &c.	...	84	...	84	...	2,414	688	...
B.—Other affections of the Mouth—								
Stomatitis	...	28	1	28	1	1,003	337	...
Glossitis, &c.	...	9	...	9	...	536	124	...
109. Affections of the Pharynx or Tonsils—								
Tonsillitis	...	56	1	56	...	649	221	...
Pharyngitis	...	20	1	20	1	383	89	...
Carried forward	689	12,650	1,115	13,339	842	89,078	32,058	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	689	12,650	1,115	13,339	842	89,078	32,058	362
VI.—Diseases of the Digestive System (contd.)								
110. Affections of the Esophagus ...	...	1	...	1	...	3	1	...
111. A.—Ulcer of the Stomach ...	...	4	...	4	...	...	1	...
B.—Ulcer of the Duodenum ...	...	...	...	...	...	1	1	...
112. Other affections of the Stomach—								
Gastro Enteritis ...	1	...	...	1	...	...	...	...
Gastritis ...	2	96	3	98	1	1,419	387	...
Dyspepsia, &c. ...	...	204	...	204	...	2,669	906	...
Others ...	...	...	...	...	...	60	3	...
113. Diarrhoea and Enteritis								
Under two years ...	1	149	15	150	3	1,117	390	...
114. Diarrhoea and Enteritis—								
Two years and over ...	7	618	44	625	6	3,315	671	...
Colitis ...	...	107	4	107	2	719	175	...
Ulceration ...	...	3	3	3	...	3	...	...
114a. Sprue ...	...	...	...	...	...	14	2	...
115. Ankylostomiasis ...	16	317	36	333	8	546	105	...
116. Diseases due to Intestinal Parasites—								
(a) Cestoda (Tænia) ...	...	71	...	71	...	3,779	727	...
(b) Trematoda (Flukes) ...	...	2	...	2	1	29	1	...
(c) Nematoda (other than								
Ankylostoma) ...	...	6	...	6	1	54	7	...
Ascaris ...	7	199	2	206	...	3,603	2,524	...
Trichocephalus dispar ...	...	26	...	26	...	34	1	...
Trichina ...	...	80	...	80	...	1	...	...
Dracunculus ...	13	338	4	351	13	1,850	181	...
Strongylus ...	...	...	...	...	...	4	...	...
Oxyuris ...	...	2	...	2	...	52	28	...
(d) Coccidia ...	...	...	...	...	...	...	...	...
(e) Other parasites ...	...	23	1	23	...	83	58	...
(f) Unclassified ...	...	9	1	9	...	16	7	...
Filariasis ...	...	...	...	...	...	111	48	...
117. Appendicitis ...	...	34	...	34	...	27	6	...
118. Hernia ...	54	900	57	954	50	872	42	...
119. A.—Affections of the Anus,								
Fistula, &c. ...	4	63	4	67	9	109	21	...
B.—Other affections of the								
Intestines—								
Enteroptosis ...	...	8	2	8	...	30	3	...
Constipation ...	1	192	6	193	3	16,327	5,090	...
Others ...	...	...	...	...	...	16	6	...
120. Acute Yellow Atrophy of the								
Liver ...	...	...	...	...	...	...	...	...
121. Hydatid of the Liver ...	...	...	...	...	...	...	...	...
122. Cirrhosis of the Liver—								
(a) Alcoholic ...	...	6	2	6	...	1	...	...
(b) Other forms ...	1	22	10	23	...	10	7	...
123. Biliary Calculus ...	...	...	...	...	...	1	...	...
124. Other affections of the Liver—								
Abscess ...	1	34	6	35	1	58	10	...
Hepatitis ...	5	53	9	58	...	127	37	...
Cholecystitis ...	...	2	...	2	...	8	3	...
Jaundice ...	...	58	6	58	1	119	5	...
Carried forward ...	802	16,277	1,330	17,079	941	126,265	63,512	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1927—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	802	16,277	1,330	17,079	941	126,265	63,512	362
VI.— <i>Diseases of the Digestive System</i> —(contd.)								
125. Diseases of the Pancreas	...	2	...	2	...	...	...	...
126. Peritonitis (cf unknown cause) ...	1	26	8	27	...	81	9	...
127. Other affections of the Digestive System	...	40	6	40	1	614	121	...
VII.— <i>Diseases of the Genito-urinary System</i> (non-Venereal)								
128. Acute Nephritis	2	68	14	70	7	58	19	...
129. Chronic	2	66	30	68	6	41	5	...
130. A.—Chyluria	...	2	...	2	...	2	...	...
B.—Schistosomiasis	1	76	1	77	2	222	5	...
131. Other affections of the Kidneys— Pyelitis, &c.	...	17	2	17	1	16	5	...
132. Urinary Calculus	...	5	...	5	...	4	...	...
133. Diseases of the Bladder— Cystitis	5	80	4	85	4	352	187	...
134. Diseases of the Urethra— (a) Stricture	7	196	10	203	13	265	4	...
(b) Other	4	66	4	70	3	195	6	...
135. Diseases of the Prostate— Hypertrophy	...	2	1	2	...	4	...	...
Prostatitis	...	8	...	8	2	18	...	...
136. Diseases (non-Venereal) of the Genital Organs of Man—								
Epididymitis	2	58	...	60	...	162	...	...
Orchitis	5	105	1	110	4	330	...	...
Hydrocele	6	234	3	240	15	313	...	...
Ulcer of Penis	1	85	...	86	3	167	...	...
Others	...	28	...	28	3	14	...	...
137. Cysts or other non-malignant Tumours of the Ovaries	1	7	3	8	...	...	117	...
138. Salpingitis	2	16	3	18	1	...	29	...
Abscess of the Pelvis	...	14	2	14	1	...	17	...
139. Uterine Tumours (non-malignant)	2	22	1	24	1	...	39	...
140. Uterine Hæmorrhage (non- puerperal)	...	3	1	3	...	...	64	...
141. A.—Metritis	...	35	...	35	1	...	233	...
Endometritis	...	8	...	8	2	...	30	...
B.—Other affections of the Female Genital Organs—	1	49	2	50	3	...	...	...
Displacements of Uterus	...	18	...	18	...	...	47	...
Amenorrhœa	1	8	...	9	...	...	278	...
Dysmenorrhœa	...	31	...	31	...	...	448	...
Leucorrhœa	...	5	...	5	...	...	129	...
Others	...	...	...	...	...	...	240	...
142. Diseases of the Breast (non- puerperal)—								
Mastitis	...	10	...	10	1	...	145	...
Abscess of Breast	...	7	...	7	...	...	28	...
Carried forward	845	17,674	1,426	18,519	1,015	129,123	45,717	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths
		Admis- sions.	Deaths.					
Brought forward	845	17,674	1,426	18,519	1,015	129,123	45,717	362
VIII.—Puerperal State.								
143. A.—Normal Labour	2	111	...	113	5	...	88	...
B.—Accidents of Pregnancy—								
(a) Abortion	1	76	6	77	3	...	117	...
(b) Ectopic Gestation	...	2	1	2	...	...	3	...
(c) Other accidents of Preg- nancy... ..	2	51	14	53	3	...	88	...
144. Puerperal Haemorrhage	...	1	...	1	...	...	4	...
145. Other accidents of Parturition ...	4	49	12	53	2	...	19	...
146. Puerperal Septicæmia	1	11	7	12	...	...	1	...
147. Phlegmasia Dolens... ..	...	1	1	1	...	...	...	...
148. Puerperal Eclampsia	...	...	...	...	...	...	...	...
149. Sequelæ of Labour	...	10	2	10	...	...	6	...
150. Puerperal affections of the Breast	...	4	...	4	...	...	19	...
IX.—Affections of the Skin and Cellular Tissues.								
151. Gangrene	2	35	7	37	5	26	32	...
152. Boil	...	56	1	56	1	1,589	175	...
Carbuncle	...	145	3	145	8	596	41	...
153. Abscess	18	491	11	509	27	1,281	333	...
Whitlow	...	71	...	71	2	2,204	376	...
Cellulitis	25	618	20	643	24	3,610	734	...
154. A.—Tinea	1	20	...	21	...	3,471	698	...
B.—Scabies	...	45	...	45	4	3,537	629	...
155. Other Diseases of the Skin—								
Erythema... ..	...	16	...	16	...	56	10	...
Urticaria	...	9	...	9	...	295	80	...
Eczema	...	50	...	50	...	1,531	387	...
Herpes	1	13	...	14	...	144	24	...
Psoriasis	2	5	...	7	...	98	35	...
Elephantiasis	15	160	6	175	21	191	28	...
Ulcers	76	1,463	33	1,539	214	17,483	4,021	...
Myiasis	...	1	1	1	...	3	2	...
Chigoes	...	3	...	3	3	163	78	...
Impetigo	1	...	...	1	...	...	...	...
Cutaneous Leishmaniasis ...	2	1	...	3	...	6	...	...
Others	5	55	...	60	...	4,258	1,250	...
X.—Diseases of bones and Organs of Locomotion (other than Tuber- culous).								
156. Diseases of Bones—								
Osteitis	5	92	2	97	9	497	225	...
Periostitis	3	...	...	3	...	...	...	...
157. Diseases of Joints—								
Arthritis	11	172	6	183	16	1,352	297	...
Synovitis	6	172	1	178	4	754	116	...
158. Other Diseases of Bones or Organs of Locomotion	7	...	...	7	...	1,811	276	...
Carried forward	1,035	21,683	1,560	22,718	1,366	174,079	55,909	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1927—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
Brought forward	1,035	21,683	1,560	22,718	1,366	174,079	55,909	362
<i>XI.—Malformations.</i>								
159. Malformations—	...	3	...	3	...	39	18	...
Hydrocephalus	...	16	...	16	...	3	2	...
Hypospadias	...	1	...	1	...	1	...	...
Spina Bifida, etc.	...	1	...	1	...	...	...	...
Others	...	133	5	133	11	...	1	...
<i>XII.—Diseases of Infancy.</i>								
160. Congenital Debility	...	7	3	7	...	44	40	...
161. Premature Birth	...	1	...	1	...	1	4	...
162. Other affections of infancy	...	8	3	8	...	34	16	...
163. Infant neglect (infants of three months or over)	...	1	...	1	...	2	12	...
<i>XIII.—Affections of Old Age.</i>								
164. Senility—	1	6	...	7	...	10	16	...
Senile Dementia	...	3	...	3	...	5	3	...
<i>XIV.—Affections produced by External Causes.</i>								
165. Suicide by Poisoning	...	...	...	...	...	...	...	...
166. Corrosive Poisoning (Intentional)	...	1	...	1	...	...	1	...
167. Suicide by Gas Poisoning	...	...	...	...	...	...	...	...
168. Suicide by Hanging or Strangulation	...	...	...	...	...	1	...	...
169. Suicide by Drowning	...	...	...	...	...	...	...	...
170. Suicide by Firearms	...	...	...	...	...	...	...	...
171. Suicide by cutting or stabbing Instruments	1	6	2	7	...	3	...	...
172. Suicide by jumping from a height	...	...	...	...	...	...	...	...
173. Suicide by crushing	...	...	...	...	...	...	...	...
174. Other Suicides	...	...	...	...	...	...	...	...
175. Food Poisoning—	...	28	2	28	...	36	1	...
Botulism	...	...	...	...	...	...	...	...
176. Attacks of poisonous animals	...	...	...	...	...	...	...	...
Snake Bite	...	36	2	36	...	75	9	...
Insect Bite	2	5	...	7	...	181	32	...
Scorpion Bite	...	...	...	...	...	18	4	...
177. Other accidental Poisonings	...	7	1	7	1	13	6	...
178. Burns (by Fire)	5	90	9	95	2	717	210	...
179. Burns (other than by Fire)	...	19	3	19	2	164	53	...
180. Suffocation (accidental)	...	...	...	...	...	...	...	...
181. Poisoning by Gas (accidental)	...	3	...	3	...	3	...	...
182. Drowning (accidental)	...	...	...	...	...	...	...	...
183. Wounds (by Firearms, war excepted)	3	70	11	73	7	51	1	...
184. Wounds (by cutting or stabbing instruments)	27	447	34	474	25	6,899	1,216	...
185. Wounds (by Fall)	10	244	14	254	19	4,256	405	...
186. Wounds (in Mines or Quarries)	1	127	...	128	6	2,588	7	...
187. Wounds (by Machinery)	2	75	2	77	7	1,584	6	...
Carried forward	1,087	23,021	1,651	24,108	1,446	190,807	57,972	362

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1927—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1926.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1927.	Male.	Female.	Deaths.
Brought forward	1,087	23,021	1,651	24,108	1,446	190,807	57,972	362
XIV.— <i>Affections produced by External Causes—contd.</i>								
188. Wounds (crushing, e.g. railway accidents, etc.)	5	82	6	87	2	2,018	51	...
189. Injuries inflicted by Animals, Bites, Kicks, etc.	14	61	5	75	1	1,065	211	...
190. Wounds inflicted on Active Service	...	1	...	1	...	12	...	...
191. Executions of civilians by belligerents	...	...	...	...	...	...	...	...
192. A.—Over fatigue	...	2	1	2	...	3	...	...
B.—Hunger or Thirst	...	9	4	9	...	6	1	...
193. Exposure to Cold, Frost bite, etc.	...	...	...	...	...	...	...	...
194. Exposure to Heat—								
Heatstroke	...	...	...	...	...	2	...	...
Sunstroke	...	...	...	...	...	...	...	...
195. Lightning Stroke	...	1	...	1	...	...	1	...
196. Electric Shock	...	15	...	15	...	1	...	...
197. Murder by Firearms	...	...	...	...	...	...	...	...
198. Murder by cutting or stabbing instruments	...	1	1	1	...	...	...	...
199. Murder by other means	...	...	...	...	...	...	...	...
200. Infanticide (Murder of an infant under one year)	...	1	1	1	...	...	...	...
201. A.—Dislocation	...	33	...	33	1	290	14	...
B.—Sprain	3	47	...	50	1	1,027	73	...
C.—Fracture	28	393	31	421	46	253	48	...
202. Other External Injuries	56	1,654	4	1,710	43	14,076	1,396	...
203. Deaths by Violence of unknown cause	...	...	...	...	...	1	1	2
XV.— <i>Ill-Defined Diseases.</i>								
204. Sudden Death (cause unknown)	...	1	1	1	...	4	1	5
205. A.—Diseases not already specified or ill-defined—	...	...	...	...	...	...	...	...
Ascites	7	66	21	73	9	76	26	...
Edema	...	32	6	32	2	100	32	...
Asthenia	...	24	2	24	1	94	92	...
Shock	...	...	...	...	...	3	...	...
Hyperpyrexia	...	7	...	7	...	4	...	...
Pyrexia of uncertain Origin	...	8	...	8	...	7	5	...
Others	...	25	...	25	...	...	...	...
B.—Malingering	...	29	...	29	...	133	...	...
XVI.— <i>Diseases, the total of which have not caused 10 Deaths</i>								
	...	183	2	183	9	1,945	632	...
Total	1,200	25,696	1,736	26,896	1,561	211,927	60,556	369

APPENDICES.

APPENDICES

APPENDIX A.

ANNUAL REPORT OF THE MEDICAL RESEARCH
INSTITUTE, 1927.

BY

ANDREW CONNAL, M.D., D.P.H., D.T.M. AND H.
Director of Medical Research Institute.

APPENDIX A

ANNUAL REPORT OF THE MEDICAL RESEARCH
INSTITUTE 1921

BY

ANDREW JOHNSON, M.D., F.R.C.S., F.R.S.
Director of Medical Research Institute

MEDICAL RESEARCH INSTITUTE,
LAGOS, NIGERIA.

5th April, 1928.

SIR,

I have the honour to present the Annual Report of the Medical Research Institute for 1927.

2. Attention was mainly concentrated on Rat Plague.
3. The work on skin diseases has been continued, as far as possible, by Dr. E. C. Smith.
4. The usual synopsis of the blackwater fever cases is included.
5. The Director proceeded on leave on 23rd September, 1927.
6. The Honorary Entomologist also proceeded on leave on that date.
7. The Bacteriologist, Dr. E. C. Smith, proceeded on leave on 28th January, 1927, and returned to duty on 15th September, 1927.
8. Dr. J. A. Young, M.C., on appointment as second Bacteriologist, assumed duty on 6th January, 1927. Unfortunately he early received injuries which necessitated a long stay in hospital. He was invalided on 12th August, 1927.
9. Dr. J. C. Paisley, who had been detailed for Rat Plague at Ereko Dispensary, proceeded to Minna on 24th August, 1927.
10. Dr. B. G. T. Elmes took over the duties at Ereko Dispensary on 23rd September, 1927.
11. Dr. G. V. Fiddian was detailed for Bacteriological work on 21st September, 1927, but was transferred to Jos on 22nd December, 1927.
12. Mr. E. F. Hines, Technical Assistant, proceeded on leave on 7th March, 1927, and returned to duty on 26th July, 1927.
13. Mr. F. W. Randall, Technical Assistant, proceeded on leave on 15th July, 1927, and resumed duty on 15th December, 1927.
14. Mr. R. A. Martins assumed duty as First Class Clerk, on promotion, on 4th July, 1927, *vice* Mr. D. O. Runsewe.
15. The Government Analyst was separated from the Medical Research Institute as from 1st April, 1927.

I have the honour to be,

Sir,

Your obedient Servant,

A. CONNAL,

Director of Medical Research Institute.

THE HONOURABLE

THE DIRECTOR OF MEDICAL AND SANITARY SERVICE.

RAT PLAGUE.

The work of examining the rodents of Lagos was continued at Ereko Dispensary. During the first part of the year, Dr. J. C. Paisley was in charge of the dissections and in the latter half of the year Dr. B. G. T. Elmes took over his duties. Corporal Bowrey assisted during the whole period. The rodents were provided principally from the "Collecting Stations," of which there are three—Egerton Square, Idumagbo and Evans Street. These stations were instituted for the purpose of receiving the rats brought in by the town inhabitants themselves, a sum of money being paid for each animal; more than half of the total rodents each day came from this source. The official rat-catchers supplied about one-third of the daily total, about ten *per cent.* came from the official "Spray Gangs" and the Port Health Office sent along all rats found when ships or sheds were fumigated.

The total number of rats dealt with at Ereko Dispensary was 56,182, made up of 51,621 black rats (*R. rattus*), 4,292 brown rats (*R. norvegicus*) and 269 rats of a kind which has been labelled "Swamp-rat," pending identification by the authorities at the British Museum (Natural History).

In addition, 3,454 specimens of the shrew (*Crocidura manni*) were examined. No specimens of the pouched rat (*Cricetomys gambianus*), or of the striped rat (*Lemniscomys fasciatus*), which figured in previous reports, have been met with.

Each rat, when it was brought to the laboratory, was given a number, which was entered in a register and also marked on a glass slide, so that, except in the case of material received from the collecting stations (where no names or addresses were taken because of the likelihood of scaring the volunteers), it was possible to tell at once the locality where an infected rat had been caught.

After being registered each rat was pinned out, belly uppermost, and dissected, to expose first the lymphatic glands of the neck axilla and groin, and secondly the abdominal and thoracic cavities were opened. A smear was taken from the cut surface of the spleen of each animal and stained and microscopically examined as a routine. Where there was any suspicion of disease, other smears were taken from glands and organs.

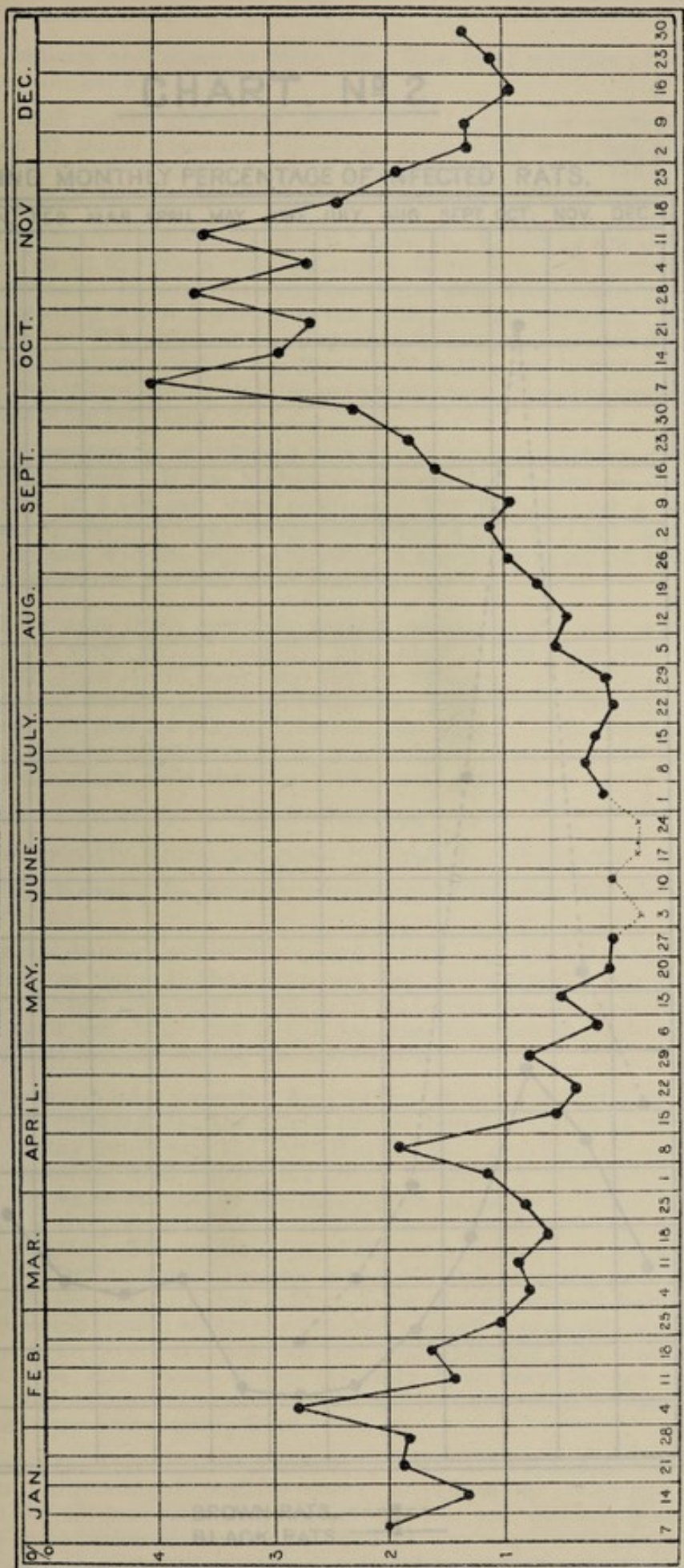
The daily number of mice brought in invariably outnumbered the rats very considerably, so that with the staff available it was quite impossible to submit them to the same careful examination which the rats received. Previous experience of the mice, however, had shown that the percentage infected was very small, so that there was no justification for increasing the staff in order to ensure that they were all examined. It was decided, therefore, to open as many mice each day as time would permit, simply taking a spleen smear for examination, and in this way the total number examined was 20,519, which brings the rodent total up to 76,701, to which the number of live rats examined has still to be added.

Live rats were sent in special cages to the Research Institute, where they were chloroformed, searched for fleas and afterwards dissected. The total thus examined was 867, made up of 804 black rats, fifty-one brown rats and twelve swamp rats. The total was therefore 77,568 rodents examined.

In addition to these, spleen smears from rats were sent from Abeokuta (including Owode) and from Ibadan, and towards the end of

CHART. N^o 1.

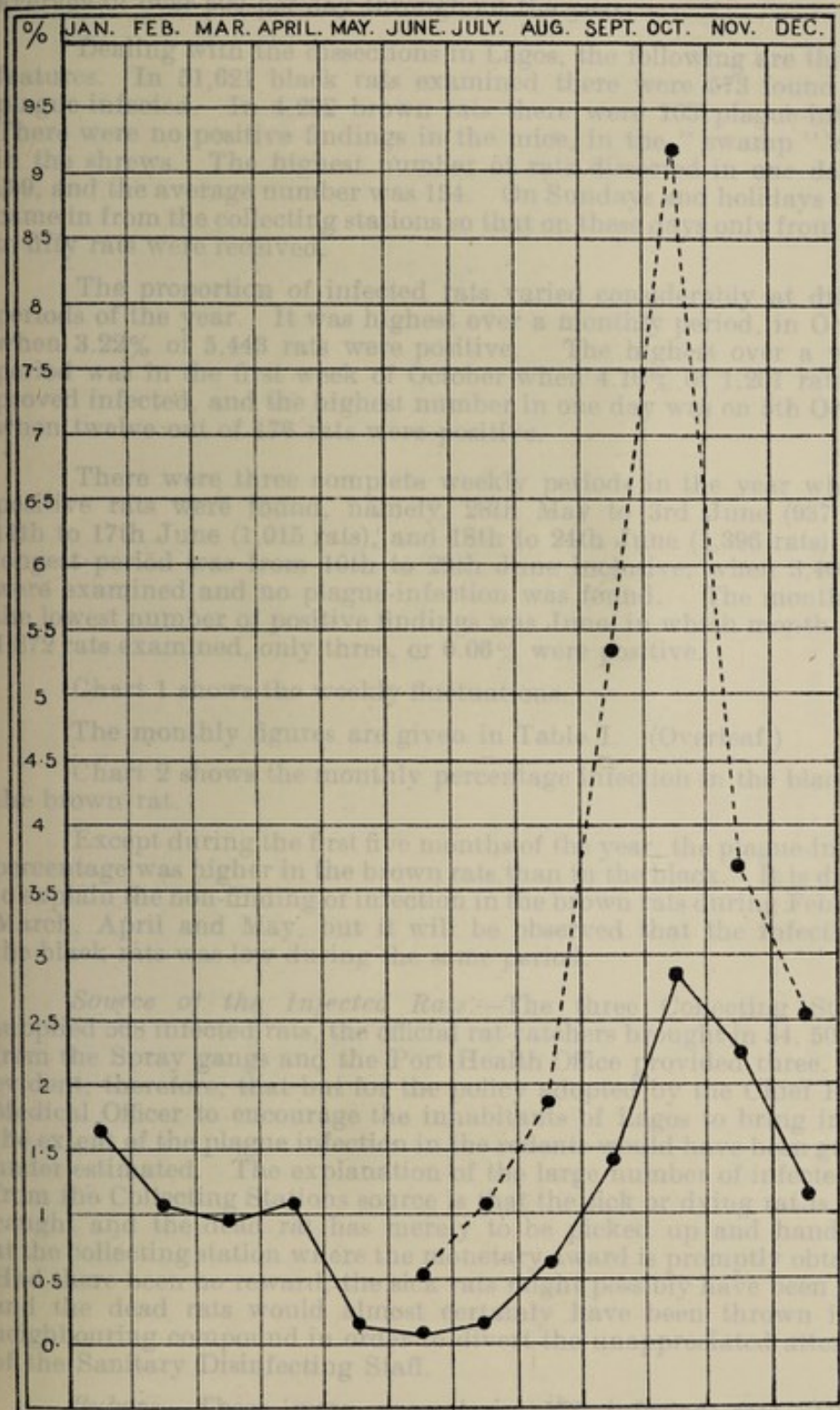
SHOWING WEEKLY PERCENTAGE OF INFECTED RATS.



Reproduced by the Survey Department Lagos.

CHART. N^o 2.

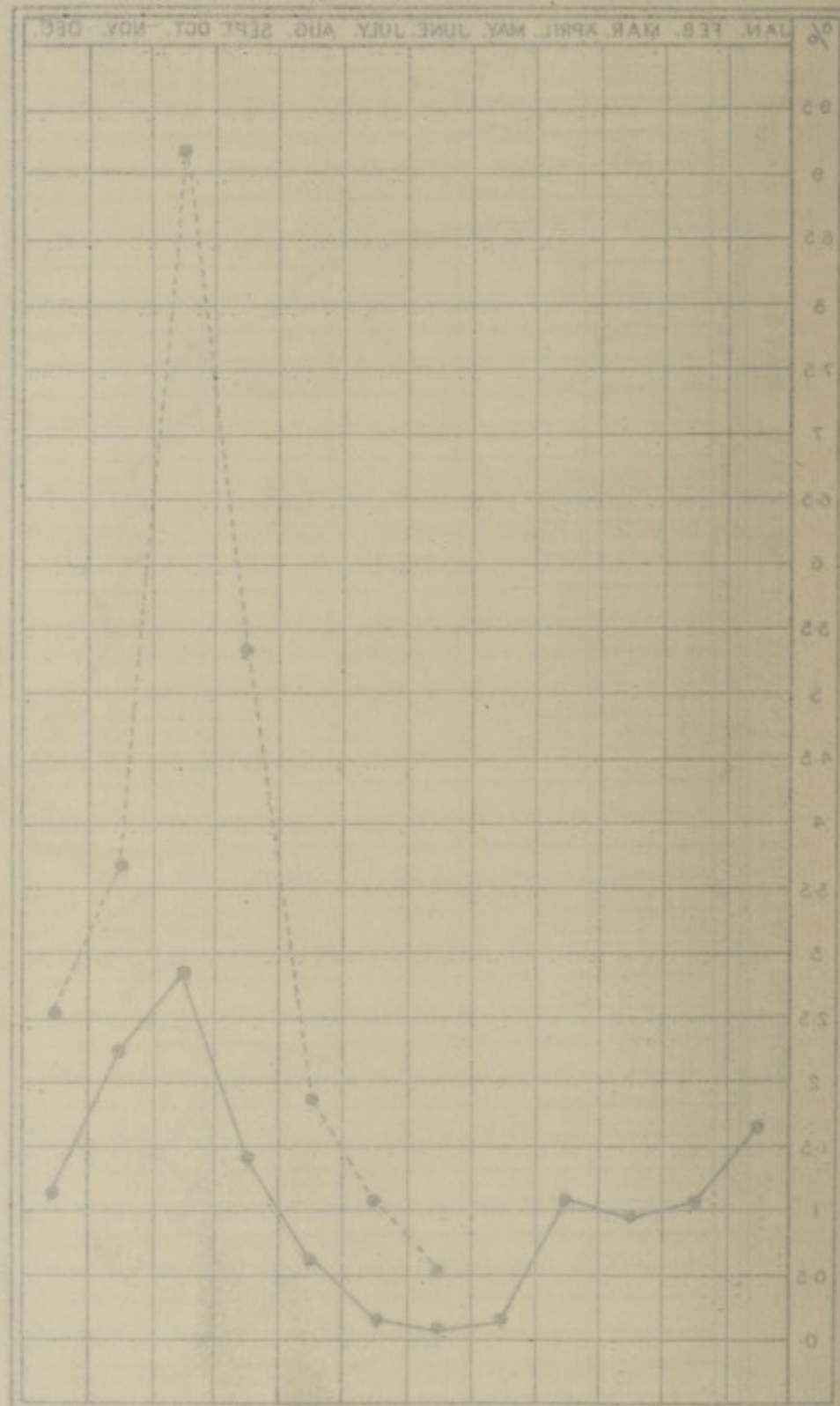
SHOWING MONTHLY PERCENTAGE OF INFECTED RATS.



BROWN RATS. ---●---
BLACK RATS. —●—

CHART. No 2.

SHOWING MONTHLY PERCENTAGE OF INFECTED RATS.



--- BROWN RATS.
— BLACK RATS.

the year smears also came in from Ifo. The total number of smears from these sources was 29,630.

As each rodent and shrew examined in Lagos represented at least one smear (in many cases several smears were made from one animal) the total number of slides examined was therefore over 110,652, an average of over 300 per day throughout the year.

Dealing with the dissections in Lagos, the following are the main features. In 51,621 black rats examined there were 573 found to be plague-infected. In 4,292 brown rats there were 103 plague-infected. There were no positive findings in the mice, in the "swamp" rats or in the shrews. The highest number of rats dissected in one day was 299, and the average number was 154. On Sundays and holidays no rats came in from the collecting stations so that on these days only from thirty to fifty rats were received.

The proportion of infected rats varied considerably at different periods of the year. It was highest over a monthly period, in October, when 3.22% of 5,443 rats were positive. The highest over a weekly period was in the first week of October when 4.10% of 1,201 rats were proved infected, and the highest number in one day was on 5th October, when twelve out of 176 rats were positive.

There were three complete weekly periods in the year when no positive rats were found, namely, 28th May to 3rd June (937 rats), 11th to 17th June (1,015 rats), and 18th to 24th June (1,396 rats). The longest period was from 10th to 29th June inclusive, when 3,406 rats were examined and no plague-infection was found. The month with the lowest number of positive findings was June, in which month out of 4,872 rats examined, only three, or 0.06% were positive.

Chart 1 shows the weekly fluctuations.

The monthly figures are given in Table I. (Overleaf.)

Chart 2 shows the monthly percentage infection in the black and the brown rat.

Except during the first five months of the year, the plague-infected percentage was higher in the brown rats than in the black. It is difficult to explain the non-finding of infection in the brown rats during February, March, April and May, but it will be observed that the infection in the black rats was low during the same period.

Source of the Infected Rats.—The three Collecting Stations supplied 568 infected rats, the official rat-catchers brought in 54, 50 came from the Spray gangs and the Port Health Office provided three. It is evident, therefore, that but for the policy adopted by the Chief Plague Medical Officer to encourage the inhabitants of Lagos to bring in rats, the extent of the plague infection in the rodents would have been gravely under-estimated. The explanation of the large number of infected rats from the Collecting Stations source is that the sick or dying rat is easily caught and the dead rat has merely to be picked up and handed in at the collecting station where the monetary award is promptly obtained. Had there been no reward, the sick rats might possibly have been killed and the dead rats would almost certainly have been thrown into a neighbouring compound in order to divert the unappreciated attentions of the Sanitary Disinfecting Staff.

Buboes.—These were present in 578 infected rats. Of the remaining ninety-eight positive cases, no glandular swellings were observed in seventy-four, decomposition was too far advanced for accurate observation in twenty-two and in two cases a swollen gland was negative in a stained smear, on cultivation and on animal inoculation. The presence of plague in these three groups of cases was diagnosed on spleen smears or on spleen and liver smears. It will be

noted, then that buboes were absent, not observable or negative in 14.49 *per cent.* of the infected rats, those with definitely absent buboes amounting to 10.94 *per cent.* of the total.

In the cases where buboes were present, the situation was in the cervical region in 394, the bubo was single in 264, was bilateral in ninety-eight, and was in association with a bubo or buboes in other situations in thirty-two cases.

Axillary buboes numbered seventy-seven; they were single in forty-eight, bilateral in one, and in association with buboes in other sites in twenty-eight cases. The bubo was situated in the groin region in 115 cases, was single in twenty-one, bilateral in three, and in association with buboes in other situations in ninety-one cases.

Pelvic buboes were observed in 114 cases. They were single in twenty-five, bilateral in two, and in association with buboes in other areas in eighty-seven cases. In eighty cases the pelvic buboes were associated with groin buboes.

Retroperitoneal buboes, that is, buboes higher up than those called pelvic, were noted in sixteen cases. They were single in only five cases and in association with buboes in other sites in eleven cases.

The bubo was mesenteric in three cases, single in all.

It may be inferred that the infection was conveyed through the skin by inoculation from an infected flea in all the cases under discussion, excepting possibly in the three cases in which the bubo was mesenteric. In these three cases it is possible that the mode of infection was alimentary, through eating infective material, that material being most probably a rat dead of plague.

The large number of pelvic buboes is interesting, indicating that the bacilli were able to pass through the groin gland barriers. In the case of the retroperitoneal buboes, both the groin and the pelvic gland barriers were passed, and it becomes easier then to comprehend the seventy-four cases in which no buboes were present, that is, the intermediate gland barriers were passed and access gained directly to the blood stream. The very large proportion of cervical buboes to buboes in other situations suggests that, as has been shown by the Indian Plague Commission, fleas are more numerous in the fur of the neck than in other parts of the body, and it is likely that most of the septicæmic cases were bitten in this area, the infective bacilli having few gland barriers to pass and thus gaining rapid entrance to the blood stream. Abscess-formation had occurred in the bubo in five cases, in all of which the bubo was cervical.

In two of these, *B. pestis* were fairly numerous in the stained smear, but in only one were they present also in smears from the liver and spleen. In three, no *B. pestis* were seen in the abscess smears or in the organ smears. Guinea-pigs were inoculated with material from each of these three apparently negative cases and the experimental animals succumbed a few days later to plague, with typical signs.

Table 2 gives the data in monthly columns.

Enlarged glands in non-plague cases.—These were fairly common, particularly in the brown rat, which appeared to be the most liable to skin diseases, wounds, ulcerated areas and maggots under the skin. In the earlier part of the year they appeared to be more common than later. Smears were examined from each, and in most cases cultures were also made and guinea-pigs directly inoculated. The total number of enlarged glands encountered, not due to plague, was 113, cervical sixty-two, axillary twenty, groin twenty-eight and pelvic three.

TABLE II.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cervical	16	12	20	12	4	2	7	21	57	109	67	32	359
Axillary	3	3	3	2	...	...	2	5	10	14	6	1	49
Groin	9	2	...	...	...	...	...	...	1	6	3	3	24
Pelvic	...	2	2	2	1	...	...	2	1	8	5	4	27
Retroperitoneal	3	1	...	...	...	...	...	...	1	...	...	...	5
Mesenteric	...	...	...	...	...	...	...	...	...	...	...	...	3
Groin and Pelvic	...	4	5	3	2	...	...	5	12	14	...	2	55
Cervical and Groin	1	1	...	...	...	...	...	1	...	...	1	1	5
Axillary and Groin	...	...	...	...	...	...	...	1	3	...	1	...	6
Cervical, Groin and Pelvic	...	...	1	2	1	...	...	1	1	4	2	...	12
Pelvic and Retroperitoneal	...	...	...	...	...	...	...	...	...	1	...	...	1
Cervical and Retroperitoneal	...	...	...	...	...	...	...	1	...	...	1	1	3
Cervical and Axillary	...	...	...	...	1	...	1	...	2	3	2	1	10
Axillary, Groin and Pelvic	...	...	...	...	...	1	1	...	1	1	3	1	8
Cervical and Pelvic	...	...	...	...	...	...	...	1	...	...	1	...	2
Cervical and Retroperitoneal	...	1	...	...	...	...	...	...	...	1	...	...	2
Axillary and Pelvic	...	...	...	...	...	...	...	...	...	1	1	...	2
Axillary and Retroperitoneal	...	...	...	...	...	...	...	...	...	1	...	...	1
Groin, Pelvic and Retroperitoneal	...	...	...	...	...	...	...	...	1	2	...	...	3
Axillary and Retroperitoneal	...	...	...	...	...	...	...	...	...	...	1	...	1
Total with Bubo...	32	26	31	21	9	3	11	38	90	166	102	49	578
Total with no Bubo	28	6	6	12	...	...	1	3	6	15	13	8	98
Total ...	60	32	37	33	9	3	12	41	96	181	115	57	676

Abscesses in non-plague cases.—These were met with in the lymph-glands, the spleen, the liver and the lung. In the present group of cases they were all examined in smear preparations, in culture, and by animal inoculation, the results being negative as regards plague in all. The abscess was in the cervical region in eleven, in the axilla in four, in the groin and in the mesentery in two cases each, and in the pelvic region in one case.

Single abscesses were met with in the spleen in thirteen cases, in the lung twice and in the liver once. Multiple abscesses of the spleen occurred in five cases, and they were observed in the liver in ten cases.

Naked-eye appearance of organs in Plague Cases: Liver.—This organ was most commonly "mottled," sometimes finely, sometimes coarsely. The latter is an earlier stage of the next commonest condition, which was "speckled." The speckling is due to innumerable minute areas of necrosis. Congestion, the earliest manifestation, was met with least commonly. The actual figures are shown in Table III.

TABLE III.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Mottled ...	21	11	22	15	7	1	2	21	27	28	47	17	219
Speckled ...	16	8	3	3	—	2	8	10	30	59	19	16	174
Congested	2	1	1	2	—	—	—	3	4	5	3	1	22
Normal ...	6	6	3	7	1	—	1	2	18	29	13	6	92
Putrid ...	15	6	8	6	1	—	1	5	17	60	33	17	169
Total ...	60	32	37	33	9	3	12	41	96	181	115	57	676

The Spleen.—This organ practically always showed congestion and enlargement. A speckled appearance was noted in only eight cases and a mottled appearance in one.

The Suprarenals shared in the general congestion. *B. pestis* were not found more frequently or in greater numbers in them than in other organs.

The Lungs frequently showed congestion but no consolidation either lobar or lobular.

Other conditions met with.—Pleural effusion was very common. It was noted in 492 cases. Usually the fluid was clear, but in twenty-six cases it was hæmorrhagic.

Subcutaneous hæmorrhages.—These were met with in the flanks, the axillary and the cervical regions. They were noted in the flanks in thirty cases, in the cervical region in twenty-four and in the axilla in five cases.

Intestinal Hæmorrhage.—This was observed in ninety-one cases. Sometimes practically the whole length of the intestine contained reddish black material, but mostly only a few inches of the bowel were involved. In eleven cases no buboes were present, in one case a mesenteric bubo was noted and in sixty cases the bubo was in the cervical region.

Evidence of chronic plague.—Five cases possibly belong to the category of chronic plague. They all occurred, in the latter half of the year, when the number of plague cases was increasing.

Case 1.—July—*R. norvegicus*. Cervical abscess present. Organs appeared healthy. No *B. pestis* in smears from abscess or from organs. Three guinea-pigs inoculated, all of which died within seven days with all the signs of typical plague.

Case 2.—September—*R. norvegicus*. Cervical abscess present, nothing else noteworthy. Smears from abscess and from internal organs negative. Guinea-pig inoculated on a scarified area of abdomen, with pus from abscess. Guinea-pig died eight days later with all the typical signs of plague.

Case 3.—September—*R. rattus*. Cervical abscess present. Nothing else noteworthy. Smears from abscess and from internal organs negative. Guinea-pig inoculated as above, died six days later with all the typical signs of plague.

Case 4.—November—*R. rattus*. Cervical gland on both sides of neck, yellowish, soft, not congested, adherent. Involution forms of *B. pestis* in pus from gland. Smears from organs negative. Liver faintly mottled, spleen slightly enlarged. No pleural effusion. Animal well-nourished and pregnant.

Case 5.—December—*R. rattus*. Pelvic gland on both sides enlarged, liver and spleen speckled, pleural effusion present, no general congestion. Smears from glands and internal organs negative. Gland juice injected into Guinea-pig, which died six days later with all the typical signs of plague.

In this connection, it must be added that, as already noted, enlarged glands to the number of 113, glandular abscesses to the number of twenty, and abscesses in the liver, the spleen and the lungs to the number of thirty-one were all examined, not only microscopically, but also culturally and by animal inoculation, with negative results.

Evidence of healed plague.—Some of the cases with enlarged but negative glands may have been examples of recovery from plague, but this is not capable of proof. Scars and adhesions of the spleen, thirty-nine cases of which were met with, may also have been signs of recovery from plague, but are equally incapable of proof.

Occurrence of R. rattus var. frugivorus and R. rattus var. alexandrinus.—Very many of the black rats showed signs of mixed breeding, but in a three-monthly period, when 14,623 *Rattus rattus* were examined, 332 were definitely *frugivorus* and 165 were *alexandrinus*.

Age of infected rats. It was only rarely that a young infected rat was found. There were four which measured three and half inches from snout to root of tail, and four were four inches long. All the others were adults.

Ectoparasites of the Lagos Rodents.—Ectoparasites were collected from the dead rats at Ereko by sieving the liquid disinfectant in which they were brought, washing the retained matter into a white basin and picking out the insects.

The number thus obtained gives no indication of the number of fleas, etc., per rat. The fleas obtained were *Xenopsylla cheopis* and *Xenopsylla brasiliensis* mostly, and on rare occasions *Ctenocephalus canis*. Male *X. cheopis* (2,096) outnumbered female *X. cheopis* (1,615), both of these outnumbered both sexes of *X. brasiliensis*; and the male *X. brasiliensis* (973) outnumbered the female *X. brasiliensis* (690). The other ectoparasites were *Laelaps echidninus* and *Hæmatopinus* sp. Table IV. shows the monthly figures.

TABLE IV.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<i>X. cheopis</i> ♂ ...	65	80	100	168	273	283	231	210	205	196	146	139	2,096
♀ ...	56	58	64	128	181	253	204	188	161	118	104	100	1,615
<i>X. brasiliensis</i> ♂ ...	17	43	41	99	161	112	98	84	57	70	95	96	973
♀ ...	17	21	27	64	88	72	64	83	54	59	52	89	690
<i>C. canis</i> ♂ ...	...	1	...	...	...	2	...	...	...	...	...	...	3
♀ ...	...	...	...	...	...	...	...	3	3	...	...	...	6
<i>Laelaps</i> ...	34	50	25	13	27	77	16	28	18	6	4	4	302
<i>Hæmatopinus</i> ...	...	...	...	...	...	...	...	1	...	...	...	...	1
Total ...	189	253	257	472	730	799	613	597	498	449	401	428	5,686

Ectoparasites were also obtained from live rodents, 804 black rats, fifty-one brown rats, and twelve "swamps" rats. The monthly numbers are rather small on which to base percentages for comparison and there was great variation in the number of fleas per rat. The figures are set out in Table V.

TABLE V.
FLEAS FROM LIVE *R. rattus*.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Number of Rats ...	127	96	93	24	108	50	60	35	41	39	66	65	804
<i>X. cheopis</i> ♂ ...	63	103	79	38	36	61	63	32	61	86	63	50	735
♀ ...	75	79	70	22	28	37	34	23	34	34	35	39	510
<i>X. brasiliensis</i> ♂ ...	52	34	56	15	15	20	10	43	49	22	46	19	381
♀ ...	32	28	42	7	6	15	6	34	18	7	58	14	261
<i>C. canis</i> ♂ ...	1	...	...	...	...	...	...	...	...	...	...	...	1
♀ ...	1	1	...	...	...	1	...	...	...	...	...	...	3
Highest number per rat ...	6	30	15	16	4	9	8	9	19	14	14	7	...
Lowest	0	0	0	0	0	0	0	0	0	0	0	0	...
Average	1.76	2.55	2.65	3.41	0.78	2.68	1.88	3.77	3.95	3.82	3.06	1.87	2.35

Only fifty-one live *R. norvegicus* were received. They yielded *X. cheopis* 18♂♂, 28♀♀, *X. brasiliensis* 12♂♂, 9♀♀, and *C. canis* 4♀♀, a total of seventy-one fleas, averaging 1.39 per rat.

Twelve "swamps" rats were received. They yielded *X. cheopis* 7♂♂, 4♀♀ and *X. brasiliensis* 3♂♂, a total of fourteen fleas, averaging just over one per rat.

Seventeen shrews, *Crocidura manni* were received. They yielded one flea *X. cheopis* ♂.

Laelaps echidninus was found on the "swamps" rat as well as on the black and the brown rat. The black rats (804), supplied 247 *Laelaps*, the brown rats (51), supplied sixty-eight and the "swamp" rats (12), supplied 135 *Laelaps*. These insects were not found on any of the shrews.

Hæmatopinus sp.—The black rats yielded 105, the brown rats seventy-five and the "swamp" rats thirty.

ATTEMPTS TO TRANSMIT PLAGUE TO WILD RATS BY FEEDING.

Six experiments were carried out in an attempt to transmit plague to rats by feeding infective material to them.

Experiment (1). 15.2.27.—Five *R. rattus* in cage, fed with two crushed livers and two crushed spleens, mixed with bread and water. The two livers and two spleens both showed abundant plague-bacilli and were quite fresh. All the material was eaten within a few minutes as the rats had been kept without food for half-a-day in order to ensure that they were both hungry and thirsty. No rat showed any sign of illness after eating the infective material. They were all killed with chloroform ten days later (25.2.27). No signs of plague were found, there were no enlarged glands and all organs appeared healthy.

Experiment (2). 17.2.27.—One *R. rattus* fed on the liver and spleen of three infected rats, crushed and mixed with a small amount of bread and water. The three livers and three spleens were fresh and showed very numerous plague bacilli. All the material was eaten by the rat within a few hours. Eleven days later (28.2.27) the animal was killed with chloroform. On dissection, the organs appeared healthy, there were no enlarged glands, and no plague bacilli were found in smears.

Experiment (3). Two *R. rattus* fed on crushed liver and spleen from one infected rat, mixed with bread and water, on 18.2.27. Both liver and spleen showed numerous *B. pestis*. The rats were chloroformed on 28.2.27, the findings being entirely negative, as before.

Experiment (4). Two *R. rattus* on 24.2.27, fed on the hæmorrhagic intestinal contents of three infected rats, mixed with bread and water. The intestinal contents of all showed numerous plague bacilli. One experimental rat died three days later, but showed no sign of plague. The other was killed with chloroform on 8.3.27, and it also proved negative.

Experiment (5). 10.3.27.—Two *R. rattus* fed on crushed liver and spleen, mixed with the bloody intestinal contents of one infected rat. A little bread and water was added to the mixture. On the following day, 11.3.27, the crushed liver and spleen of a fresh infected rat was fed to them. On 14.3.27 one animal was found dead, but showed no signs of plague. The other animal died on 19.3.27, and it also was negative.

Experiment (6). 12.3.27.—Three *R. rattus* fed on hæmorrhagic intestinal contents of infected rat. On the following day they were given the crushed liver and spleen of a fresh infected rat, the infective material on both occasions being mixed with bread and water. On 18.3.27 one experimental rat was found dead, and the viscera of both abdomen and thorax had been eaten by the companions. A

small fragment of liver was found, however, and smears were made from it, no plague bacilli being found. On the following day, 19.3.27, both the remaining animals were found dead. There were no signs of plague at autopsy.

Thus, six feeding experiments on fifteen rats were entirely negative. It will have been observed that no control experiments were done. These were considered not necessary, as on all previous occasions, when infective rat material had been used on guinea-pigs, the results were invariably positive.

Intestinal hæmorrhage in plague rats.—In the Annual Report, 1926, pp. 11-14, certain observations and experiments were described. These were continued and extended during the first three months of 1927, and were communicated to the Royal Society of Tropical Medicine and Hygiene under the heading of "Intestinal Hæmorrhage in Rats Suffering from Septicæmic Plague considered as a Factor in the Spread of Human Pneumonic Plague." This was reprinted in the transactions of that Society, Vol. XXI, No. 4, January, 1928, pp. 289-294. The paper was written in collaboration with Dr. J. C. Paisley, and it was considered that there is a definite danger of the transmission of pneumonic plague to human beings by means of the hæmorrhagic intestinal contents of plague rats.

The following experiments were carried out by Dr. B. G. T. Elmes, with the assistance of Dr. E. C. Smith. They were designed to ascertain whether plague bacilli obtained from infected rats in Lagos were capable of penetrating the unbroken skin of guinea-pigs, and if so, whether the channel of entry could be detected.

In all, three series of guinea-pigs were used. Owing to the rapid attenuation of the organism after having made several passages, new strains had to be made use of.

The method of applying the infectious material was as follows:—In an area of abdominal skin, about the size of half a crown, the hair was cut short with a scissors. The area was then examined with a hand-lens to make certain that no accidental abrasions had occurred. On this area, the plague infected material was applied by means of a cotton wool swab held in a forceps. From the tabulated results it will be seen that infection was obtained through the unbroken skin in six out of seven cases. The average time required for death to occur was 9.66 days, as compared with 5.8 days, which was the average obtained with nine infections through the scarified skin. It is worth noting the tendency to a pulmonary localisation of the condition in some of the animals infected *via* the unbroken skin (Nos. 22, 23, 25, 26, particularly No. 22). By a typical autopsy is meant that the animal showed the usual appearances of death from plague, *i.e.* :

- (1) General subcutaneous congestion.
- (2) Pleural effusion.
- (3) Speckled liver and spleen with marked enlargement and congestion of the latter organ.
- (4) Congestion of the suprarenals.
- (5) Buboes.
- (6) Pulmonary hæmorrhages.

Conclusions.

(1) That the strains of *B. pestis*, isolated in Lagos, can readily pass through the unbroken skin of guinea-pigs. The time required for the infection to become established is longer than when the plague-infected material is inoculated through the scarified skin.

(2) That from an examination of sections of the skin, taken at various intervals from the time of inoculation, it would seem that only a very small proportion of the inoculated plague bacilli penetrated the skin. This probably explains the longer time interval required in these cases.

Series A, B and C overleaf.

BLACKWATER FEVER.

Reports of thirty-five cases have been received, a number slightly higher than in recent years. For the purpose of recording cases of this disease there is a special schedule known as Combined Medical Form No. 18. The unwieldiness of the Form and the large amount of information asked for, tend to defeat the object, which is to obtain accurate data. No single schedule has been completely filled in, which is not surprising considering the amount of work involved, but is disappointing because in some cases the more important information is sacrificed to the lesser. The various data, as supplied, have been grouped and to some extent analysed under headings.

Sex.—An unusual feature is that there were four females, two of these being children.

Age.—All except three were adults, two being girls aged twelve and thirteen years respectively, and the third a male infant aged two and half years. This last case has been reported by Dr. C. Mackey in the West African Medical Journal, Volume I, No. 3, January, 1928, page 43.

The individual ages were: 2½, 12, 13, 22, 24, 25 (four cases); 26 (four cases); 28, 29 (two cases); 31 (three cases); 32, 37 (three cases); 38 (three cases); 38, 45 (two cases); 46, 47, 48, 50 (two cases) and 60 years.

Between the ages of twenty-five and thirty-five years there were fifteen cases and there were nine cases between the ages of thirty-five and forty-five years. Below twenty-five years there were five cases and above forty-five there were six cases. Most of the European population in Nigeria are in the age period twenty-five to thirty-five years.

Occupation.—Non-officials numbered twenty-three, of which eight were engaged in trade, three were connected with the tin-mining industry, three were seafarers in local waters, two were attached to a Bank, two were married women, three were children, one was an engineer and one was a Moslem priest. Government officials were: Three Locomotive Drivers, three Political Officers, two Military, one Posts and Telegraphs, one Agriculture, one Railway Motor Engineer and one African Clerical Staff.

Race.—The descriptions given under this heading are: English sixteen, Scottish three, Irish three, Syrian two, Nigerian two, and Tasmanian, French, German, Swiss, West Indian, Gold Coaster, Sierra Leonean, Arab and Egyptian, one each.

Locality.—There were twenty cases in the Northern Provinces, fourteen in the Southern Provinces and one in British Cameroons. Kano provided nine cases, Lagos five, Jos four, Kaduna three, Agbor, Ibadan and Zaria two cases each, and Abeokuta, Egbe (Ilorin Province), Ikot-Ekpene, Ilorin, Opobo, Sapele, Victoria and Warri, one case each.

SERIES A.

G.P. No.	Mode of inoculation and material used.	Result.	Autopsy.	Remarks.
1.	Saline emulsion of a bubo from a plague rat rubbed into a scarified area of abdomen.	Died on 7th day.	Typical.	
2.	Spleen of No. 1 sliced open and rubbed into scarified area of abdomen.	Died on 6th day.	Typical.	
3.	Spleen of No. 2 rubbed on <i>unbroken</i> skin of abdomen.	Died on 9th day.	Speckled liver and spleen B. pestis in smears from organs.	Sections of skin from the inoculation area showed little change from normal. Blood vessels of corium packed with B. pestis.
4.	Spleen of No. 2 sliced and rubbed on scarified skin of abdomen.	Died on 6th day.	Typical.	This animal was inoculated same day as No. 3 and served as a control. It also demonstrated the shorter time necessary for infection <i>via</i> this mode of inoculation.
5.	Spleen of No. 4 rubbed on scarified area of abdomen.	Died on 6th day.	Typical.	Shows period required for infection to take place by this route to be fairly constant (<i>i.e.</i> 6 days) with this strain of B. pestis.
6. 7. and 8.	Spleen of No. 5 sliced and rubbed on the <i>unbroken</i> skin of abdomen of all three.	Nos. 6 and 7 killed at 24 and 48 hours intervals from time of inoculation respectively. No. 8 was allowed to live and never developed infection.	—	Sections of inoculated areas revealed plague bacilli on the surface only. As No. 8 never developed plague it would seem that the strain had become too attenuated to produce an infection through the unbroken skin.
9.	Spleen of No. 5 rubbed on scarified area of abdomen.	Died on 9th day.	Typical.	This G.P. was inoculated the same day as Nos. 6, 7 and 8 and therefore served as a control. Note the longer time required for the infection to become established.

SERIES B.

10.	Liver and spleen of a plague rat sliced and smeared on a scarified area of the abdomen.	Died on the 4th day.	Typical.	
11. 12. 13. 14. and 15.	Spleen of No. 10, sliced and rubbed into the <i>unbroken</i> skin of the abdomen.	Nos. 11, 12, 13, and 14 killed at 6, 12, 18, and 24 hours respectively from time of inoculation. No. 15 died on the 9th day.	— Typical.	Skin sections all negative except for occasional plague bacilli on the surface. No. 15 served as a control and showed that this strain was capable of producing infection through the unbroken skin.

SERIES C.

G.P. No.	Mode of inoculation and material used.	Result.	Autopsy.	Remarks.
16.	Liver of plague rat sliced and rubbed on scarified area of abdomen.	Died on the 6th day.	Typical.	
17.	Spleen of No. 16 sliced and rubbed on scarified area of abdomen.	Died on the 4th day.	Typical.	
18. 19. 20. 21. and 22.	Spleen of No. 16 sliced and rubbed on the <i>unbroken</i> skin of abdomen in all.	Nos. 18-21 were killed in 8, 15, 24 and 36 hours respectively from inoculation No. 22 was left and died on the 10th day.	— Liver and spleen negative. Infarct-like areas in the lungs which showed numerous <i>B. pestis</i> in smears.	Skin sections all negative except for scanty <i>B. pestis</i> on the surface. The lung involvement was the striking feature of autopsy.
23.	Liver, lungs and spleen of No. 22 emulsified in distilled water and rubbed into the <i>unbroken</i> skin of abdomen.	Died on the 10th day.	Typical and conspicuous hæmorrhagic areas in the lungs.	
24.	Same material used as in No. 23 smeared on scarified area of abdomen.	Died on the 5th day.	Typical.	Nos. 23 and 24 being inoculated the same day and with the same material, demonstrate well the variation of the time interval dependent upon the method of inoculation.
25.	Liver and lung of No. 23 emulsified in distilled water and smeared on <i>unbroken</i> skin of abdomen.	Died on the 10th day.	Typical and marked hæmorrhagic splotches in the lungs.	Smears from lungs, liver and spleen showed many involution forms of <i>B. pestis</i> .
26.	Liver and lung of No. 25 emulsified in distilled water and smeared on <i>unbroken</i> skin of abdomen.	Died on the 10th day.	Typical changes in lungs as in No. 25.	Involution forms present but not so marked as in No. 25.

Season.—There was one case in January and there were four in February, two in March, nil in April, two in May, two in June, three in July, six in August, four in September, five in October, three in November and three in December.

Period of residence in district.—This information is of doubtful value in the following cases, for the attached reasons: Three seafaring patients, two of whom developed the attack in Lagos and one in Victoria, and all of whom spent most of their time either on the water or in other ports; three locomotive drivers, two of whom developed the attack in Kaduna and one in Ibadan, and all of whom daily or nightly passed through or stopped at different places; a Lieutenant whose stations had included Zaria, Ibadan, Lagos and Kaduna, whose illness occurred during a visit to Zaria after a twenty-days' period of manœuvres; a sergeant who had been stationed at Ibadan, Lagos and Agbor within seven months and who got his attack seventeen days after arrival in the last-named station; and a French trader with no permanent residence whose dealings were mainly in cattle, who arrived at Kano a few hours before he went down with an attack.

In the remaining cases, the period of more or less continuous residence in the place where the attack developed was: Two, many years; one, four years; one, three years; three, two years; two, eighteen months; one, fifteen months; one, fourteen months; four, one year; one, ten months; four, eight months; one, seven months; two, six months; one, four months; one, one month and one not noted.

Length of present tour.—By this is meant the period since last in a temperate climate. Excluding the non-Europeans, this period was: one, five years; one, four years; one, nineteen months; one eighteen months; one, sixteen months; one, fifteen months; two, thirteen months; one, eleven months; two, ten months; three, nine months; two, eight months; four, seven months; two, six months; one, four months; one, three months; one, one month; and one, not noted.

Previous residence in Tropics.—*Case 1.*—Syrian, age 38 years; 36 years in Lebanon, 2 years in Nigeria.

Case 2.—English, age 38 years; most of his life at sea, 3 years in Nigeria.

Case 3.—English, age 29 years; 6 years in India, Mesopotamia and China, three years in Nigeria.

Case 4.—Egyptian, age 45 years; 44 years in Egypt, 1 year in Nigeria.

Case 5.—Swiss, age 50 years; 12 years in China, 8 years in Senegal, 4 years in Nigeria.

Case 6.—Scottish, age 26 years; 2½ years in Nigeria.

Case 7.—English, age 31 years; 8 years in Nigeria.

Case 8.—English, age 47 years; 4 years in Ceylon, 8 years in Nigeria.

Case 9.—Nigerian, age 60 years; lifetime in Nigeria.

Case 10.—English, age 26 years; 1½ years in Nigeria.

Case 11.—English, age 37 years; 8 months in Nigeria, other tropical experience not stated.

Case 12.—Gold Coaster, age 46 years; 24 years in Gold Coast, 22 years in Nigeria.

Case 13.—Irish, age 45 years; 15 years in Nigeria.

Case 14.—English, age 32 years; 10 years in Egypt and Sudan, 1½ years in Nigeria.

Case 15.—Scottish, age 38 years; 2 years in Near East, 3 years in Ceylon, $3\frac{1}{2}$ years in Nigeria.

Case 16.—Nigerian, age $2\frac{1}{2}$ years; lifetime in Nigeria.

Case 17.—Syrian, age 12 years; $10\frac{1}{2}$ years in Syria, $1\frac{1}{2}$ years in Nigeria.

Case 18.—West Indian, age 26 years; 20 years in West Indies, 6 years in Nigeria.

Case 19.—Sierra Leonean, age 25 years; 23 years in Sierra Leone, 2 in Nigeria.

Case 20.—English, age 39 years; 5 years in South America, 7 years in Nigeria.

Case 21.—English, age 25 years; 2 years in Nigeria.

Case 22.—German, age 24 years; 9 months in Cameroons.

Case 23.—Irish, age 31 years; 5 years in India, 7 years in Nigeria.

Case 24.—English, age 53 years; 17 years in Nigeria.

Case 25.—French, age 28 years; 5 years in French West Africa.

Case 26.—English, age 26 years; 10 months in Nigeria.

Case 27.—Arab, age 25 years; 22 years in Tripoli, 3 years in Nigeria.

Case 28.—Irish, age 37 years; 3 years in India, 7 years in Nigeria.

Case 29.—Scottish, age 29 years; 5 years in Sierra Leone, 1 year in Gold Coast, 1 year in Nigeria.

Case 30.—English, age 13 years; $5\frac{1}{2}$ years in India, 13 months in Nigeria.

Case 31.—English, age 48 years; 4 years in Ceylon, over 2 years in Nigeria.

Case 32.—English, age 25 years; 10 years in West Africa.

Case 33.—English, age 27 years; 5 years in French Congo, 10 months in Nigeria.

Case 34.—Tasmanian, age 37 years; 2 years in Egypt, 17 months in Nigeria.

Case 35.—English, age 31 years; no information given.

It is noteworthy that the only tropical experience in Case 11 was, probably, only eight months; in Case 22, only nine months; and in Case 26, only ten months.

Personal Prophylactic Measures.—The data regarding personal prophylactic measures against malaria are given for what they are worth. They form interesting reading even if they are not all reliable, and attaching the malarial history adds to the interest.

Case 1.—Syrian, age 38 years; a chronic malarial cachectic, has had two previous attacks of blackwater. Takes quinine irregularly.

Case 2.—English, age 38 years; admits to only two previous attacks of malaria. Had been seedy for last four months. Takes five grains quinine more or less daily.

Case 3.—English, age 29 years; had malaria in Mesopotamia in 1918, several attacks in India, 1922-24, one "bad" attack and several "slight goes" last tour in Nigeria, and three or four "slight goes" this present tour. Has been taking five grains quinine regularly each day for last five months.

Case 4.—Egyptian, age 45 years; a chronic malarial cachectic, had blackwater twenty years previously. Takes quinine irregularly.

Case 5.—Swiss, age 50 years; had an attack of blackwater two years previously, has had frequent attacks of malaria. Takes quinine irregularly.

Case 6.—Scottish, age 26 years; had his first attack of malaria three days before onset of present attack of blackwater, used a mosquito-curtain in bed, wore mosquito boots in evenings, had taken no quinine for eighteen days before his malarial attack.

Case 7.—English, age 31 years; has had malaria, uses a mosquito curtain in bed and takes five grains quinine daily, has had "low fever" for last few months.

Case 8.—English, age 47 years; six attacks of malaria noted on his Medical History Sheet during 1919-1923, and another attack in October, 1924. Reports having had no fever during last eight months, sleeps under a mosquito net, does not wear mosquito boots, takes quinine very irregularly.

Case 9.—Native of Lagos, age 60 years; found dead, diagnosed post-mortem. Stated to have had frequent attacks of "cold fever" for which he took "native medicine," no prophylactic measures against malaria.

Case 10.—English, age 26 years; no notes except "no recent fever."

Case 11.—English, age 37 years; stated to have had an attack of malaria five days previous to onset of blackwater, and to have taken five grains quinine daily.

Case 12.—Gold Coast native, age 46 years; had frequent attacks of malaria. Took quinine irregularly.

Case 13.—Irish, age 45 years; ten attacks of Malaria on Medical History Sheet, has had numerous other "slight" attacks, sleeps in a mosquito-proof cubicle, takes five grains quinine in tablet form daily and was suffering from malaria just before onset of blackwater.

Case 14.—English, age 32 years; has had repeated attacks of malaria. He states that he takes the usual precautions, and that he takes five grains quinine daily, both of which statements are doubted by his medical attendant.

Case 15.—Scottish, age 38 years; had severe "malignant malaria" in Salonika in 1916, several mild attacks in Ceylon, 1920-23, two attacks in his first tour, one in his second tour and none, up to the present, in this, his third tour, in Nigeria, uses a mosquito net, wears mosquito boots and takes five grains quinine in tablet form daily. Had blackwater one year ago.

Case 16.—Ibo (Nigerian), age 2½ years; had attacks of "fever" from time to time and was given quinine only when he complained of "feeling cold."

Case 17.—Syrian, age 12 years; diagnosed post-mortem, no history obtained.

Case 18.—West Indian, age 26 years; has had malaria, and has had irregular "bouts of fever" from time to time. Took quinine irregularly.

Case 19.—Sierra Leonean, age 25 years; has had malaria "off and on" frequently, and is an irregular taker of quinine.

Case 20.—English, age 39 years; has had several attacks of malaria, uses a mosquito net, takes five grains quinine when he

remembers, and had a definite malarial attack one week previous to onset of present attack of blackwater.

Case 21.—English, age 25 years; states he has had no malaria and that he takes five grains quinine daily. The medical attendant considers these statements untrue.

Case 22.—German, age 24 years; frequent attacks of malaria during last few months, seldom more than a week free from the illness. Says he is a regular quinine taker.

Case 23.—Irish, age 31 years; has had malaria, and had slight attacks for some time previous to the onset of blackwater. Used a mosquito net and had taken quinine regularly until the last few weeks.

Case 24.—English, age 53 years; has had malaria, uses a mosquito net, has taken quinine irregularly during the last six months.

Case 25.—French, age 28 years; has had malaria several times, sometimes uses a mosquito net, does not take quinine.

Case 26.—English, age 26 years; had a definite attack of malaria four months previously, uses a mosquito net, wears mosquito boots, did not take quinine until the attack of malaria, thereafter took five grains Quinine Bisulphate twice weekly.

Case 27.—Arab, age 25 years; has had malaria "off and on," took no prophylactic measures.

Case 28.—Irish, age 37 years; has had seven or eight attacks of malaria, one attack about one month ago, sleeps in a mosquito proof room and takes five grains quinine daily.

Case 29.—Scottish, age 29 years; three definite attacks of malaria, last one a fortnight ago, uses a mosquito net, wears mosquito boots and takes five grains quinine regularly at lunch time.

Case 30.—English, age 13 years; had malaria several times in India and fairly frequently during her year's stay in Nigeria. Used a mosquito net and is stated to have taken $2\frac{1}{2}$ grains quinine daily. This last statement is queried by the medical attendant.

Case 31.—English, age 48 years; has had several "small goes" of fever during last three months, uses a mosquito net and is quite regular in taking five grains quinine in tablet form daily.

Case 32.—English, age 25 years; has had repeated attacks of malaria, and took no prophylactic measures.

Case 33.—English, age 27 years; has had occasional attacks of fever, uses a mosquito net and is practically a non-taker of quinine.

Case 34.—Tasmanian, age 37 years; has had occasional "small attacks" of fever, never consulted Medical Officer, used a mosquito net and never missed taking five grains quinine hydrochloride in the morning.

Case 35.—English, age 31 years; no history.

In thirteen cases the patient stated that a prophylactic dose of quinine was taken regularly, which suggests that in their case, the drug failed to protect them from malaria. In four instances the medical attendant has reason to doubt the accuracy of the claim to regularity. It would appear also that although all thirteen cases were having malaria more or less frequently, no attempt was made to get rid of the disease by means of adequate doses of quinine.

RECENT QUININE AND ONSET OF ILLNESS.

Case 1.—Syrian, chronic malarial cachectic, fever on 9th January, 1927, saw Medical Officer on 11th January, 1927, subtertian malaria diagnosed microscopically and five grains quinine in liquid form prescribed twice daily. Took five grains in the morning and again at noon, rigor at 9 p.m., passed blackwater at 9.15 p.m. Total quinine ten grains in twelve hours, last dose five grains, interval 9-9½ hours. Died on 13th January, 1927. Urine did not clear.

Case 2.—English, "seedy" for months previous to 19th February, 1927, on which date he took a five-grain tablet of quinine bisulphate at 9 a.m. At 1 p.m. on 20th February, 1927, he passed blackwater. He did not complain of a rigor. Total quinine in twenty-four hours, five grains, interval twenty-eight hours. Urine cleared in forty-eight hours.

Case 3.—English. Caught a typical "cold" on 16th February, 1927, took his usual five grains quinine daily in the evening until 23rd February, 1927, on which date he took 5 grains quinine hydrochloride at 9 a.m., 5 grains at 11 a.m. and ten grains at 5 p.m. At 2 a.m. on 24th February, 1927, he had a rigor, and at 6 a.m. he passed blackwater. Total quinine in eight hours, twenty grains, last dose ten grains interval nine to thirteen hours. Urine cleared in twenty-four hours. As soon as urine became clear and alkaline he was put on quinine, rapid recovery following.

Case 4.—Egyptian. Chronic malarial cachectic. Had rigor at 1 p.m. on 25th February, 1927, took twenty grains quinine in liquid form in one dose at 9 p.m., and at 6 a.m. on 26th February, 1927, passed blackwater. Total quinine twenty grains, interval nine hours. Urine cleared in twenty-four hours.

Case 5.—Swiss. Felt unwell and took a five-grain tablet of quinine at noon on 22nd February, 1927. Four days later, *i.e.*, on 26th February, 1927, at 5 p.m., he had a rigour, and at 10 p.m., he passed blackwater. Total quinine five grains, interval four days. Urine cleared in four days.

Case 6.—Scottish. Malarial attack on 6th March, 1927, took twenty grains quinine in tablet form on 7th March, 1927, and again on 8th March, 1927, whether in divided doses and actual hour, not stated. At 2 a.m. on 9th March, 1927, he had a rigor and at 8 a.m., he passed blackwater. Total quinine forty grains in two days, last day twenty grains, interval probably about twelve hours. Urine cleared in eight hours.

Case 7.—English. Fever commenced on 14th March, 1927, increased his daily five grains to ten grains quinine in tablet form and continued this dosage until 17th March, 1927, on which day, at noon, he passed blackwater. He had no definite rigor. Total quinine in four days forty grains, last dose ten grains at 8 a.m., interval four hours. The urine cleared in three days.

Case 8.—English. Had "fever" on 1st May, 1927, felt better on 2nd May, 1927, took a five-grain tablet of quinine hydrochloride at 7 a.m. on 3rd May, 1927, had a rigor at 6 p.m. and passed blackwater at 11 p.m. Total quinine 5 grains, interval eleven to sixteen hours. The urine was clear on 6th May, 1927, but on 12th May, 1927, the temperature rose and blackwater reappeared. On 13th May, 1927, the urine was clear. On 17th May, 1927, there was again a slight rise of temperature and two samples of urine on that day were reddish in colour. Liquid quinine was begun, then, in one grain doses daily, increased by one grain each day until five grains daily were being taken. The two relapses occurred when no quinine was being given, and there were no relapses after quinine treatment was given.

Case 9.—Reliable history unobtainable.

Case 10.—No history given.

Case 11.—English. Had a malarial attack on 19th June, 1927, took only his usual five grains quinine daily and finally called in the Medical Officer on 22nd June, 1927, who took him to hospital. On 23rd June, 1927, had five grains quinine in liquid form thrice daily, last dose at 8 p.m. At 2 a.m. on 24th June, 1927, he had a rigor and at 10 a.m. passed blackwater. Total quinine in five days, thirty-five grains, last day fifteen grains, last dose five grains, interval six to fourteen hours. The urine cleared in twenty-four hours, but as the temperature rose again on 27th June, 1927, quinine was administered on 28th June, 1927, and blackwater at once reappeared, to disappear finally on 30th June, 1927.

Case 12.—Gold Coast native. On 2nd July, 1927, took twenty grains quinine in two doses of ten grains, on account of fever. On 3rd July, 1927, took ten grains quinine bihydrochloride in tablet form at 6 p.m., had a rigor at 9 p.m. and at 6.30 a.m. on 4th July, 1927, passed blackwater. Total quinine thirty grains in two days, last dose ten grains, interval three to twelve-and-a-half hours. Urine cleared in thirty-six hours.

Case 13.—Irish. Remained in bed on 5th July, 1927, temperature $102^{\circ}.4$ F, took five five-grain doses of quinine, last dose at 6 p.m. had no rigor, but just before midnight he passed blackwater. Total quinine twenty-five grains in one day, last dose five grains, interval six hours. Urine cleared in forty-eight hours.

Case 14.—English. A malarial attack began on 1st July, 1927, for which he took five grains quinine twice daily until 4th July, 1927, when he increased the quinine to three five-grain doses daily. On 5th July, 1927, blackwater was passed, but as there had been no rigor, and he had passed water several times on that day without observing its colour, the time of onset cannot be accurately determined. Total quinine forty-five grains in four days. The urine cleared in thirty-six hours.

Case 15.—Scottish. Had fever on 8th August, 1927, and next day doubled his usual five-grain dose of quinine. On 10th August, 1927, after taking one five-grain dose of quinine he sent for the Medical Officer who admitted him to hospital, examined his blood microscopically and found malarial parasites. Notwithstanding this finding, quinine was withheld, pending rendering the urine alkaline. On 12th August, 1927, the urine being only faintly acid, five grains quinine hydrochloride were given in solution at 8 a.m., at 10.30 a.m., there was a rigor, and at 11.30 a.m. blackwater was passed. From onset of fever on 8th August, 1927, onwards, the total quinine was twenty-five grains in five days, no quinine given on 11th August, 1927, last dose five grains, interval two-and-a-half to three-and-a-half hours. Urine cleared in forty-eight hours.

Case 16.—Ibo (Nigerian) infant. Complained of "colic" on 17th August, 1927, was given four grains quinine at 1 p.m., at which hour there was a rigor. Blackwater was passed at 2 p.m. on 18th August, 1927, and eleven hours later the child died. A similar dose of quinine had been given without ill-effect on 10th August, 1927.

Cases 17 and 18.—Histories unobtainable.

Case 19.—Sierra Leone native. Had malarial attack on 28th August, 1927, took ten grains quinine in a single dose (bihydrochloride) and repeated the dose on 29th August, 1927. On 30th August, 1927, he took ten grains in liquid form at noon. Almost immediately he had a rigor and at 2 p.m. he passed blackwater. Total quinine thirty grains in three days, last dose ten grains, interval two hours. Urine cleared in twenty-four hours.

Case 20.—English. An attack of malaria began on 25th August, 1927, the Medical Officer was called in on 28th August, 1927, and on microscopic examination of the blood malaria parasites were found. He was then put on a quinine mixture (exact dosage not stated but probably five grains thrice or four times daily) and his temperature became normal. On the morning of 31st August, 1927, at 6 p.m., he had a severe rigor and at 10 p.m., he passed blackwater. The total amount of quinine is not stated but the last dose was five grains in solution at 5 p.m., so that the interval was one to five hours. The urine cleared during the next day (1st September, 1927), but darkened again after another rigor in the evening, finally clearing on 3rd September, 1927.

Case 21.—English. Felt unwell towards evening of 21st September, 1927, and on 22nd September, 1927, took five grains quinine in tablet form at 1 p.m. after a shivering fit, sent for medical officer who brought him into hospital. At 8 p.m. he passed blackwater. Total quinine five grains, interval seven hours. Urine cleared in forty-eight hours.

Case 22.—German. Had an attack of malaria on 22nd September, 1927, and took thirty grains of Quinine, whether in divided doses or not, is not stated, had a rigor a few hours later and when he passed urine next, it was black. Twelve hours later the urine was clear.

Case 23.—Irish. Felt out of sorts for ten days previous to 23rd September, 1927, on which date, at 10.30 a.m. he took ten grains quinine in tablet form. At 10.30 p.m. on 24th September, 1927, he passed blackwater, and half-an-hour later he had a rigor. Total quinine ten grains in one dose, interval thirty-six hours. Urine cleared in forty-eight hours.

Case 24.—English. Had fever on 24th September, 1927, and took three five-grain tablets quinine in one dose at 6 p.m. On 25th September, 1927, he took five grains twice in the day. On 26th September, 1927, he took five grains at 6 p.m., six hours later he had a rigor and at 6 a.m. on 27th September, 1927, he passed blackwater. Total quinine in three days thirty grains, last dose five grains on last day, interval six to twelve hours. Urine cleared in six hours.

Case 25.—French. Felt feverish on 5th October, 1927, and took fifteen grains quinine in cachet at 7 p.m. He had had a rigor at 6 p.m. and passed blackwater at 8 p.m. Total quinine fifteen grains in one dose interval one hour. Urine began to clear next day, but darkened again after a rigor on 7th October, 1927 (no more quinine having been taken) and finally cleared on 8th October, 1927.

Case 26.—English. In indifferent health for some time. Took her usual twice-weekly dose of five grains quinine bisulphate at 8 p.m. on 12th October, 1927. At 10 a.m. on 13th October, 1927, there was a severe rigor, followed by vomiting and diarrhoea. The diarrhoea continued throughout the day, so that the character of the urine was not observed and it was only on 14th October, 1927, that she found she was passing blackwater. Total quinine five grains, interval fourteen hours. She died on 16th October, 1927, the urine having remained black, but much diminished in quantity.

Case 27.—Arab. Had malaria "off and on" for weeks. On 16th October, 1927, took a five-grain tablet quinine bihydrochloride in morning and again in evening at 6 o'clock. Next day he had a rigor at 3 p.m., and at 4 p.m. he passed blackwater. Total quinine ten grains, last dose five grains, interval twenty-one to twenty-two hours. Urine cleared in eighteen hours.

Case 28.—English. Admitted to hospital suffering from malaria on 29th October, 1927, and was put on five grains quinine thrice daily by the mouth. The last dose was taken at 9 a.m. on 1st November, 1927, and blackwater was passed at 10 a.m. There was no rigor. Total

quinine forty-five grains in four days, last dose five grains, interval one hour. Urine began to clear on morning of 2nd November, 1927, but darkened again in afternoon, a phenomenon which was repeated on each of the following two days, the urine finally clearing on the fifth day.

Case 29.—Scottish. Had malaise on 29th October, 1927. On that day and on each of the two following days he took five grains quinine hydrochloride in tablet form at noon and again in the evening. The last dose was taken at 6 p.m. on 31st October, 1927, and at 10 a.m. on 1st November, 1927, he passed blackwater. There was no rigor. Total quinine thirty grains in three days, last dose five grains, interval sixteen hours. Urine cleared in five days.

Case 30.—English. Said not to have had fever for some weeks. Took her usual daily two-and-a-half grains tablet quinine hydrochloride at 7 a.m. on 23rd November, 1927 (believed to have had no quinine for five days previously) and an hour later passed reddish water. There was no rigor and the condition was at first thought by the parents to be due to menstruation. Total quinine two-and-a-half grains, interval one hour. Urine gradually cleared but on 27th November, 1927 it darkened again, coincident with a rise in temperature. Quinine was given in one grain doses once a day from 28th November, 1927 onwards, the temperature subsided and the urine finally cleared on 29th November, 1927.

Case 31.—English. Felt fairly well on 27th November, 1927, but at 10 p.m., had a rigor and felt very ill; at 11 p.m. and again at midnight he took a five-grain tablet of quinine. Driving a train leaving Minna at 7 p.m. on that day (27th November, 1927), he arrived at Kaduna at 8 a.m. and took another five-grain tablet of quinine. He had passed water several times *en route*, but could not observe the colour. He passed water at 8.30 a.m. on 28th November, 1927, which was black, and shortly thereafter had another rigor. If the usual morning dose of quinine is included, the total quinine is twenty grains in twenty-four hours, last dose five grains, interval half-an-hour. Urine cleared on second day, darkened on third, cleared again on fourth, darkened once more on fifth and finally cleared on sixth day.

Case 32.—English. Had a malarial attack on 2nd December, 1927, subtertian rings being found on microscopic examination of the blood, and he was given a mixture containing five grains quinine per dose. He took two doses on that day, and two doses again on 3rd December, 1927. On 4th December, 1927 he was taken to hospital on account of severe vomiting during the previous night. A severe rigor occurred at noon on 4th December, 1927, but no urine was passed until 3 a.m. on 5th December, 1927, when only a small quantity was passed, the colour being black. Patient died on 8th December, 1927, having passed very little urine, which remained black. Total quinine twenty grains in two days, last dose five grains, interval perhaps eighteen hours.

Case 33.—English. Had a slight attack of fever on 4th December, 1927, but took no quinine (he had taken none for months). He had a slight rigor at noon on 4th December, 1927, but did not feel ill and remained at work. On 6th December, 1927, at 12.40 p.m., he passed blackwater. At 4 p.m. it was red, at 6.15 p.m. it was yellow, at 8.30 p.m. it was dark red and it remained so until death at noon on 7th December, 1927. Only small quantities of urine were passed.

Case 34.—Tasmanian. Had fever on 8th December, 1927, and took his usual five grains quinine hydrochloride in tablet form at 8.30 a.m. on that and on succeeding day. He had no rigor but at 4.30 p.m. on 9th December, 1927, he passed blackwater. Total quinine in two days ten grains, last dose five grains, interval eight hours. Towards night of 9th December, 1927, urine was clear; it darkened again in early morning of 10th December, 1927, by evening of that day it was again clear but it again darkened in early morning of 11th December, 1927.

From 12th December, 1927, until 14th December, 1927, the urine remained clear, becoming red at end of 14th December, 1927, clearing in early morning of 15th December, 1927, darkening and again clearing during that day, remaining clear till 18th December, 1927, when it darkened again, to become clear on 19th December, 1927. On 23rd December, 1927, there was one specimen passed at noon which was bright-red in colour. Thereafter he rapidly recovered. No quinine was given throughout the illness.

Case 35.—No history given.

It will be seen that in every case where a history of onset was available, the initial signs and symptoms of the illness were those of a malarial attack; indeed, in Cases 1, 11, 14, 15, 20, 28 and 32 malaria parasites were found on microscopic examination of the blood, previous to the appearance of blackwater. It is only natural to find that quinine was taken in every case except one, always on the patient's own initiative, and in some cases later increased, moderated or stopped by the Medical Officer. The dosage in no case was excessive, although it was rather high in Case 22, namely thirty grains in one dose.

However, if the rigor be regarded as the first indication that lysis of the red blood cells is taking place on a large scale, the blackwater itself being the later manifestation of the condition, then it is probable that in Cases 4, 16, 21, 25, 30 and 31 quinine was first administered after, and not before the damage was done. This would mean that, including Case 33 where no quinine was taken, there were seven cases in which quinine was neither an exciting nor a predisposing cause. Case 19 might be added to this list, making the total eight, as the taking of quinine and the onset of rigor almost coincided. There were, in addition, six cases in which the amount of quinine taken was small, and the interval, before the appearance of rigor or blackwater prolonged. These cases are:—

Case 2.—One five-grain dose taken, an interval of twenty-eight hours.

Case 5.—One five-grain dose taken, an interval of four days.

Case 8.—One five-grain dose taken, an interval of eleven to sixteen hours.

Case 23.—One ten-grain dose taken, an interval of thirty-six hours.

Case 26.—One five-grain dose taken, an interval of fourteen hours.

Case 27.—Two five-grain doses taken, an interval of twenty-one hours.

The following cases are of particular interest: Case 8. The urine had remained clear for four days after the first relapse, but following a rise of temperature it reddened again. Quinine, in small doses gradually increased, lowered the temperature and the urine cleared during its administration. Case 11—Two days after the urine had cleared, the temperature rose and on the third day quinine was given, the blackwater reappearing shortly thereafter.

Case 15.—Quinine withheld for two days during which period attempts were made to render the urinary output alkaline. At the end of the two days, the urine being only faintly acid, the administration of five grains quinine was followed two-and-a-half hours later by a rigor and another hour later by the passing of blackwater. Case 30.—A relapse, accompanied by a rise in temperature was treated with quinine, the temperature subsiding and the urine clearing under its administration. Case 34.—No quinine was given after the five-grain dose which preceded the onset of blackwater by eight hours, nevertheless, he had

numerous relapses in the ensuing fortnight. The cases cited above, in their different groups, indicate that although it is wise, in a chronic malarial subject to be cautious in administering quinine, it is not justifiable to incriminate an indispensable drug the proper use of which will, in most cases prevent that state of malarial saturation which precedes blackwater.

Examination of the Blood.—A microscopic examination of the blood was made in thirty-one cases. As already noted, subtertian rings were found in seven cases before the onset of hæmoglobinuria, all of which were negative on examination after the appearance of blackwater except in Case 1 in which pigmented mononuclears were present on the second day. Sixty-one examinations were done during the course of the illness. On the first day of hæmoglobinuria nineteen cases were examined, subtertian rings were found in four, pigmented mononuclears in three and twelve were negative. Sixteen cases were examined on the second day of hæmoglobinuria, there were subtertian rings in two, pigmented mononuclears in one, and thirteen were negative. On the third day eight cases were examined, there were subtertian rings in one, pigmented mononuclears in one, and six were negative. On the fourth day five cases were examined, subtertian rings were present in one, pigmented mononuclears were present in one, and three were negative. The figures are the same for the fifth day. On the sixth and seventh days the four cases examined on each day were negative. In the total of thirty-one cases therefore in which the blood was examined after the appearance of hæmoglobinuria, five cases showed subtertian rings and an additional three showed pigmented mononuclears. Including those which showed subtertian rings before the onset of hæmoglobinuria and subtracting one of these which afterwards showed pigmented mononuclears, fourteen cases were thus definitely proved to have malaria.

Details of the positive cases are:—

Case 1.—Subtertian rings on first day.

Case 5.—Subtertian rings on second and fourth days.

Case 13.—Subtertian rings on first day.

Case 16.—Subtertian rings on first day.

Case 19.—Pigmented mononuclears on first day.

Case 26.—Pigmented mononuclears on first day.

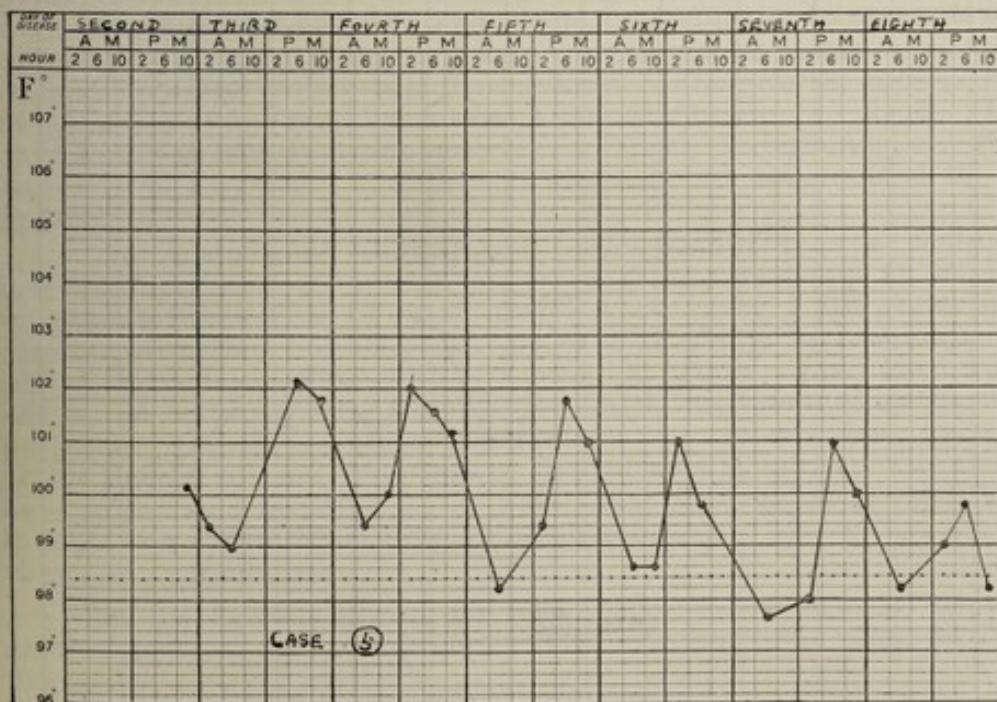
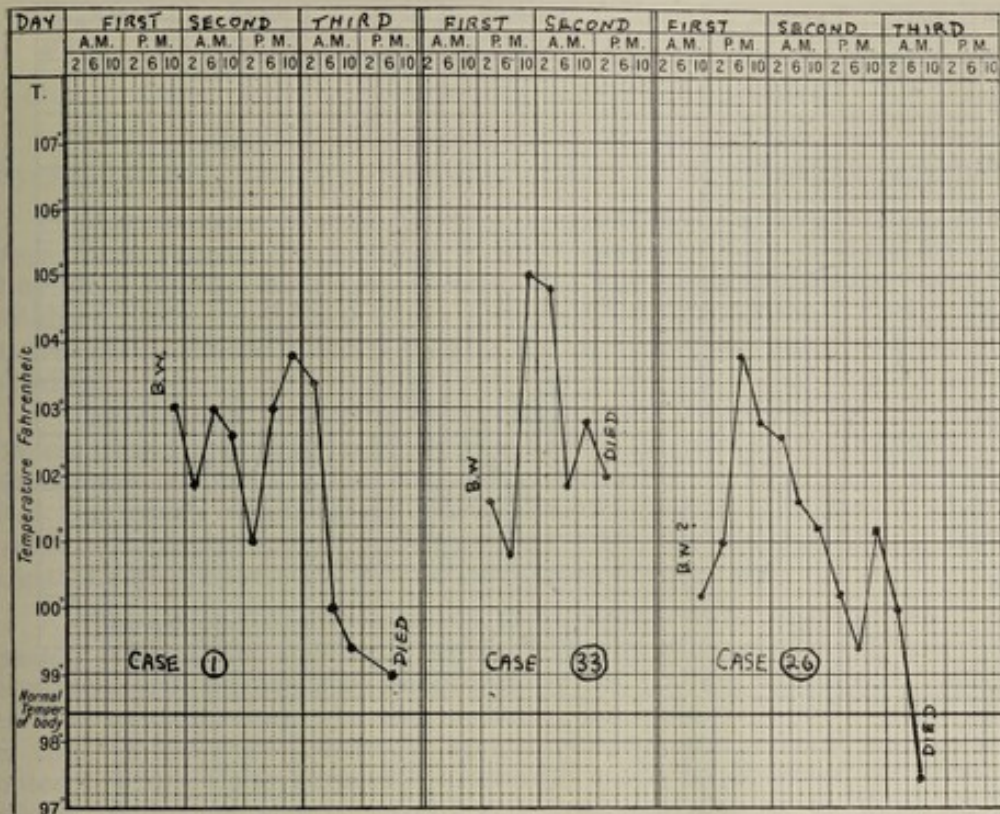
Case 34.—Pigmented mononuclears on first, second, third and fourth days.

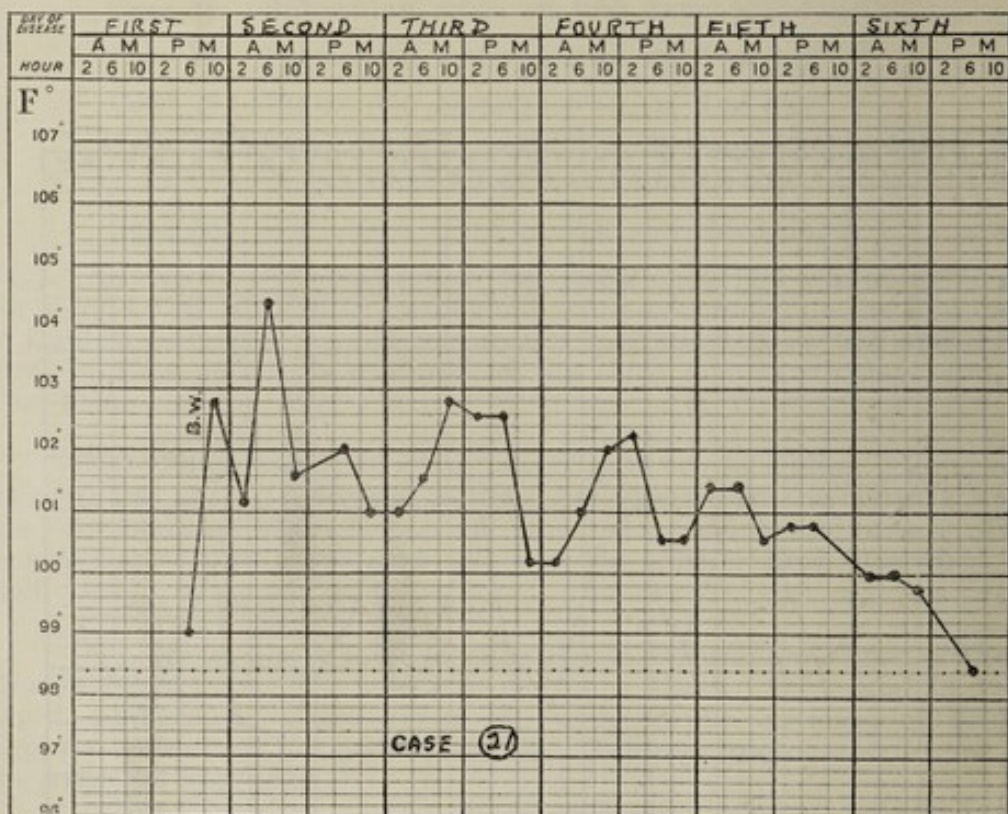
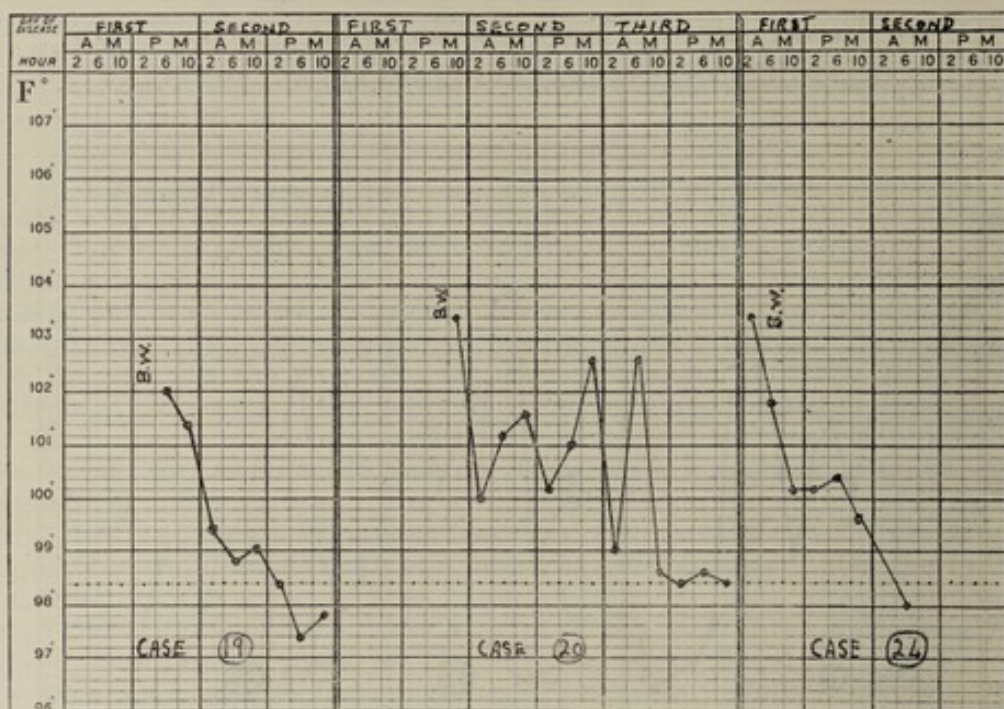
Case 35.—Subtertian rings on first and third days.

As regards the blood serum, in Case 2 cholæmia was observed on the second day, in Case 15 hæmoglobinæmia was noted on the first day, in Case 23 hæmoglobinæmia was observed on the first, second and third days, in Case 24 it was recorded on the third and fourth days and in Case 31 on the first day.

The clinical signs and symptoms require no description. Vomiting more or less severe, a certain anxiety, early jaundice and pyrexia were the outstanding features apart from the hæmoglobinuria. The occurrence of remissions and relapses has already been described in each case.

The illness had a fatal termination in eight cases. Two of these (Nos. 9 and 17) were first seen post-mortem. Cases 1, 2, 18 and 33 were rapid, particularly Cases 2 and 33, with ample excretion of urine. Suppression ensued in Cases 26 and 32. Temperature charts of some of the cases are appended.





DERMATOLOGY.

Dr. E. C. Smith reports as follows:

As investigations were only renewed in September, owing to leave of absence, the results are necessarily somewhat curtailed.

Two conditions of interest deserves special mention, namely, mycetoma and "creeping eruption." Illustrations of both are appended.

Mycetoma.—Though cases have occurred from time to time, which were classed under the heading of mycetoma or under madura-mycosis, they were for the most part incomplete, inasmuch as cultures were not obtained, thus rendering exact classification impossible. Fortunately, in two of the cases reported during the current year, cultures have been obtained.

In one case, occurring in a young native woman of Ibadan, where the condition was diagnosed by Dr. Naudi, the arm in the region of the elbow was involved. The area was markedly swollen and indurated, and numerous discharging sinuses were present. In the discharge, numerous bright red granules existed. Dr. Robertson, Acting Radiologist, Lagos, reported that no bone lesions were present.

The second case was much more instructive, inasmuch as it had passed muster for a chronic septic inflammation of the big toe, until finally its true nature was recognised by Dr. Cullen, who kindly sent the case for examination. In this instance, the metacarpal and carpal areas of the big toe were indurated and thickened, and several sinuses were noted. From these sinuses a discharge could be obtained on pressure, which contained scanty bright red granules similar to those in the previous case.

In both cases the neighbouring glands were slightly enlarged. The first case was treated therapeutically without any material benefit for some months, when she then vacated hospital.

The second case decamped after a sojourn of a few days in hospital. Fortunately, biopsies and material for culture had been obtained from both cases, thanks to the kindness of Dr. Ross (Surgical Specialist).

The red grains were washed repeatedly in saline and were inoculated on various media, positive results being obtained on Sabouraud's Glucose Agar, at room temperature (27°C) after an interval of about twenty days. The cultures appeared as heaped-up, raspberry or pyramid-like pink masses, showing irregular powdery areas. They were of a hard consistency, and fragments could be broken off with difficulty by means of a platinum loop. Examination of such a fragment in liquor potassæ (which rapidly decolourised the growth) showed it to be composed of fine mycelial masses, exhibiting beading in places. This mycelium was mainly Gram-positive. In broth, the formation of "puff-balls" was observed. Serum was clarified but not liquified by the growth.

The histological appearances corresponded to the text-book descriptions of such conditions, the grains lying surrounded by zones of inflammatory reaction. Fuchsin bodies were scanty. The grains were Gram-positive but not acid-fast. They appeared to be composed of a central mycelial portion with a peripheral fringe of minute coccoid bodies. A culture has been sent to the Lister Institute for identification purposes. Numerous animal inoculations were made, using both the grains themselves and emulsions of the cultures in saline. The results have so far been negative. It is hoped that Medical Officers will keep in mind the possibility of mycetomatous infections in cases that are not clinically characteristic.

In the Annual Report for 1926 (page 32) reference is made to another atypical case of mycetoma, but no culture was obtained from this case.

Myiasis.—A good illustration of this condition, which is but rarely seen in Lagos, is shown. The patient was a baby less than a year old and the condition had been present for about a month. Under a general anæsthetic, a circular area of skin about one and a half inches in diameter was removed by the Medical Officer in charge of the African Hospital. This piece of skin was cleared *en masse* in cedar-wood oil and the serpiginous track examined under a low power of the microscope. No parasite could be identified. One week later it was found that the condition had begun again at the site of the incision, truly a case of insult added to injury! The parasite tracked downwards for some days, and just when a fresh excision was in contemplation, the condition regressed and has since remained dormant.

Among other conditions noted were:

Moniliasis lingue.—Thanks mainly to Dr. Savage, of the African Hospital, Lagos, numerous examples of this condition were seen. Typically, one finds the tongue spotted over with small white heaped-up areas. In some, fusion has occurred resulting in a thick coating which can be removed piecemeal with but little difficulty with a small curette. The removal of this false membrane leaves the surface of the tongue raw, but actual bleeding was not noted. The condition occurred in young infants. By repeated washing of minute pieces of the detached membrane in saline, and subsequent inoculation on Sabouraud's Glucose Agar, a prolific creamy growth was obtained within three to four days. Stained by Gram it was seen to be composed of Gram-positive, budding yeast-like bodies. Cultures on sugars produced acid and gas in Lævulose, Maltose and Glucose. Apparently the organism responsible for the condition is a monilia, probably *Monilia pinoyi*. Some of the larger portions of curettings were embedded in paraffin and sectioned, when a clear exposition of the relations of the fungus to other organisms was obtained.

Pseudo-leprosy.—During the year, numerous cases have arisen in which the clinical appearance is very similar to leprosy of the maculo-anæsthetic type. The patients were mainly young males and were enjoying good health. The clinical appearance, though varying according to duration, may be typified shortly as follows: The areas affected may be single or multiple and are usually asymmetrical. The colour is lighter than that of the surrounding skin, being of a characteristic brown-yellow tint. The areas have, for the most part, a serpiginous outline but ringed or plaque-like forms are also encountered. The edges are raised and infiltrated and frequently present a papular or follicular form. These papules when well-marked are flattened, with a smooth shiny surface and pitted centre. When the papules are of small size they suggest the appearance of sago grains lying subjacent to the epidermis. Scaliness is usually very slight. The condition is very chronic in nature and seems to progress with marked slowness. It is of paramount importance to distinguish the condition from true leprosy. To label such a condition leprotic means that the person affected is needlessly ostracised and has probably to undergo unnecessarily a prolonged course of treatment. In making such a distinction, two criteria were made use of, namely (1) the excision of a small portion under local Anestele for the purpose of microscopical examination, and (2) the pilocarpine test, readily performed by injecting intra or subcutaneously a few drops of a solution of pilocarpine nitrate in sterile water. A quarter-grain tablet dissolved in one cubic centimetre of water has been the strength adopted. By making an injection into the normal skin also, a useful control is obtained. If sweating occurs in both areas to approximately the same extent, it is strong evidence that the condition is non-leprotic. As regards the histology of the condition, it would seem that the primary lesion is a tubercle-like structure with well-defined giant cells. By subsequent fusion more extensive areas are formed which are localised mainly around the hair

follicles and sebaceous glands. Many of the hair follicles were heavily infected with bottle bacilli, others showing groups of gram-positive bacilli which were presumed to be acne organisms. Staining for acid-fast bacilli and for spirochaetes was negative. To name the condition just described is a different problem, as syphilis, yaws, acne, lichen, and seborrhea have all been suggested. The important point to recognise is that there is a condition, very akin to leprosy in its clinical manifestations but essentially different in its aetiology. The following reasons for regarding the condition as not being leprotic might bear emphasis.

- (1) The prolonged history with scant progress of the lesions.
- (2) Absence of acid-fast organisms.
- (3) Absence of anhidrosis.
- (4) The histological appearances.

Tinea flava.—This condition, ubiquitous in Lagos, may cause some difficulty in diagnosis owing to its varied clinical appearances. In its more usual form it appears as pale areas situated on the face, neck, chest or arms. The areas may show considerable scaliness of a branny type, or may be smooth and entirely devoid of scales until scraped. The initial areas seem to be localised around the hair follicles. This perifollicular arrangement may be retained, the macules remaining separate so that a very typical mosaic-like formation results. More frequently the macules fuse and give rise to irregular map-like areas. Where the condition has been of long duration and has assumed a slowly progressive type, normal areas of skin darker in colour are inter-woven with the lighter-tinted abnormal portions to such an extent that it may be difficult to differentiate one from the other. Some of these cases may be confused with leprosy, but an examination of the scrapings will readily reveal the causative fungus.

The condition may prove very resistant to treatment, but the following prescription taken from Macleod's "Diseases of the Skin" has been found useful.

Acid salicylici ...	...	...	Grains, thirty.
Hydrargyri perchloridi	...	...	Grains, two.
Spiritus rectificatus	...	...	Drachms, two.
Aquam destil. ad.	...	...	Ounces, six.

Used as a lotion twice daily, if possible after bathing.

The causative fungus has long been recognised and has been named *Malassezia tropica* by Castellani. In sections the fungus can usually be found in abundance in the superficial layers of the horny epithelium and also, in many cases, it is seen to be present in the hair follicles at some considerable depth from the surface.

DERMAL MONILIASES AMONG NATIVES OF WEST AFRICA.

The out-patient department of the African Hospital, Lagos, provides a happy hunting-ground for those interested in dermatology. Mycotic affections are ubiquitous, those produced by the ringworm class predominating. It is only by close examination of such cases that many of them are found to be in reality the outcome of parasitisation with another type of mycosis, namely, *monilia*.

Castellani and Taylor (1925) and Castellani (1925) have drawn attention to the presence of *monilia* in certain cases of vulval, vaginal, and ano-perineal pruritus; they, however, doubt their pathogenicity and regard them as secondary invaders. Castellani (1912) alludes to a condition labelled "Intertrigo Saccharomycetica," apparently a rare condition which is met with in Ceylon and involves the scroto-crural and axillary regions—from scrapings of these areas a saccharomyces-like fungus *Saccharomyces samboni* (Castellani, 1907), is found and readily

cultured. From recent researches it is thought that the organism belongs to the genus *Monilia*. Again, Castellani and Chalmers (1921) describe blastomycetic conditions that yield a *monilia* on careful examination. These conditions all appear severe in type, being either ulcerative or granulomatous in nature. Kaufmann (1922) also alludes to vaginal pruritus brought about by *monilia*. Engman (1920) describes the case of a negress with a scaly inflammatory eruption of the vulva, and under both breasts, from which a fungus was obtained and classified as a *Monilia*. Adcock (1923) portrays a case of two years' duration in a European, occurring on the palm and interdigital clefts—eczematous in nature with small deep epidermal blisters, in the fluid of which he observed yeast-like cells.

The cases seen in Lagos are numerous, but it is intended to utilise only those which have been definitely proved to be the result of an infection with *monilia*. All the cases, apart from clinical examination, were investigated microscopically (*i.e.*, examination of scrapings from the lesion in caustic potash solution and in stained smears) and culturally.

Where permissible, a biopsy was always performed and a careful histological examination made. In a certain number of cases, the microscopical, cultural and histological examinations, all gave positive findings. In others, two criteria—microscopical and cultural, microscopical and histological, or cultural, and histological—were positive. No case was regarded as definite when a positive finding was only obtained microscopically or by culture. A positive histological examination was regarded as definite.

CLINICAL APPEARANCES.

The area most frequently involved was found to be the scrotum, the patient invariably giving a history of severe and persistent itching. In those very early cases, an examination of the part proved disappointing—nothing abnormal was visible beyond a faint whiteness and dryness of the scrotal integument from which minute fluffy or powdery scales were obtained by scraping. At a later stage, larger scales were present—sometimes hanging down in large flakes and producing an intense, almost cast-like, exfoliation. The desquamated areas had a pinkish hue as compared with the normal, darkly pigmented, surrounding skin. A demarcation line, slightly raised and composed of small, adherent, darkly pigmented scales, was occasionally present.

At still later stages the clinical picture underwent various metamorphoses, dependent upon the exertions of the owner of the scrotum in question. The application of that native panacea, palm oil, being particularly favoured, the resultant product was a revolting mixture of matted scales, dirt and exudate. Oedema and eczematous thickening of the skin—which takes on a shiny, ichthyotic appearance—accompanied by glandular swelling in the groin frequently occurred; sepsis often supervened, a condition brought about presumably by the continued scratching awarded to such areas.

In a few cases the scrotal skin presented a rough, sandpapery appearance, comparable to lilliputian pebble-dashing, the pebbles being formed of heaped-up epithelial cells, darkly pigmented.

The groin or crural region was but rarely involved in the process. In a few cases, where the condition had extended to the inguino-crural region, fungi of the ringworm type were recovered from the scrapings.

The condition, as it affects the remainder of the body, is again very variable in appearance. Psoriasis-like patches, scattered over the trunk and limbs, form one variety and may occur in connection with the scrotal involvement. In such circumstances it seems reasonable to conclude that these patches are the result of a mechanical spread from that region.

Such patches vary in size and shape; large irregular areas may ensue from confluence of smaller ones. They are usually very scaly and tend to become whiter when scraped.

A second clinical variety exists in which the areas involved are irregular, somewhat shiny, and like much creased silver paper with here and there scaly patches and tiny dark-coloured scabs. Peripherally, such areas may be definitely delineated by small, dark, tightly adherent scales, with occasionally a hint at papule or vesicle formation. The mammary region is a rather frequent site for this variety of lesion.

On the face, an impetiginous character may be imparted to lesions by the scab or crust-like covering which occurs. When scraped, the scabs are found to be formed of masses of dry scales.

Many of the lesions closely resemble the changes produced by the seborrhœa of temperate climes.

Very possibly *monilia* affections do not always remain so superficially located. Quite a few cases have been seen in whom the involved area—usually the limbs, and particularly the legs—showed a markedly eczematous type of lesion, the skin being very stiff and indurated like leather, scaly in patches and slightly moist. On pressure the areas were inclined to pit, and if this were sufficiently exerted beads of pus broke out between the scales. *Monilia*-like bodies could be demonstrated in the scales and the fungus could be obtained in culture therefrom. Repeated examinations of the pus proved negative as regards a mycosis, as also did sections of the parts involved.

Two cases of a somewhat different character deserve brief mention. Both were adult males, each with a chronic history of leg abscess. The lesions in the two cases were closely similar. The skin of the legs, on their anterior aspects, was indurated and in places definite scarring was noted. Here and there sinuses occurred which yielded a thick purulent discharge on pressure. From each of these cases a *monilia* was obtained in pure culture from the pus on one or two occasions only. Several small excised pieces, together with enlarged inguinal lymph glands, were examined for the presence of a fungus and were found to be negative. The cases just referred to had resisted various treatments prior to the isolation of the fungus. On being placed on potassium iodide medication they rapidly cleared up. In such cases as these, it is difficult to know how much of the condition can be ascribed to secondary sepsis and how much, if any, to the fungus. Lacking further proof it seems better to regard them with doubt.

From the foregoing description it will readily be seen that there are few, if any, characteristic features to be found in a clinical examination of a *monilia* infection. The various forms of ringworm are capable of producing exactly similar appearances. Consequently, if a differential diagnosis is to be made, other criteria must be used.

DIAGNOSIS.

Microscopical.—Scrapings from an involved area will frequently reveal whether the condition is due to a *monilia* or a *tinea*. In the former the yeast-like budding forms, when stained by Gram's method, are very characteristic, mycelium is usually scanty. In the latter, caustic potash preparations reveal, as a rule, well-marked mycelium, and the typical yeast-like budding forms are absent. Consequently, a positive microscopic examination can be regarded as reliable.

Cultural.—Sowing of the scales on Sabouraud's medium, subsequent to washing in saline or a few minutes in weak alcohol, is the method adopted.

If present, the *monilia* should appear from within four to seven days as an opaque white (or in some strains, pink) growth. On

examination in a drop of saline it is found to be composed almost entirely of yeast-like forms, though an occasional mycelial fragment may occur. A positive culture must never, in itself, be regarded as diagnostic, since these fungi may be present saprophytically. It should be confirmed by a positive microscopical or histological examination.

Histological.—Examination of sections usually allows of a certain diagnosis, and a ready differentiation from other fungal conditions, to be made. It is important that the sections pass through a hair follicle, since it frequently happens that this is the only site in which the *monilia* is found—a point equally applicable to other fungal types. On what grounds can the differential diagnosis be made? In the various forms of *tinea* met with, mycelial strands are of common occurrence. Where spore forms are present they tend to arrange themselves regularly—either in patterns or chains. Again, the hair itself is frequently invaded by the fungus.

With *monilia*, hyphæ are extremely scanty and, if present, are short and elementary in form (except in experimental lesions when a heavy infection is present). In no case has the fungus been demonstrated with certainty within the hairs.

The typical yeast-like character of the budding or sporulation is very striking in *monilia* affections and is shown to advantage in sections.

A point of interest is the fact that staining by the pyronin methyl green method shows considerable chromatic variation according to the variety of fungus present. The *monilia* fungus takes up the pyronin stain intensely and appears a bright red or crimson tint, the capsules showing but poorly. In the other fungal varieties, the hyphæ and spores assume a much more subdued tint—appearing as a rather pale pink or violet-pink shade—and the capsules are more distinct.

It is not unusual for the corium to show a considerable reaction to the follicular invasion and a barrier of inflammatory cells—polymorphs and lymphocytes, or in the later stages lymphocytes and young fibroblasts—is set up round the invaded areas, and may infiltrate considerably the surrounding tissues. Giant cells may be found, and, when such an inflammatory area happens to be cut in a section which is without a hair follicle, it may, if not sufficiently examined, simulate a lupoid condition.

Hyperkeratosis and parakeratosis are constant findings, and usually dominate the microscopical picture.

The stratum granulosum frequently appears unusually distinct. Various distortions in the adjacent malpighian cells, particularly œdema, would be expected, and are usually present. The epithelium of the affected follicles also shows degenerative changes.

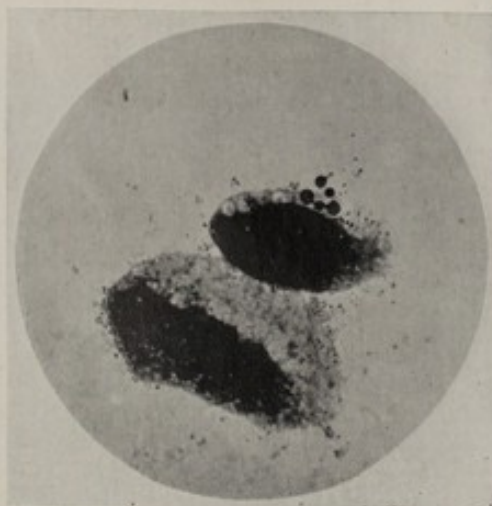
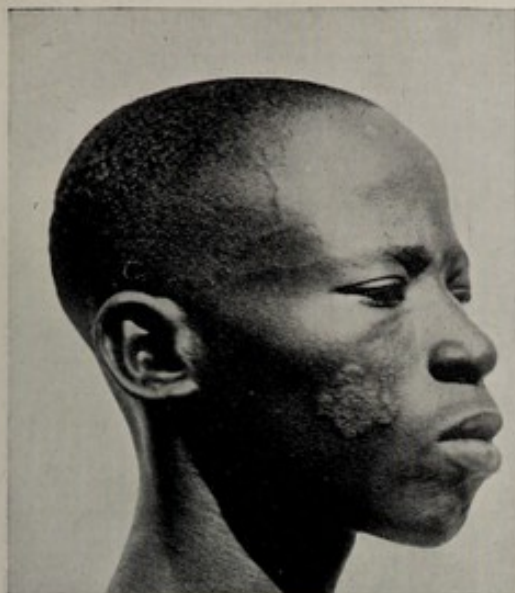
It is interesting to consider the possibility of these native-borne moniliasis as originating some of the "prickly heat" so rife among Europeans.

SUMMARY.

1. The class of fungus known as *monilia* is shown to occupy a real position among the many mycoses capable of producing a dermatitis in natives of West Africa.

2. The close clinical resemblance to the various forms of *tinea* infection, rendering in many instances a naked-eye differentiation difficult if not impossible, is stressed.

3. Various diagnostic criteria—microscopic, cultural and histological—are discussed. The cultural method used alone, is shown to be inconclusive. The histological findings are described in some detail since it is believed that they offer the most reliable means of diagnosis and differentiation.



× 790.

Scrapings from cheek showing good budding forms.

This patient came complaining of severe pain in the legs. Examination revealed that they were indurated and scaly on their anterior aspects, and beads of pus exuded on gentle squeezing.

Microscopical: Scales from the involved areas showed numerous yeast-like bodies.

Cultural: Repeated cultures were made of the pus. Staphylococci only were obtained.

Histological: The findings were those of a chronic inflammatory condition.

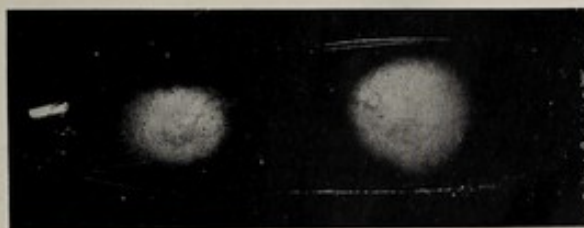
The condition cleared up completely under potassium iodide treatment.

Five months later the patient returned with a scaly, slightly papular patch on the cheek. The legs appeared to be quite normal.

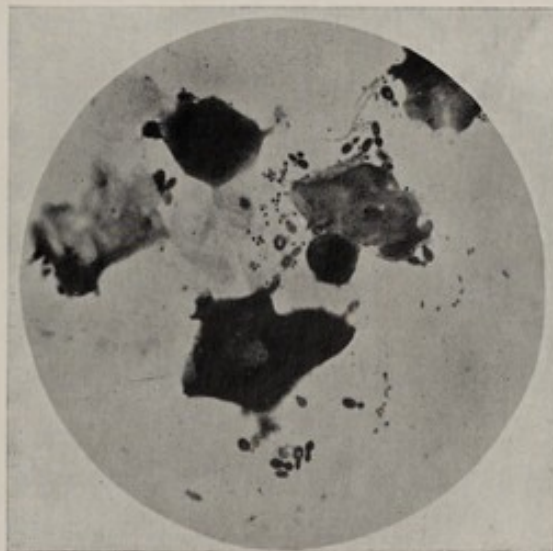
Microscopical: Typical fungal groups present in the scrapings from this area.

Cultural: Pure growth of a monilia obtained.

It seems possible that the condition of the patient's legs was a septic one which had become superimposed upon a dermal moniliasis.



Culture on Sabouraud's glucose agar from case depicted below.



× 790.

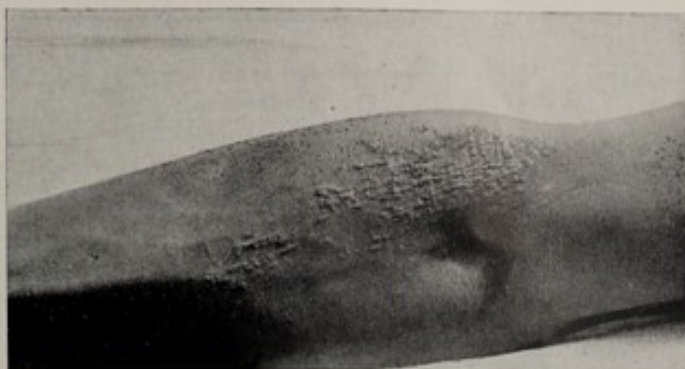
A young girl, aet. 12. Duration one month. The lesion involves only the face where it appears as scaly patches with scab formation in places. The scales come away in large flakes and are very dry.

Microscopical: Numerous yeast-like bodies present, some arranged in groups. Scrapings stained by Gram.

Cultural: positive. The photo is that of twenty-one day growth on Sabouraud's glucose agar.

100

6



Male, aet. 22. Duration three months. The lesion involved the anterior aspect of the right elbow joint and the posterior part of the patient's neck. The condition presented a peculiar linear character as if numerous parallel scratches had been made with resulting hypertrophy and slight hyperpigmentation of the horny layer in these regions.

Microscopical: Numerous yeast-like bodies and spores present.

Cultural: Negative. Heavy secondary infection.

Histological: Marked hyper- and para-keratosis especially in the region of the hair follicles. Numerous fungal elements (monilia) present in the cells of the infected hair follicles and in the horny layer.



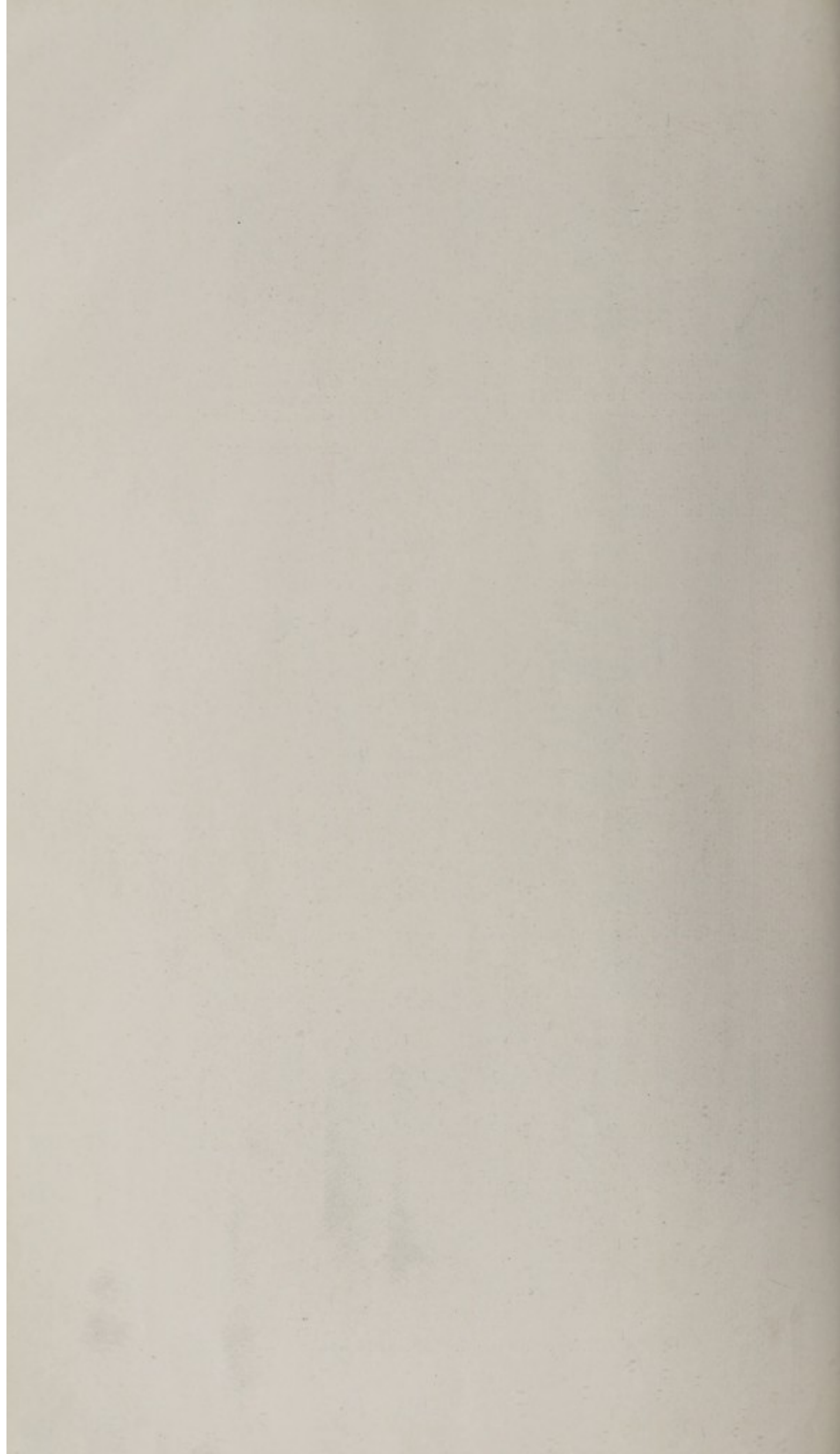
× 80.

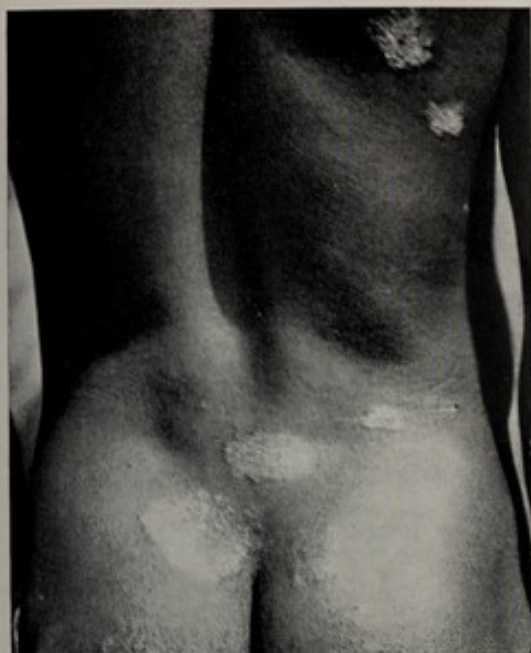
Section showing the ridge-like thickening of the horny layer. The corium shows some infiltration.



× 790

Hair follicle showing monilia bodies.





× 80.

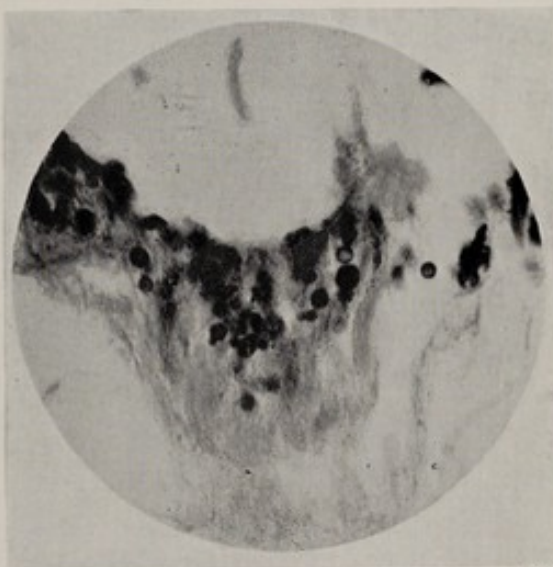
Section showing the hyper- and para-keratosis and acanthosis.

Male, aet. 21. Had a marked desquamatory condition of the scrotum, combined with numerous very scaly, almost psoriasis-like, patches on the body and legs.

Microscopical: Scales from buttock showed numerous monilia bodies.

Cultural: A red-coloured strain of monilia isolated.

Histological: Marked hyper- and para-keratosis with acanthosis of the malpighian layer. Irregular keratinisation giving the appearance of horny processes extending into the *rete malpighii*. Slight reaction in the corium. Fungal elements found after prolonged examination of the horny layer. Presumably the lesions on the body originated from the scrotal infection (also of the monilia type).



× 790

Section through portion of a hair follicle showing numerous monilia bodies.

Male, aet. 30. Duration of lesion four months. The lesion consisted of an irregular patch in the right scapular region. The central part showed hyperpigmentation and yielded delicate fluffy scales on scraping. Peripherally, the area was surrounded by a raised band-like border composed apparently of fused papules.

Microscopical: Negative.

Cultural: Negative.

Histological: A heavy infection of the hair follicles with the characteristic yeast-like bodies found.





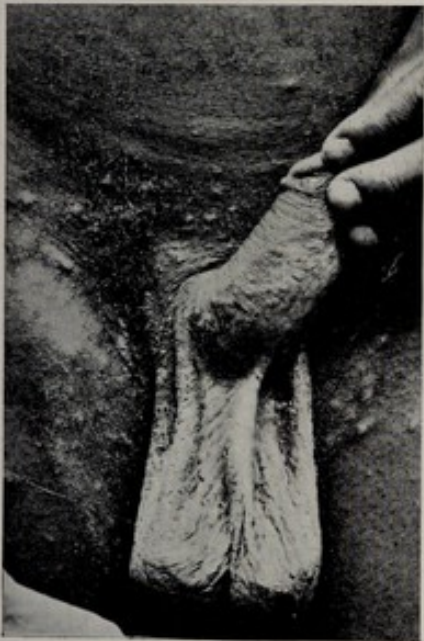
A.



B.



C.

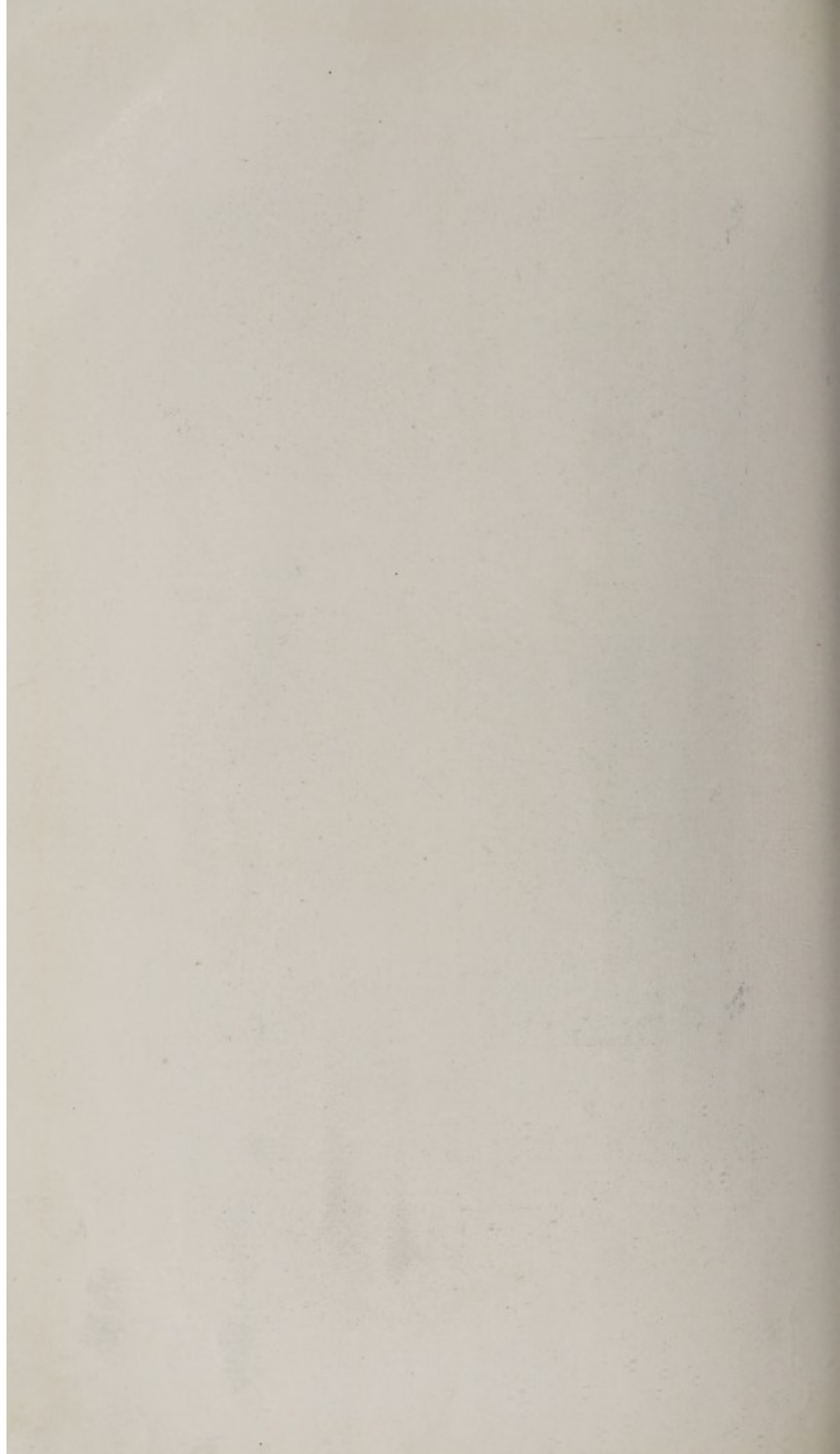


D.



E.

Monilia dermatitis as it involves the scrotal region. A, B and C show, to a certain extent, the creased appearance of the skin and also, here and there, the little tags of separating epithelium. In D, the condition is seen to be extending up on to the ventral surface of the penis. The affected portion appears smooth and has a raised, slightly papular edge. In E, a faint demarcation line can be made out between the lower involved portion and the upper normal area, particularly on the right side.



MYIASIS.



Creeping Eruption in a child one year old. Two months' duration.

MYCETOMA.



Case of mycetoma sent by Dr. Cullen.



Case of mycetoma sent by Dr. Naudi.

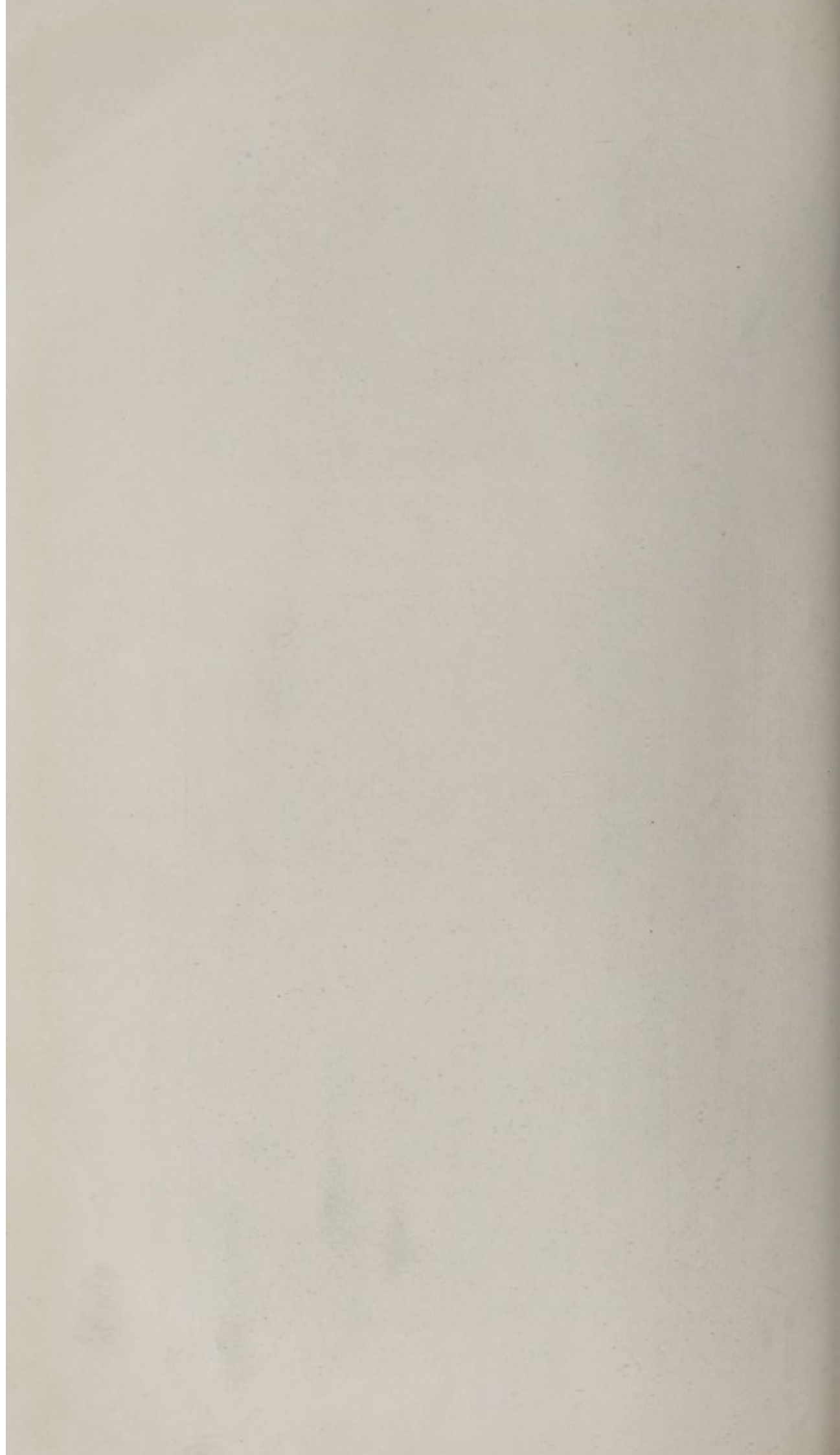




Fig. 1.

Congenital hæmangioma in a child aged 1½ years. The upper photograph shows the histological structure. Below is shown the actual lesion.



Fig. 2.

CASE OF ANGIOMA IN A CHILD.



MICROPHOTOGRAPHS ILLUSTRATING
THREE TYPES OF NEOPLASM
OCCURRING IN NATIVES.

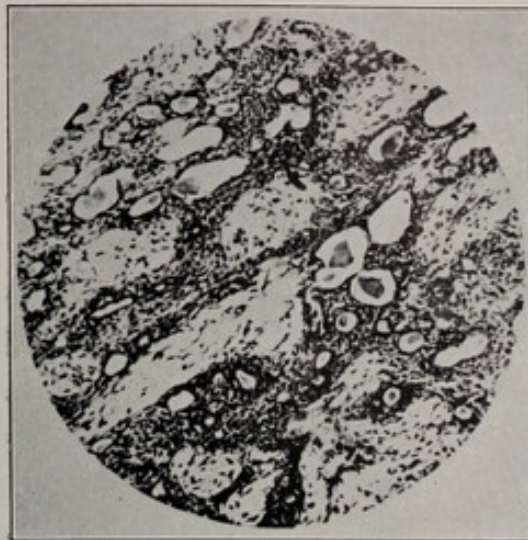


Fig 1.

Section of an endotheliomatous-like tumour.
Removed from the neck by Dr. Selby,
Ijebu-Ode.

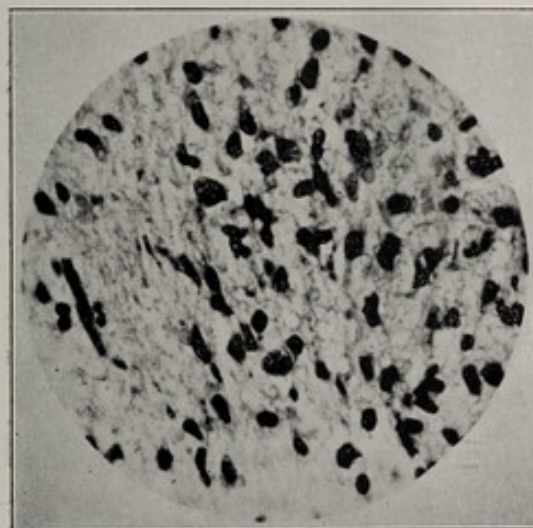


Fig 2.

Section of a glioma of the eye.

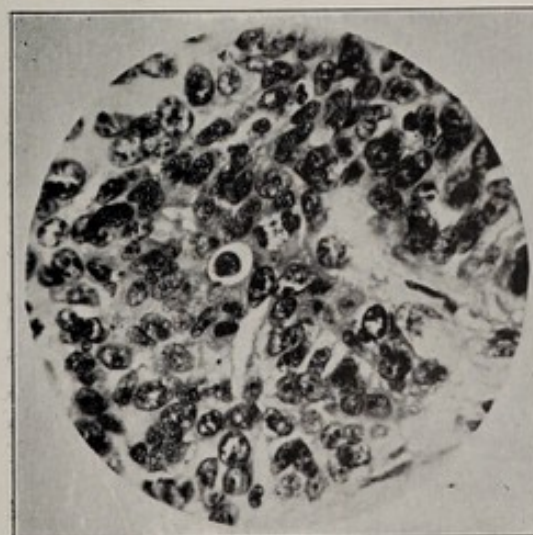
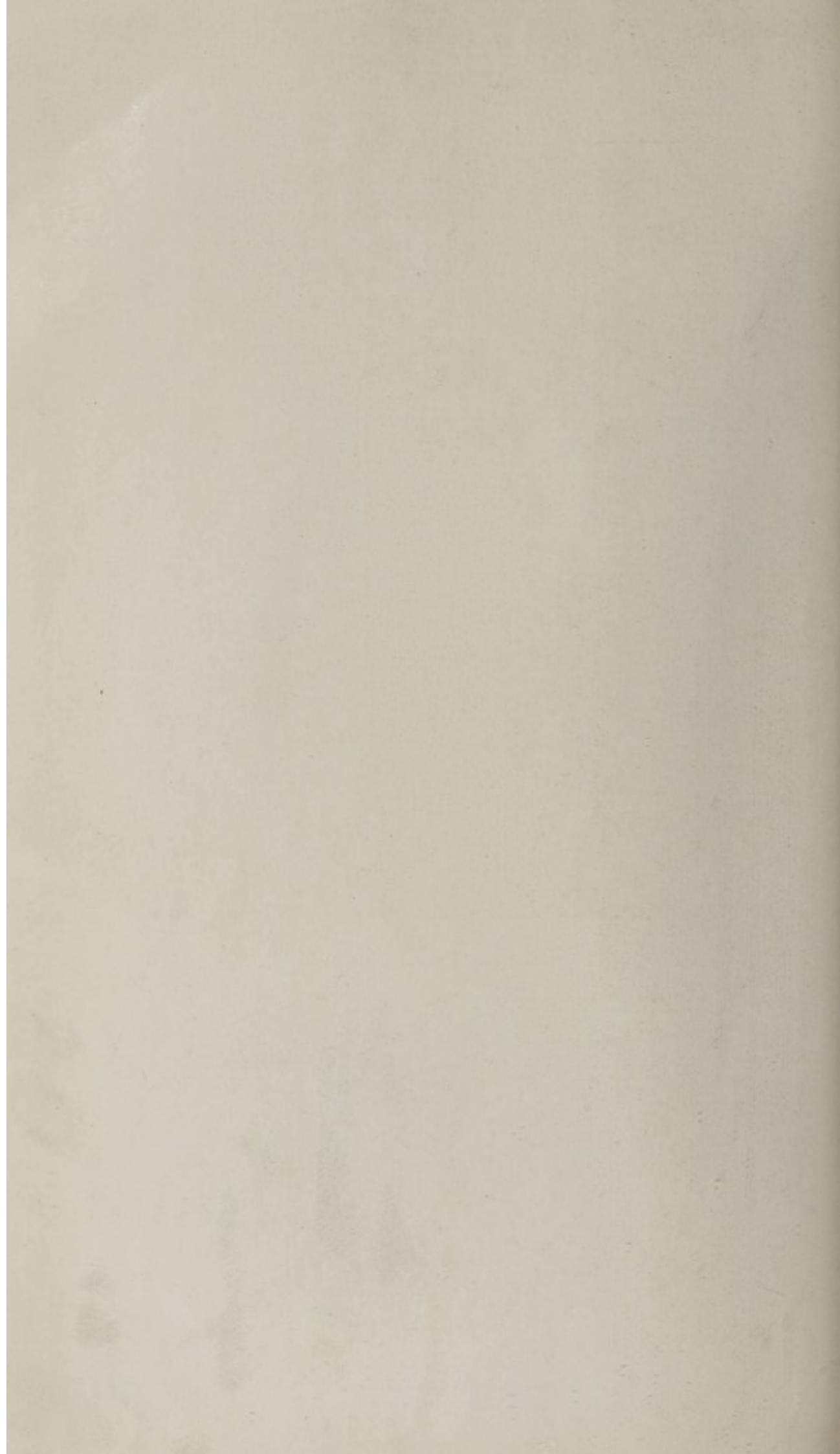


Fig 3.

Section of round-celled sarcoma showing
numerous mitoses.



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E. C. SMITH.

* Tropical Diseases Bulletin only consulted.

TUMOURS.

The number and variety of tissues received for examination was greater than usual, and these contributions from both members of the Staff and private practitioners have been greatly appreciated.

Carcinomas numbered fifteen. Eight were Epithelioma, two were glandular cancers of the liver, two were solid cancers of the cervix, one was a secondary growth at the umbilicus and one was secondary in an axillary gland. There was one endothelioma.

There were fourteen sarcomas, eleven of which were round-celled, (including a lymphosarcoma), one contained mixed cells, another was spindle-celled, and the last was a gliosarcoma. One of the cases in the round-cell group was an example of metastases in the liver, kidney, spleen and lung.

Melanomas or melanotic sarcomas numbered four, all of which were situated on the heel or the sole of the foot.

Two cases of rodent ulcer have to be added.

All the tumours occurred in native Africans except in one case of epithelioma of the upper lip, and one case of rodent ulcer, which occurred in Europeans.

Of simple tumours there were eight fibromas, four lipomas, three adenomas, three warty and two soft papillomas, a polypus of the cervix and a hæmangioma.

OTHER CONDITIONS.

Chronic inflammatory swellings numbered fourteen, non-malignant ulcers four, and there was a mesenteric cyst, a calcified mass from the mesentery, a juxta-articular nodule and a cutaneous horn.

Two cases of mycetoma of the foot and one of the elbow have been described in another part of the report.

Two *Onchocerca volvulus* tumours were received, both of which showed on section parts of the adult worm and also embryos. A portion of a free adult *O. volvulus* which had protruded from an ulcerated area on the foot of a native, was sent from Mamfe.

Three specimens of *Porocephalus* larvæ, two found free and one found encysted in the mesentery, were sent from Ilorin. The two free individuals had made their way through a hernial wound during the course of the operation.

Two adult male *Filaria loa* were also received, both of which had been obtained in the same way, *i.e.*, during an operation for inguinal hernia.

Several fresh-water snails sent from Oshogbo were kindly identified at the British Museum (Natural History) as *Physa waterloti*, Germain. Other interesting additions to the Research collection was a portion of a gallstone of an elephant, sent from Mamfe, several snakes which await identification, an aneurism of the ascending aorta and the inflamed appendix of two native Africans.

The organs in cases of malaria, relapsing fever, blackwater fever, tuberculosis, syphilis, suspected poisoning, suspected yellow fever, and suspected anthrax were also received. These included twelve specimens of kidney, nineteen specimens of liver, seventeen specimens of spleen, six of lung, four of stomach, two of heart, two of spinal cord, two of intestine, one of brain, one of pancreas and one of suprarenal. Six pieces of skin from suspected leprotic patches and nine lymphatic glands were also received.

Blood smears.—Forty-nine of these were examined, a differential leucocyte count and the Arneth Formula being obtained in twenty-one.

Other smears.—There were, from various organs twenty-seven, for gonococcus nine, for *Spironema pallidum* five, glands eight, meninges eight, tongue three and other sources six.

Eleven specimens of sputum were examined, tubercle bacilli being demonstrated in four.

Thirty-three Widal tests were performed, three of which were positive with bacillus typhosus.

Four vaccines were prepared.

Various tinned foods were examined bacteriologically.

Other investigations were of stomach contents, "native medicines," and water supplies from various sources.

A weekly bacteriological analysis of the Lagos Water Supply was done throughout the year. It was hoped to make this more than a somewhat superficial routine procedure, but unfortunately, Dr. J. A. Young, M.C., who had just begun a very promising investigation, received accidental injuries which necessitated his invaliding within a few weeks of beginning the work.

ENTOMOLOGICAL.

The Medical Officer of Health continued to send collections of the mosquito larvæ obtained by the Sanitary Inspectors on their daily rounds. The following figures deal with those larvæ collected between January and September. Table VI shows the monthly totals.

TABLE VI.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Totals.
<i>Aedes argenteus</i>	133	144	131	120	163	194	162	112	72	1,231
<i>Culex nebulosus</i>	98	103	108	101	101	135	107	71	75	899
<i>A. argenteus</i> and <i>A. luteocephalus</i>	1	...	...	1	...	1	2	...	...	5
<i>Culex fatigans</i>	3	4	...	1	...	2	...	...	1	11
<i>Aedes luteocephalus</i>	...	...	...	...	...	...	1	...	...	1
<i>C. thalassius</i> and <i>C. invidiosus</i>	...	...	...	...	1	...	...	...	...	1
<i>A. argenteus</i> and <i>C. nebulosus</i>	6	2	...	2	3	6	5	3	4	31
<i>Anopheles gambiæ</i>	...	...	2	3	6	18	10	1	...	40
<i>Culex thalassius</i>	4	2	...	3	3	4	1	...	...	17
<i>An. gambiæ</i> and <i>C. thalassius</i>	1	...	...	...	1	1	2	...	...	5
<i>A. argenteus</i> and <i>An. gambiæ</i>	...	...	2	...	...	2	...	...	...	4
<i>A. argenteus</i> and <i>C. fatigans</i>	3	...	1	...	...	...	...	1	...	5
<i>C. nebulosus</i> and <i>An. gambiæ</i>	...	...	...	...	...	2	...	...	...	2
<i>Culex duttoni</i>	...	...	1	1	1	1	2	...	...	6
<i>An. gambiæ</i> and <i>C. invidiosus</i>	...	...	...	...	...	...	2	...	...	2
<i>C. nebulosus</i> and <i>Lutzia tigripes</i>	...	...	...	...	1	...	...	...	...	1
<i>A. argenteus</i> , <i>A. luteocephalus</i> , <i>C. nebulosus</i>	...	...	...	...	...	1	...	...	...	1
<i>An. gambiæ</i> , <i>C. thalassius</i> , <i>C. invidiosus</i>	...	...	...	...	1	...	...	...	...	1
<i>An. gambiæ</i> and <i>C. decens</i>	...	...	...	...	...	1	...	...	...	1
<i>A. argenteus</i> , <i>C. nebulosus</i> , <i>An. gambiæ</i>	...	...	...	...	...	...	...	1	...	1
<i>C. nebulosus</i> and <i>C. fatigans</i>	1	...	...	...	...	...	...	...	...	1
<i>Culex decens</i>	...	1	...	...	...	1	...	...	2	4
<i>A. argenteus</i> and <i>C. duttoni</i>	...	...	...	...	1	1	...	...	...	2
<i>C. nebulosus</i> , <i>C. thalassius</i> , <i>C. fatigans</i>	...	...	...	...	...	1	...	...	...	1
<i>Culex invidiosus</i>	...	...	...	...	...	1	...	...	...	1
<i>C. nebulosus</i> and <i>A. luteocephalus</i>	...	...	...	...	1	...	...	...	...	1
<i>Aedes apicoannulatus</i>	...	...	...	...	...	1	...	...	...	1
<i>An. gambiæ</i> , <i>C. thalassius</i> and <i>C. nebulosus</i>	...	...	...	...	...	1	...	...	...	1
Totals	250	256	245	232	283	374	294	189	154	2,277

It will be observed that single collections of *Aedes argenteus* larvæ and of *Culex nebulosus* larvæ account for 2,130 out of the total of 2,277 collections. *Aedes argenteus* larvæ form more than half the total. *Culex nebulosus* is in the proportion of three to four of *Aedes argenteus* and forms a little more than one-third of the total. *Anopheles gambiæ* would appear to be comparatively rare, occurring in only forty single collections but it has to be remembered that the real anopheline breeding areas are rather out with the path of the house-to-house inspector. *Aedes argenteus* was found breeding in association with other mosquitoes in forty-nine collections; thirty-one times in association with *C. nebulosus*, five times with *Aedes luteocephalus*, five times with *C. fatigans*, four times with *An. gambiæ*, twice with *C. duttoni*, on one occasion along with both *C. nebulosus* and *Aedes luteocephalus* and on another occasion with both *C. nebulosus* and *An. gambiæ*. The total number of collections, therefore, containing *Aedes argenteus* either alone or in association with other kinds of larvæ is 1,280. *Culex nebulosus* larvæ were found in association with other kinds of larvæ on forty occasions; thirty-one times with *Aedes argenteus*, twice with *An. gambiæ*, and on one occasion each with *Lutzia tigripes*, *Aedes argenteus* and *A. luteocephalus*, *Aedes argenteus* and *An. gambiæ*, *Culex fatigans*, *Culex thalassius* and *C. fatigans*, *Aedes luteocephalus* and with *An. gambiæ* and *C. thalassius*. *Culex nebulosus* therefore figured in 939 collections altogether.

Anopheles gambiæ was found in association with other kinds of larvæ on seventeen occasions; five times along with *Culex thalassius*, four times with *Aedes argenteus*, twice with *Culex nebulosus* and twice

with *Culex invidiosus*, once with *C. thalassius* and *C. invidiosus*, once with *C. decens*, once with *Aedes argenteus* and *C. nebulosus*, and once with *C. thalassius* and *C. nebulosus*.

The other mosquito-larvæ were: (1) *Culex thalassius* (twenty-six collections); (2) *Culex fatigans* (eighteen collections); (3) *Aedes luteocephalus* (eight collections); (4) *Culex duttoni* (eight collections); (5) *Culex invidiosus* (five collections); (6) *Culex decens* (five collections); and *Aedes apicoannulatus* (one collection).

The receptacles in which the larvæ were found were numerous and varied. In January, they were: Agbo Pot (*Culex nebulosus*), Banana stump (*C. nebulosus*), Barrel (*C. nebulosus* and *Aedes argenteus*), Borrow Pit (*Culex fatigans*, and *C. nebulosus*), Bottle (*A. argenteus*), Bucket, (*A. argenteus* and *C. nebulosus*), Canoe (*C. thalassius* and *An. gambiæ*), Catchpit (*A. argenteus*, *C. nebulosus*, *C. fatigans*), Cooler (*C. nebulosus*), Drain (*C. nebulosus*, *C. fatigans*), Drum (*C. nebulosus*, *A. argenteus*), Flower-Vase (*A. argenteus* and *A. luteocephalus*), Jug (*A. argenteus*, *C. nebulosus*), Kerosine tin (*C. nebulosus*), Pan (*A. argenteus*, *C. nebulosus*), Pool (*An. gambiæ*), Pot (*A. argenteus*, *C. nebulosus*, *C. fatigans*), Tin (*C. nebulosus*, *A. argenteus*) and Well (*C. nebulosus*, *A. argenteus*).

During February, the receptacles were: Barrel (*C. nebulosus*, *A. argenteus* and *C. fatigans*), Basin (*C. nebulosus*, *A. argenteus*), Bottle (*A. argenteus*), Bucket (*A. argenteus*), Calabash (*C. nebulosus*), Canoe (*C. thalassius*), Catchpit (*A. argenteus*, *C. nebulosus*, *C. fatigans*), Cooler (*A. argenteus*), Drain (*C. nebulosus*), Drum (*C. nebulosus*, *A. argenteus*), Jug (*A. argenteus*, *C. nebulosus*), Kettle (*A. argenteus*), Pan (*A. argenteus*), Pool (*A. argenteus*), Pot (*A. argenteus*, *C. nebulosus*, *C. fatigans*, *C. decens*), Tank (*A. argenteus*), Tin (*C. nebulosus*, *A. argenteus*) and Well (*A. argenteus*).

In March, the receptacles were: Barrel (*C. nebulosus* and *A. argenteus*), Bath-room floor (*C. nebulosus*), Bottle (*A. argenteus* and *C. nebulosus*), Bucket (*A. argenteus*, *C. nebulosus*), Calabash (*C. nebulosus*), Catchpit (*A. argenteus*, *C. nebulosus*), Cooler (*A. argenteus*), Drain (*C. nebulosus*, *A. argenteus*), Drum (*C. nebulosus*, *A. argenteus*), Go-cart (*C. nebulosus*), Ice chest (*A. argenteus*), Motor Tyre (*C. nebulosus*, *A. argenteus*), Pan (*C. nebulosus*, *A. argenteus*, *C. fatigans*), Pool (*An. gambiæ*, *A. argenteus*, *C. nebulosus*), Pot (*A. argenteus*, *C. nebulosus*, *An. gambiæ*), Tin (*A. argenteus*, *C. nebulosus*, *C. duttoni*, *An. gambiæ*) and Well (*C. nebulosus*, *A. argenteus*).

In April, the receptacles were: Agbo pot (*C. nebulosus*), Barrel (*C. nebulosus*, *A. argenteus*), Bath-room floor (*C. nebulosus*), Bucket (*A. argenteus*, *C. nebulosus*), Calabash (*C. nebulosus*, *An. gambiæ*), Canoe (*C. thalassius*), Catchpit (*A. argenteus*, *C. nebulosus*), Drum (*A. argenteus*), Kettle (*A. argenteus*, *C. nebulosus*), Pot (*A. argenteus*, *C. nebulosus*, *C. fatigans*, *A. luteocephalus*, *C. duttoni*, *An. gambiæ*), Tank (*A. argenteus*), Tea-pot (*A. argenteus*), Tin (*A. argenteus*, *C. nebulosus*, *An. gambiæ*) and Well (*C. nebulosus*, *A. argenteus*, *C. thalassius*).

In May, the receptacles were: Banana stump (*A. argenteus*), Barrel (*C. nebulosus*, *A. argenteus*, *C. thalassius*, *C. invidiosus*), Bath-room floor (*A. argenteus*), Borrow-pit (*A. argenteus*), Bottle (*A. argenteus*, *C. nebulosus*), Bucket (*A. argenteus*), Calabash (*C. nebulosus*), Canoe (*C. thalassius*), Catchpit (*A. argenteus*, *C. nebulosus*, *An. gambiæ*), Cooler (*C. nebulosus*), Corrugated Iron sheet (*A. argenteus*), Drum (*A. argenteus*, *C. nebulosus*, *L. tigripes*), Go-cart (*A. argenteus*), Jug (*A. argenteus*), Kerosine Tin (*A. argenteus*), Kettle (*C. nebulosus*), Mortar (*C. nebulosus*), Motor Tyre (*C. nebulosus*, *A. argenteus*), Pan (*A. argenteus*, *C. nebulosus*), Pool (*An. gambiæ*, *C. thalassius*, *C. invidiosus*), Pot (*A. argenteus*, *C. nebulosus*, *C. duttoni*, *An. gambiæ*, *C. thalassius*), Sharping Stone (*C. nebulosus*), Swamp (*An. gambiæ*), Tank (*A. argenteus*), Tin (*C. nebulosus*, *A. argenteus*) and Well (*A. argenteus*).

During June, the receptacles were: Agbo pot (*C. nebulosus*), Barrel (*C. nebulosus*, *A. argenteus*), Bath-room Floor (*A. argenteus*), Bucket (*A. argenteus*, *C. nebulosus*), Calabash (*C. fatigans*), Canoe (*C. thalassius*, *An. gambiæ*, *A. argenteus*), Catchpit (*A. argenteus*, *C. nebulosus*, *An. gambiæ*, *C. duttoni*), Hollow in cement (*A. argenteus*, *C. nebulosus*), Cooler (*A. argenteus*), Demijohn (*A. argenteus*), Drum (*A. argenteus*, *C. nebulosus*, *A. luteocephalus*), Flower vase (*A. argenteus*, *C. nebulosus*), Gutter (*A. argenteus*), Ice-chest (*A. argenteus*), Jug (*C. nebulosus*), Kerosine tin (*C. nebulosus*), Kettle (*A. argenteus*, *C. nebulosus*), Lighter (*C. nebulosus*), Mortar (*A. argenteus*, Motor Tyre (*C. nebulosus*, *A. argenteus*), Pan (*A. argenteus*), Pool (*An. gambiæ*, *C. decens*, *C. thalassius*, *C. nebulosus*), Pot (*A. argenteus*, *C. nebulosus*, *C. decens*, *A. luteocephalus*, *An. gambiæ*, *C. duttoni*, *C. fatigans*, *C. thalassius*, *C. invidiosus*), Swamp (*An. gambiæ*, *C. nebulosus*), Tank (*A. argenteus*), Tin (*C. nebulosus*, *A. argenteus*, *An. gambiæ*), Tree-hole (*A. apicoannulatus*), Tug (*A. argenteus*), Watering Can (*A. argenteus*) and Well (*C. nebulosus*, *A. argenteus*, *C. fatigans*).

During July, the receptacles were: Agbo pot (*A. argenteus*), Banana stump (*A. luteocephalus*, *A. argenteus*), Barrell *A. argenteus*, *C. nebulosus*, *A. luteocephalus*), Bath-room floor (*A. argenteus*, *C. nebulosus*), Burrow pit (*An. gambiæ*), Bottle (*A. argenteus*), Bucket (*A. argenteus*, *C. nebulosus*), Calabash (*A. argenteus*), Canoe (*C. nebulosus*, *An. gambiæ*, *A. argenteus*), Catchpit (*A. argenteus*, *C. nebulosus*), Cooler (*A. argenteus*, *C. nebulosus*), Corrugated Iron Sheet (*A. argenteus*), Dish (*A. argenteus*, *C. nebulosus*), Drain (*C. nebulosus*, *A. argenteus*, *An. gambiæ*, *C. invidiosus*), Drum (*A. argenteus*, *C. nebulosus*), Filter (*A. argenteus*), Flower Vase (*C. nebulosus*), Gutter (*A. argenteus*), Horn (*C. nebulosus*, *A. argenteus*), Jug (*A. argenteus*, *C. nebulosus*), Kettle (*A. argenteus*), Mortar (*A. argenteus*), Motor Tyre (*A. argenteus*, *C. nebulosus*), Pan (*C. nebulosus*, *A. argenteus*), Pool (*An. gambiæ*, *C. thalassius*, *C. invidiosus*), Pot (*A. argenteus*, *C. nebulosus*, *A. luteocephalus*, *C. duttoni*, *An. gambiæ*), Tank (*A. argenteus*, *C. nebulosus*), Tea-pot (*C. nebulosus*, *A. argenteus*), Tin (*C. nebulosus*, *A. argenteus*) and Well (*C. nebulosus*, *A. argenteus*).

The receptacles in August were: Barrel (*A. argenteus*, *C. nebulosus*), Bottle (*A. argenteus*, *C. nebulosus*), Bucket (*A. argenteus*, *C. nebulosus*), Calabash (*A. argenteus*), Canoe (*C. nebulosus*, *An. gambiæ*), Catchpit (*A. argenteus*, *C. nebulosus*), Drain (*C. nebulosus*, *A. argenteus*), Drum (*A. argenteus*, *C. nebulosus*), Flower Vase (*A. argenteus*), Kettle (*A. argenteus*), Oil Can (*C. nebulosus*), Pan (*A. argenteus*, *C. nebulosus*, *An. gambiæ*), Pot (*A. argenteus*, *C. nebulosus*, *C. fatigans*), Tank (*A. argenteus*), Tea-pot (*A. argenteus*, *C. nebulosus*), Tin (*C. nebulosus*, *A. argenteus*) and Well (*A. argenteus*).

In September (up to and including 22nd September), the receptacles were: Agbo pot (*C. nebulosus*), Barrel (*A. argenteus*, *C. nebulosus*), Basin (*A. argenteus*), Bottle (*A. argenteus*, *C. nebulosus*), Bucket (*A. argenteus*, *C. nebulosus*), Catchpit (*A. argenteus*, *C. nebulosus*), Drum (*C. nebulosus*, *A. argenteus*), Gutter (*A. argenteus*), Jug (*A. argenteus*), Motor Tyre (*C. nebulosus*, *A. argenteus*), Pan (*A. argenteus*, *C. nebulosus*), Pot (*A. argenteus*, *C. nebulosus*, *C. fatigans*), Tin (*A. argenteus*, *C. nebulosus*), Sharping Stone (*C. nebulosus*, *A. argenteus*), and Well (*C. nebulosus*, *A. argenteus*, *C. decens*).

It will be observed that the number of mosquitoes represented in the collections is eleven, namely, *Aedes argenteus*, *Aedes luteocephalus*, *Aedes apicoannulatus*, *Culex nebulosus*, *Culex invidiosus*, *Culex duttoni*, *Culex decens*, *Culex thalassius*, *Culex fatigans*, *Lutzia tigripes* and *Anopheles gambiæ*. The receptacles were: Agbo pot (fourteen collections, *C. nebulosus*, *A. argenteus*); Banana stump (five collections, *C. nebulosus*, *A. argenteus* and *A. luteocephalus*), Barrel (107 collections, *C. nebulosus*, *C. fatigans*, *A. argenteus*, *A. luteocephalus*, *C. thalassius*

and *C. invidiosus*); Basin (three collections, *C. nebulosus*, *A. argenteus*); Bath-room floor (ten collections, *C. nebulosus* and *A. argenteus*); Borrow-pit (seven collections, *C. nebulosus*, *C. fatigans*, *A. argenteus*, *An. gambiæ*); Bottle (sixteen collections, *A. argenteus*, *C. nebulosus*); Bucket (forty-seven collections, *A. argenteus*, *C. nebulosus*, *C. fatigans*); Calabash (ten collections, *A. argenteus*, *C. nebulosus*, *C. fatigans*, *An. gambiæ*); Canoe (twenty-five collections, *C. thalassius*, *C. nebulosus*, *An. gambiæ*, *A. argenteus*); Catchpit (183 collections, *A. argenteus*, *C. nebulosus*, *C. fatigans*, *An. gambiæ*, *C. duttoni*); Cement hollow (two collections, *A. argenteus*, *C. nebulosus*); Cooler (ten collections, *A. argenteus*, *C. nebulosus*); Corrugated Iron Sheet (two collections, *A. argenteus*); Demijohn (one collection, *A. argenteus*); Dish (two collections, *A. argenteus*, *C. nebulosus*); Drain (seventeen collections, *C. nebulosus*, *C. fatigans*, *C. invidiosus*, *A. argenteus*, *An. gambiæ*); Drum (seventy-three collections, *C. nebulosus*, *A. argenteus*, *L. tigripes*, *A. luteocephalus*); Filter (one collection, *A. argenteus*); Flower Vase (six collections, *A. argenteus*, *A. luteocephalus*, *C. nebulosus*); Go-cart (two collections, *C. nebulosus*, *A. argenteus*); Gutter (four collections, *A. argenteus*); Horn (two collections, *A. argenteus*, *C. nebulosus*); Ice-chest (two collections, *A. argenteus*); Jug (fifteen collections, *A. argenteus*, *C. nebulosus*); Kerosine tin (three collections, *C. nebulosus*); Kettle (thirteen collections, *A. argenteus*, *C. nebulosus*); Lighter (one collection, *C. nebulosus*); Mortar (three collections, *C. nebulosus*, *A. argenteus*); Motor Tyre (twenty-five collections, *C. nebulosus*, *A. argenteus*); Oil Can (one collection, *C. nebulosus*); Pan (thirty collections, *C. nebulosus*, *C. fatigans*, *A. argenteus*); Pool (thirty-two collections, *An. gambiæ*, *A. argenteus*, *C. nebulosus*, *C. thalassius*, *C. invidiosus*, *C. decens*); Pot (1,332 collections, *A. argenteus*, *A. luteocephalus*, *C. nebulosus*, *C. fatigans*, *C. decens*, *C. duttoni*, *C. invidiosus*, *C. thalassius*, *An. gambiæ*); Tank (fifteen collections, *A. argenteus*, *C. nebulosus*); Tea-pot (six collections, *A. argenteus*, *C. nebulosus*); Tin (172 collections, *C. nebulosus*, *C. duttoni*, *A. argenteus*, *A. luteocephalus*, *An. gambiæ*); Tree-hole (one collection, *A. apicoannulata*); Tub (two collections, *A. argenteus*); Sharping stone (two collections, *C. nebulosus*, *A. argenteus*); Swamp (three collections, *An. gambiæ*, *C. nebulosus*); Watering-can (one collection, *A. argenteus*); Well (seventy collections, *C. nebulosus*, *C. thalassius*, *C. decens*, *C. fatigans*, *A. argenteus*).

There were therefore forty-three different kinds of receptacles or breeding places. The house-hold pots were the most prolific source of larvæ, catchpits, tins, barrels and drums being also common sources. The pot also supplied the largest variety of larvæ.

BLOOD-SUCKING FLIES IDENTIFIED.

Anopheles gambiæ 356♂♂ 225♀♀.

Culex decens 4♀♀.

Aedes argenteopunctatus 1♀.

Sent by Mr. F. D. Evans, collected at Ikoyi.

Anopheles gambiæ 13♂♂.

Culex thalassius 1♀.

Sent by Mrs. Hall, collected at Ikoyi.

Anopheles domicolus 1♀.

Sent by Dr. M. Morrison, Kontagora.

Glossina palpalis 1♀.

Hæmatopota cordigera 1♀.

Hæmatopota lacessens 3♀♀.

Tabanus secedens 1♀.

Sent by Dr. Pollard, Kaduna.

Hæmatopota lacessens 1 ♀.

Anopheles gambiæ 5 ♀ ♀.

Sent by Dr. Stephens, Ilorin.

Aedes irritans 4 ♂♂ 21 ♀ ♀.

Culex nebulosus 11 ♂♂ 7 ♀ ♀.

Culex decens 1 ♂.

Aedes nigricephalus 1 ♂ 5 ♀ ♀.

Tæniorhynchus africanus 1 ♀.

Uranotænia annulata 3 ♀ ♀.

Anopheles gambiæ 1 ♂.

Culex univittatus 2 ♀ ♀.

Ingramia circumtestacea 1 ♀.

Rhipicephalus sanguineus, a large collection.

Sent by Dr. Turner, Lagos.

DISSECTION OF BLOOD-SUCKING FLIES.

February.

Anopheles gambiæ 168 ♀ ♀.

One specimen had larval filariæ in muscles of thorax and head and also sporozoits in the salivary glands. All others were negative.

Tæniorhynchus africanus ... 216 ♀ ♀.

All negative.

Culex duttoni ... 2 ♀ ♀.

Both negative.

March.

Anopheles gambiæ ... 200 ♀ ♀.

One specimen had sporozoits in the salivary glands and zygotes on the stomach wall. Another specimen had sporozoits in the salivary glands. A third had larval filariæ in the proboscis. All others were negative. The salivary glands in one of these was peculiar in that on one side the middle lobe was very large and the two lateral lobes were shrivelled, while on the other side the structure was normal.

Culex thalassius ... 6 ♀ ♀.

Culex duttoni ... 5 ♀ ♀.

Tæniorhynchus africanus ... 4 ♀ ♀.

Anopheles pharcensis ... 1 ♀.

Aedes luteocephalus ... 1 ♀.

Culex nebulosus ... 1 ♀.

All negative

April.

Anopheles gambiæ ... 91 ♀ ♀.

Two had larval filariæ in the thoracic muscles (one a very heavy infection).

One had larval filariæ in the thoracic and neck muscles.

One had sporozoits in the salivary glands.

All others negative.

<i>Culex thalassius</i>	...	...	...	26 ♀ ♀.
<i>Tæniorhynchus africanus</i>	...	...	...	2 ♀ ♀.
<i>Culex duttoni</i>	...	...	...	1 ♀ ♀.
<i>Aedes irritans</i>	...	...	...	1 ♀.
<i>Glossina palpalis</i>	...	...	...	1 ♀.

All negative.

May.

<i>Anopheles gambiae</i>	...	...	...	122 ♀ ♀.
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Two had larval filariæ in the thoracic muscles.

One had larval filariæ in the cephalic and thoracic muscles, a heavy infection.

One had apparently a double infection, short stumpy forms in the thoracic muscles, long slender and active in the abdominal muscles.

One had larval filariæ only in the cephalic muscles.

All others negative.

<i>Culex thalassius</i>	...	...	...	9 ♀ ♀.
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Two showed active spirochaetes in the stomach contents. The others were negative.

<i>Tæniorhynchus africanus</i>	...	...	...	5 ♀ ♀.
<i>Aedes irritans</i>	...	...	...	1 ♀.
<i>Aedes nigricephalus</i>	...	...	...	1 ♀.

All negative.

June.

<i>Anopheles gambiae</i>	...	...	...	42 ♀ ♀.
--------------------------	-----	-----	-----	---------

One showed sporozoits in the salivary glands. All the others were negative.

<i>Tæniorhynchus africanus</i>	...	...	...	8 ♀ ♀.
<i>Culex thalassius</i>	...	...	...	1 ♀.

All negative.

July.

<i>Tæniorhynchus africanus</i>	...	...	...	10 ♀ ♀.
--------------------------------	-----	-----	-----	---------

One showed spirochaetes in the stomach contents.

All others negative.

<i>Anopheles gambiae</i>	...	...	...	6 ♀ ♀.
<i>Culex thalassius</i>	...	...	...	4 ♀ ♀.
<i>Glossina palpalis</i>	...	...	...	2 ♀ ♀.
<i>Culex grahami</i>	...	...	...	1 ♀.
<i>Aedes irritans</i>	...	...	...	1 ♀.

All negative.

August.

<i>Tæniorhynchus africanus</i>	...	...	14 ♀ ♀.
<i>Culex thalassius</i>	...	...	1 ♀.

All negative.

September.

<i>Tæniorhynchus africanus</i>	...	...	3 ♀ ♀.
<i>Culex thalassius</i>	...	...	1 ♀.

All negative.

All the above mosquitoes were brought by the labouring staff. They were caught in the labourers' houses. The larval filariæ corresponded very closely to the developmental forms of *filaria bancrofti*.

Several attempts were made to induce the sporozoits from the salivary glands to enter red cells in freshly drawn human blood. The gland was quickly transferred to a drop of blood on a slide, sometimes mixed with saline, sometimes mixed with citrate, sometimes undiluted, a cover-glass was lightly dropped on the slide and the whole was kept in a moist cell, in the incubator at 38°C. In no single instance were the attempts successful.

OTHER DISSECTIONS.

June.

Anopheles gambiae 64 ♀ ♀ from Mr. Evans.

„ „ 10 ♀ ♀ from Major Nunn.

All taken at Ikoyi. Zygotes on stomach wall of one, spirochætes in stomach contents of one.

Cimex rotundatus, caught in labourer's room, many hundreds dissected (probably about 400) all negative.

21 *Musca*, all negative.

3 *Pycnosoma*. Many flagellates in intestinal contents of one, many spirochætes in stomach contents of another.

1 *Sarcophaga*, several large amœbæ in stomach contents.

July.

94 *Musca*, eight had flagellates, one had a heavy infection of nematodes and one had spirochætes.

1 *Sarcophaga* had flagellates also.

3 *Pycnosoma*.

2 *Anthomyids*, negative.

August.

35 *Musca*, two had flagellates and one had a large amœba. Four had numerous fungal spores.

1 *Pycnosoma*, numerous flagellates

Stomoxys calcitrans 3, *S. nigra* 1 and *S. omega* 1, also a Hippoboscid, negative.

Insects attracted to light at night.—Through the kindness of G. Wilson, Esq., vaselined hurricane lanterns were placed in various spots in the Nigerian Dry Dock, and left burning all night. The following were the findings:

In Lighter, on shore, 145 Phlebotomus, one Culicoides, four psychodids, one Culex and many non-blood-suckers.

On open shore near high-water mark, fifteen Phlebotomus, six other insects.

On dry-dock, in stream. No Phlebotomus.

In low bush near beach, eleven Phlebotomus, thirty-four other insects.

On beach north of dock, seven Phlebotomus, thirty Culicoides, thirty other insects.

On beach south of dock, one Culicoides, one Aedes irritans, ten other insects.

On small steamer inside dry-dock, twenty-seven Culicoides, one Phlebotomus seven other insects.

Ectoparasites of Rodents in Lagos.—These have already been described in the Rat Plague section. Their identification was done in the Entomological Department.

The observations on the variations occurring in *Aedes argenteus*, Poiret, in Lagos which were detailed at some length in the Annual Report, 1926, were published in the Bulletin of Entomological Research, Volume XVIII, Part 1, September, 1927, pp.5-11.

Reproductions of some of the actual photographs are attached.

S. L. M. SUMMERS CONNAL.

ACKNOWLEDGMENTS.

The following sent material or information or both and are cordially thanked:—

Dr. Aitken, Dr. Boucher, Dr. Braithwaite, Dr. Brierley, Dr. Caffrey, Dr. Carson, Dr. Cauchi, Dr. G. Clark, Dr. Cobb, D.S.O., Dr. Courtney, Dr. Crichton, Dr. Cullen, Dr. Digby, Dr. Dilke, M.B.E., Dr. Don, Dr. Dyce Sharp, Dr. Ebdon, Dr. Elmes, Mr. Evans, Dr. Ferguson, Dr. Fitzgerald Moore, Dr. Forde, Dr. Fowler, Dr. Fraser, Dr. Gallagher, Dr. Glover, Dr. Gray, Dr. Grey, Dr. Grieve, Mrs. Hall, Dr. Innes (Gambia), Dr. Keer, Dr. Kelsall, Dr. Lindsay, Dr. Lockett, Dr. McCon, Dr. McGrath, Dr. MacGregor, Dr. Mackay, Dr. Mackey, Dr. MacLaine, Dr. Maples, Dr. Martyn-Clarke, Dr. Miller, Dr. M. Morrison, Dr. Murray, Dr. Naudi, Dr. Nelson, Dr. Newport, Major Nunn, Dr. O'Carroll, Dr. Oluwole, Dr. Paisley, Dr. Pasqual, Dr. Pearson, Mr. Peaston, Dr. Pollard, Major Price, Dr. Ramsay, Dr. Ross, Dr. Savage, Dr. Selby, Dr. C. J. Sharp, M.C., Dr. Stephens, Dr. Steven, Dr. Thomson, Dr. Turnbull, Dr. Turner, Dr. Waldron, M.C., Dr. Walker, Dr. Waller, and Dr. Wynne-Davies, O.B.E.



Black, without
bands, only
white lateral
spots.



White basal
bands narrow.



White basal
bands broad.



Very narrow
white basal
bands.



Narrow apical
white bands.



Basal and
apical bands.



Basal and
apical bands
broad.



Basal and
apical bands,
also a few
scattered white
scales.



Basal and apical
bands and white
median line.



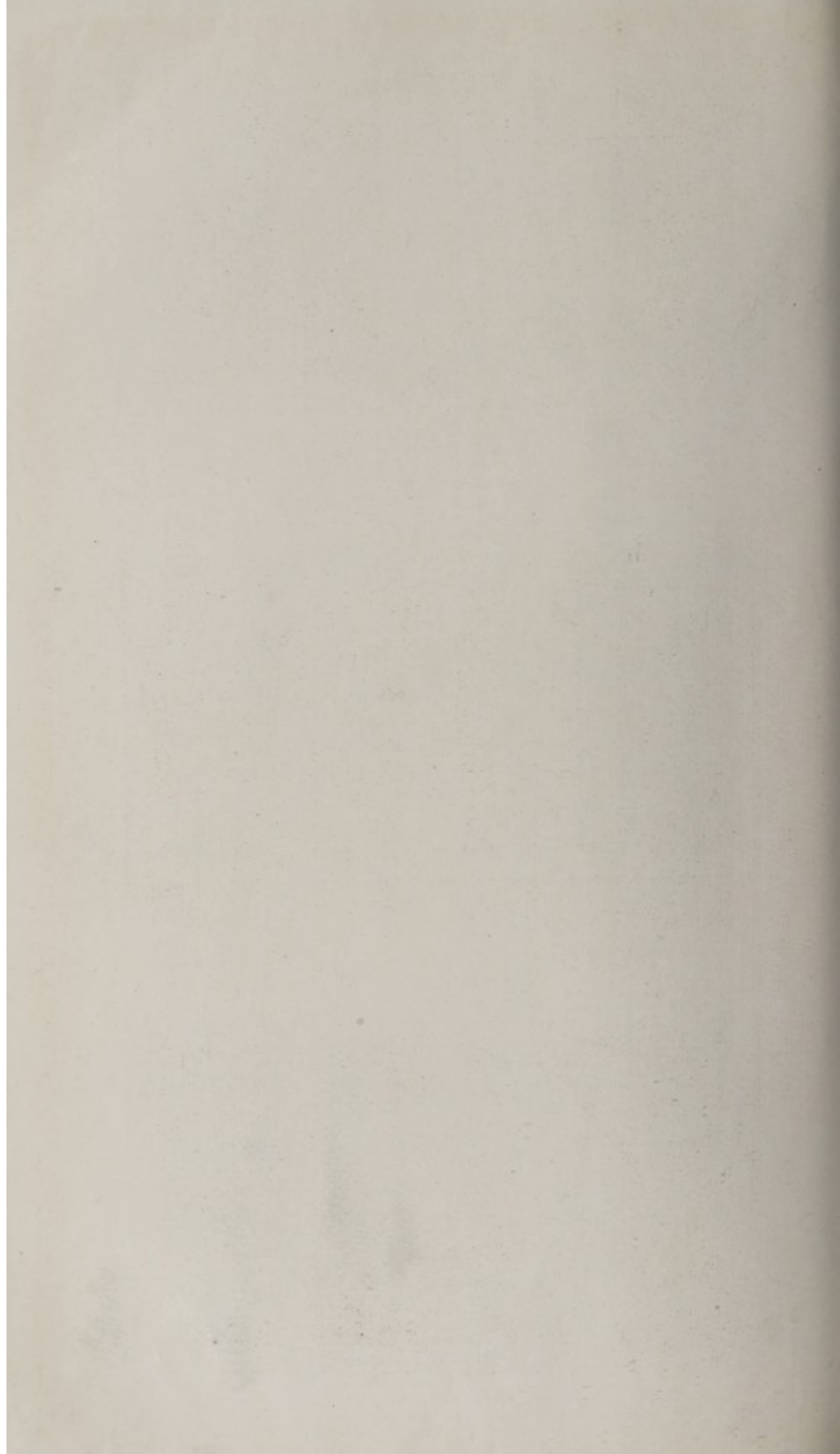
Basal bands
broad, apical
bands narrow,
scattered white
scales.

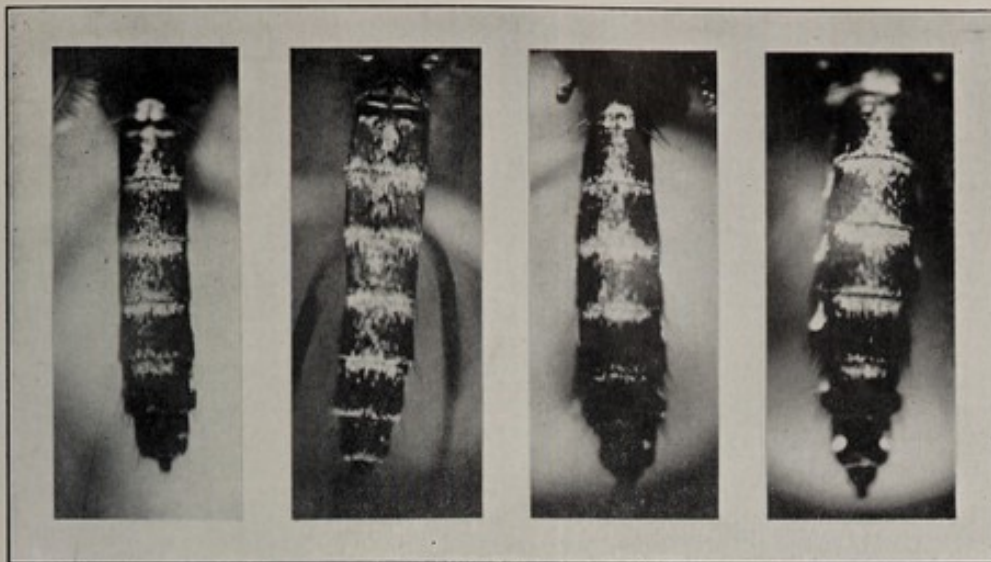


Basal and
apical bands
equal in width.



Basal and
apical bands
equal, scattered
white scales.



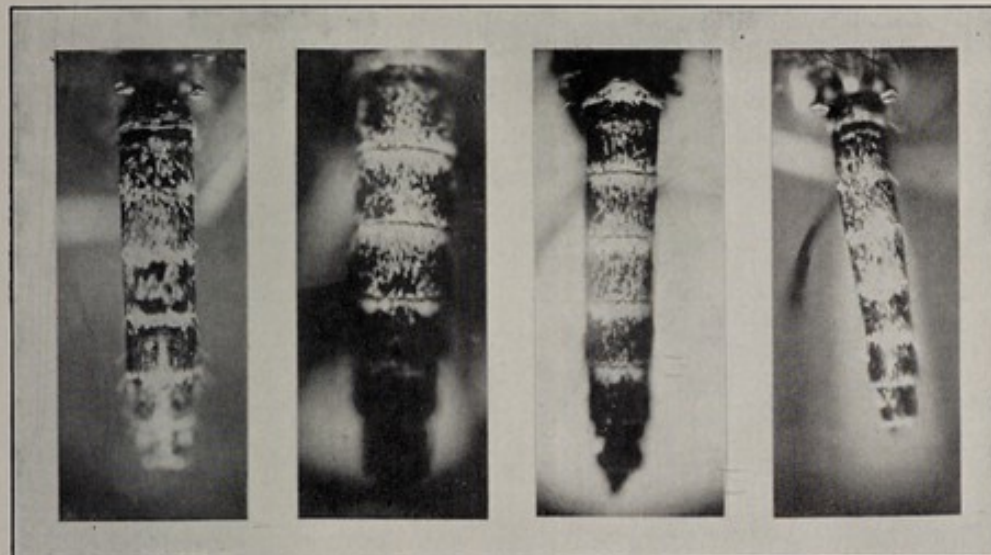


" Brindled " peppered with white and black scales.

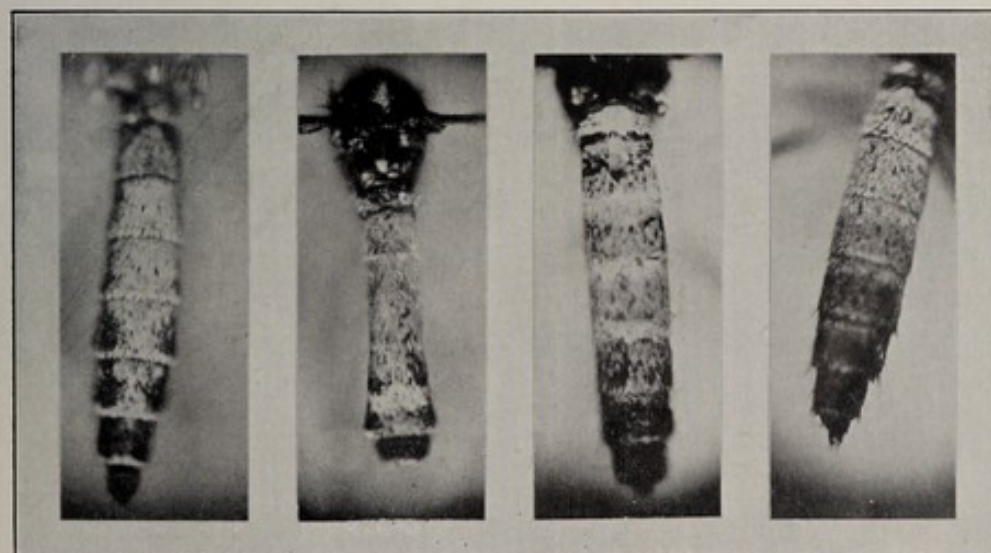
Peppered white scales more numerous than black.

White scales on first three segments in form of hour-glass.

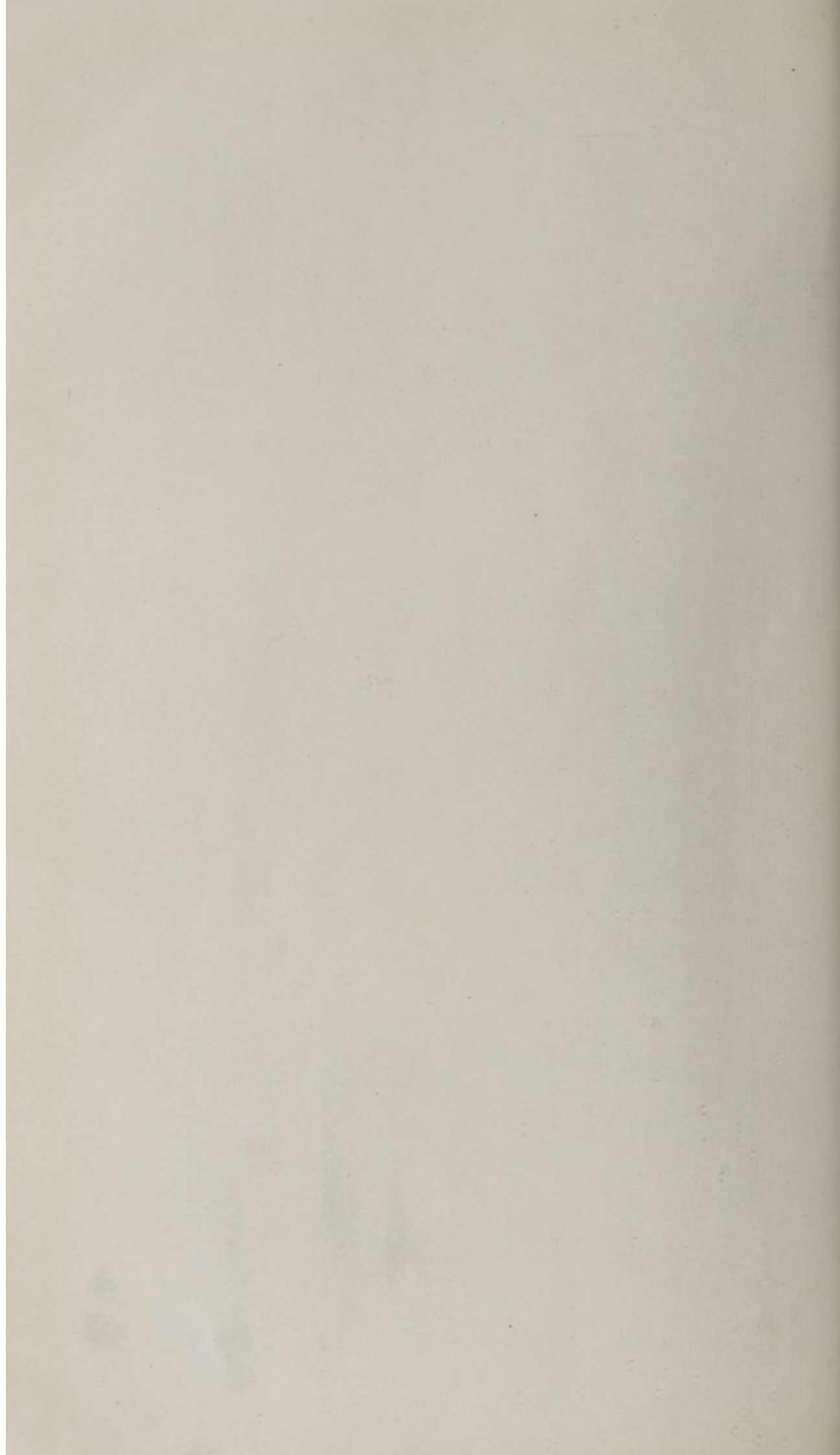
As in previous photograph.



Various " Brindled " Specimens with more white than black scales.



Abdomen practically all white.



APPENDIX B.

REPORT OF THE TSETSE INVESTIGATION, 1927.

BY

W. B. JOHNSON, M.B., B.S. (Lond.), F.R.C.S. (Eng.), L.R.C.P. (Lond.)

AND

LLEWELLYN LLOYD, D.SC.

Tsetse Investigators.

APPENDIX B.

REPORT OF THE TESTS INVESTIGATION 1877

W. H. JOHNSON, M. S., (and) (and) (and) (and) (and)

LIEUTENANT ALGER

THE INVESTIGATION



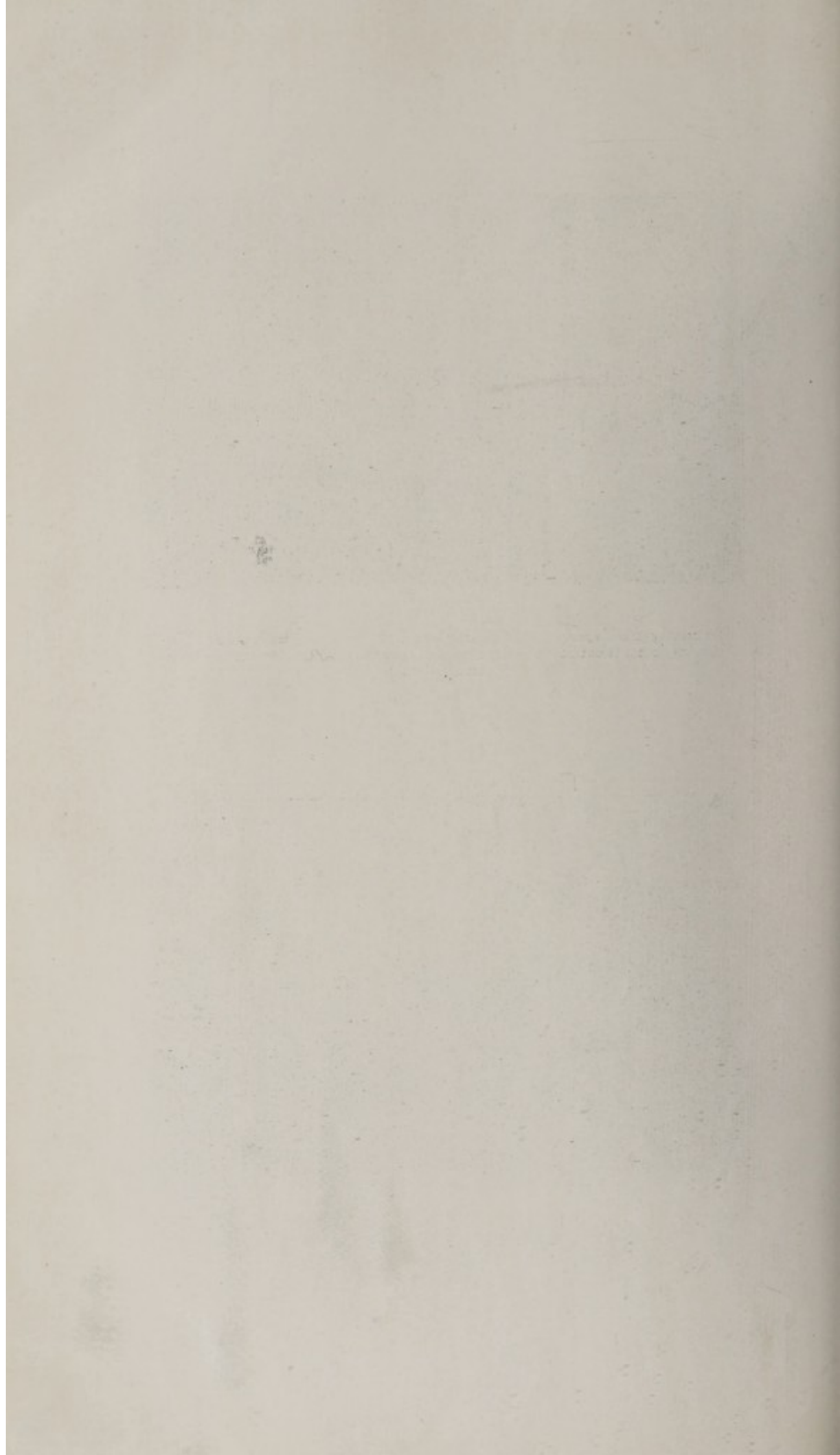
Fig. 1.

Illustrating the Experimental Clearing against *G.morsitans* at Sherifuri. The fringing forest is cut down and the general savannah forest, seen in the background, is uncut.



Fig. 2.

The Main Trade Route through Sherifuri: an old Primary Focus of *G.morsitans* and *tachinoides*: photographed the second year after clearing.



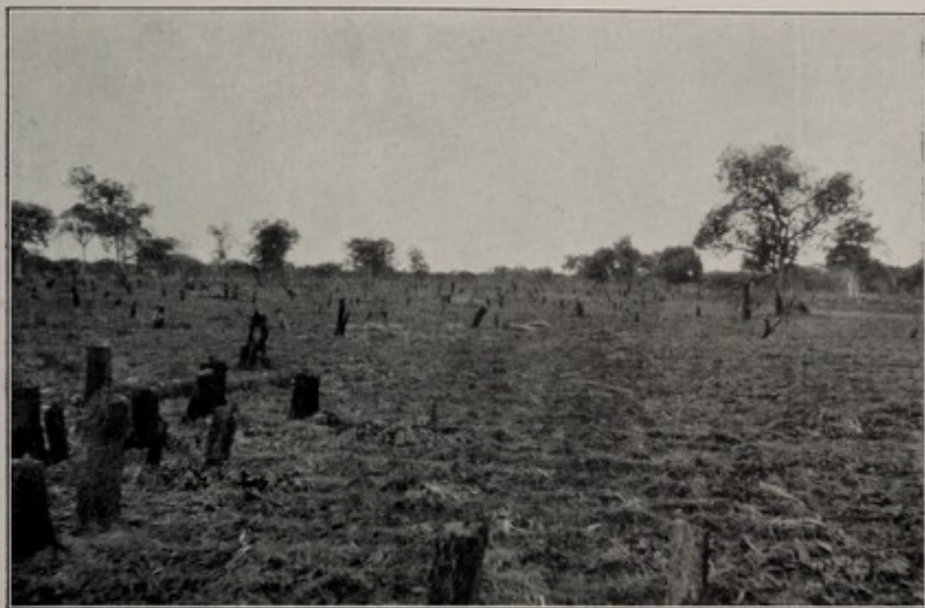


Fig. 3.

An old Important Secondary Focus of Tsetse at Sherifuri: cleared and taken up as a farm.



Fig. 4.

General view of the Matyoro Lakes in Gombe Division: the cut bush is seen in the foreground.

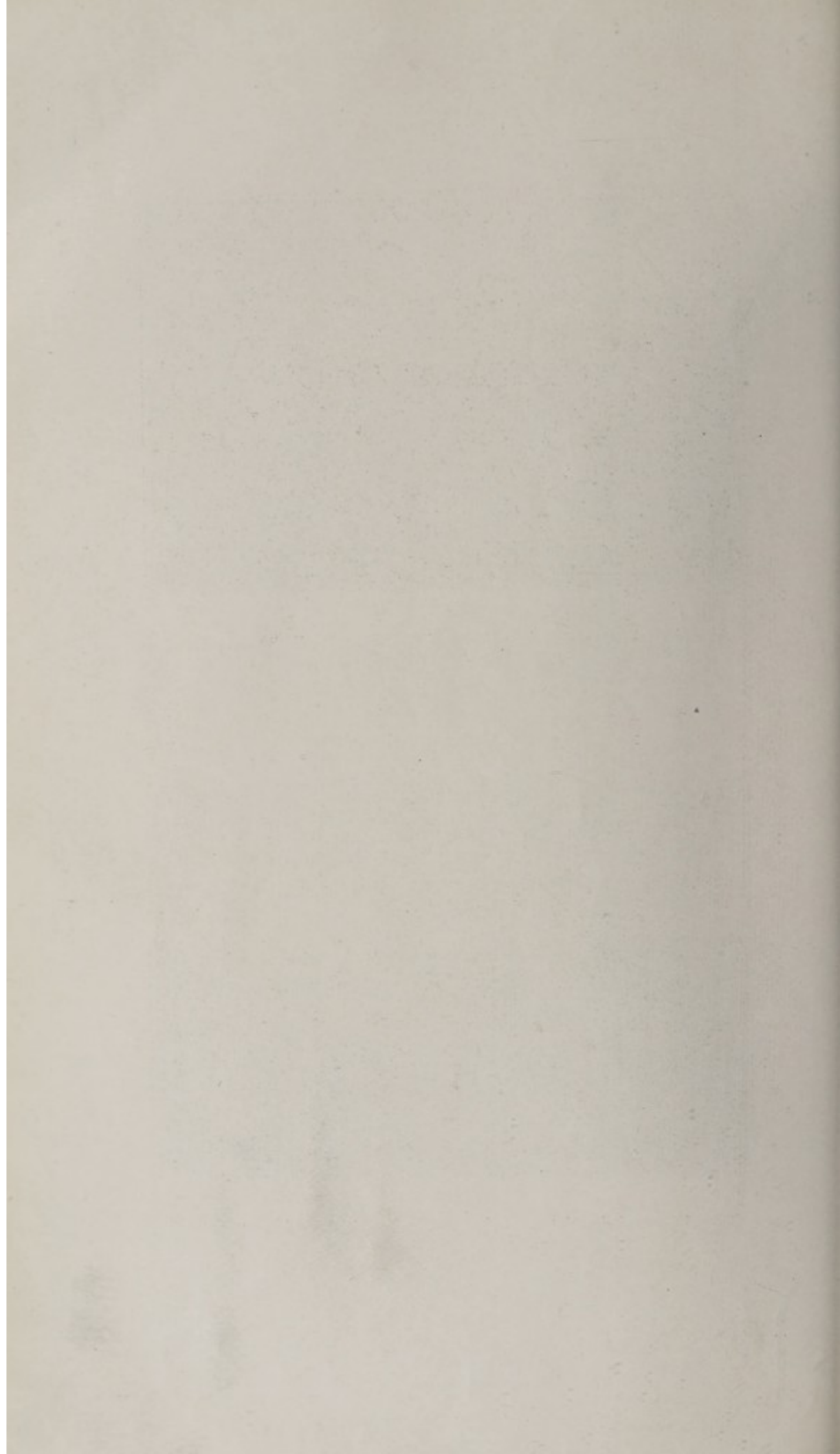




Fig. 5.

Clearing in progress around the Matyoro Lakes: bush infested with *G.morsitans* and *tachinoides*, some *G.palpalis* also present.



Fig. 6.

Clearing in a Primary Focus of Tsetse at Sherifuri: showing the effect of a judicious burning of the slash. The ash of each large tree, burnt where it fell, is seen as white patch. Part of this bank has been farmed.



REPORT OF THE TSETSE INVESTIGATIONS, 1927.

I.—Introduction.

During 1927, the working party of the investigation consisted of Dr. W. B. Johnson, Director; Dr. H. H. Hogg, Entomologist; Drs. P. H. Rawson and M. H. O. Lester, Medical Officers, seconded.

Mr. A. W. Taylor joined as Junior Entomologist in July and later in the year Drs. G. G. Brander, H. J. Hogg and J. C. Paisley were attached to the party as travelling entomologists. Mr. F. F. Collier, Assistant Conservator of Forests, was attached to the investigation till May, and rendered valuable aid in preparing a technical report on the regrowth after clearing on the various types of soil and began a study of the succession of vegetation which we hope to have continued. Veterinary Officers have not yet been appointed to the investigation.

Work is still being carried on under the pioneer conditions of a bush laboratory, with all its inconveniences such as exposure to wind and dust, lack of water supply, refrigerators or any electrical equipment.

that the building will be started shortly.

During the year a report entitled "The Tsetse Fly" was published in the Bulletin of Entomological Research and copies of this have been widely distributed in various papers and a technical report on the tsetse fly has been summarised below.

The main field experiments of the year have been the

which consists of the eradication of the tsetse fly from the primary and main secondary foci of the tsetse fly in the general forest left

partly thoroughly cleared forest, and the forest in the immediate neighbourhood, and the forest in the immediate neighbourhood of the

successful since the fly is dependent on these two practically

year but with the forest species of tsetse fly, which is not a

The main field experiments of the year have been the

primary foci there has not yet been sufficiently extended to

of the most heavily forested of the primary foci near the

purpose of study, hitherto, and it is being carried out

the spot the rate of catching in the forest has been

of the morning per fly-boy hour it is not surprising that the

forest should become infested from it. The tsetse fly is a

shown in Diagram I which was carried out before and after clearing

role from the forest. The continuous line represents the

normal conditions and the dotted line shows the

Before Clearing 1925-6

After Clearing 1926

1927

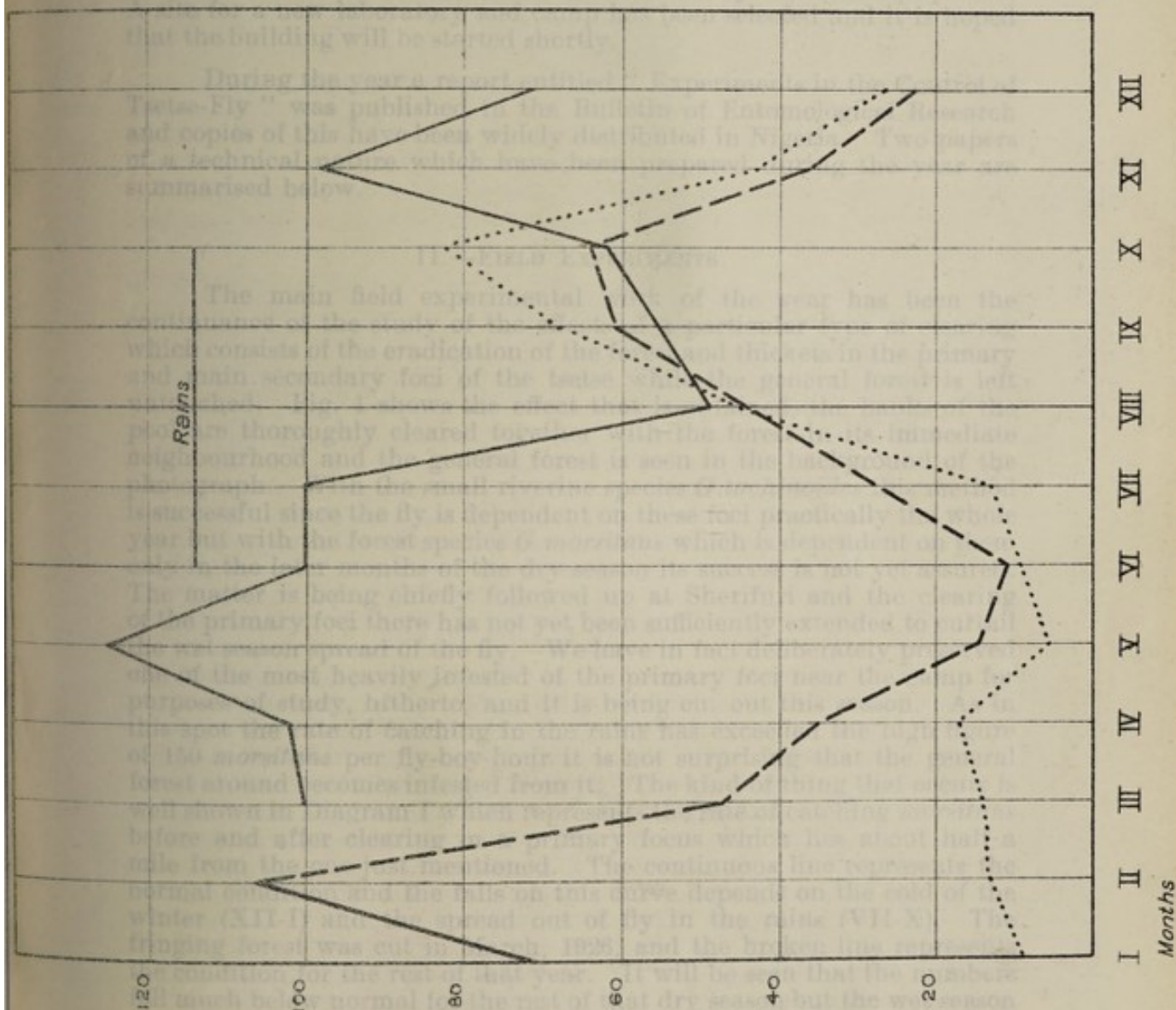
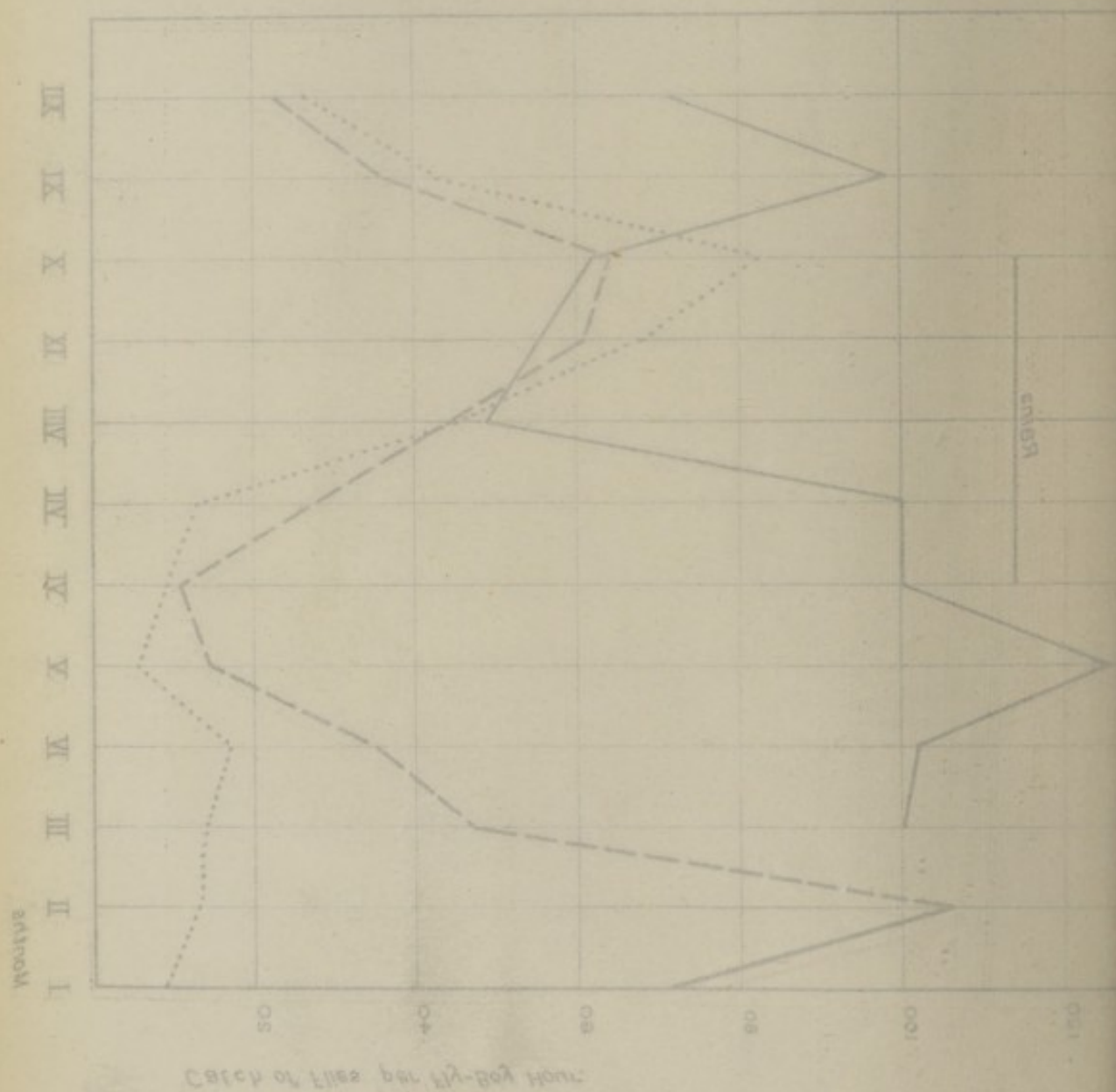


Diagram I.

Catch of Flies per Fly-Boy Hour.



REPORT OF THE TSETSE INVESTIGATIONS, 1927.

I.—INTRODUCTION.

During 1927, the working party of the Investigation consisted of Dr. W. B. Johnson, Director; Dr. Ll. Lloyd, Entomologist; Drs. P. H. Rawson and M. H. O. Lester, Medical Officers seconded.

Mr. A. W. Taylor joined as Junior Entomologist in July and later in the year Drs. G. G. Brander, H. C. E. Chantler and J. C. Paisley were attached to the party as travelling Sleeping Sickness Officers. Mr. S. F. Collier, Assistant Conservator of Forests, was attached to the Investigation till May, and rendered valuable aid in preparing a technical report on the regrowth after clearing on the various types of soil and began a study of the successional flora which we hope to have continued. Veterinary Officers have not yet been appointed to the Investigation.

Work is still being carried on under the pioneer conditions of a bush laboratory with all its inconveniences such as exposure to wind and dust, lack of water supply, refrigerators or any electrical equipment. A site for a new laboratory and camp has been selected and it is hoped that the building will be started shortly.

During the year a report entitled "Experiments in the Control of Tsetse-Fly" was published in the Bulletin of Entomological Research and copies of this have been widely distributed in Nigeria. Two papers of a technical nature which have been prepared during the year are summarised below.

II.—FIELD EXPERIMENTS.

The main field experimental work of the year has been the continuance of the study of the effects of a particular type of clearing which consists of the eradication of the forest and thickets in the primary and main secondary foci of the tsetse while the general forest is left untouched. Fig. 1 shows the effect that is obtained, the banks of the pool are thoroughly cleared together with the forest in its immediate neighbourhood and the general forest is seen in the background of the photograph. With the small riverine species *G. tachinoides* this method is successful since the fly is dependent on these foci practically the whole year but with the forest species *G. morsitans* which is dependent on them only in the later months of the dry season its success is not yet assured. The matter is being chiefly followed up at Sherifuri and the clearing of the primary foci there has not yet been sufficiently extended to curtail the wet season spread of the fly. We have in fact deliberately preserved one of the most heavily infested of the primary foci near the camp for purposes of study, hitherto, and it is being cut out this season. As in this spot the rate of catching in the rains has exceeded the high figure of 150 *morsitans* per fly-boy-hour it is not surprising that the general forest around becomes infested from it. The kind of thing that occurs is well shown in Diagram I which represents the rate of catching *morsitans* before and after clearing in a primary focus which lies about half a mile from the one just mentioned. The continuous line represents the normal condition and the falls on this curve depends on the cold of the winter (XII-I) and the spread out of fly in the rains (VII-X). The fringing forest was cut in March, 1926, and the broken line represents the condition for the rest of that year. It will be seen that the numbers fall much below normal for the rest of that dry season but the wet season spread brings them to normal again in IX-X '26. At this time the nutrition of the fly was about equal to that in the untouched focus as the growth of prone creepers over the cleared ground left the game visible to the fly. In the following dry season the new growth was slashed back and good burning was done and, considering how close was the untouched focus, the number of *morsitans* present was insignificant up

to July (*see* the dotted line in the chart) but the wet season spread brought the numbers up to normal in September. There was, however, a difference in the nourishment of the flies compared with the previous years because long coarse grass had overgrown the clearing and as the game was inconspicuous hunger was found in the flies, only 46% of them being well nourished as opposed to 80% well nourished in the neighbouring untouched focus. It is possible that when the latter has been cleared the results will show whether this concentrated attack on the primary foci is a practicable method of control for *morsitans* but it is not certain that even that additional clearing will be sufficient to cope with the wet season spread. A decision seems slow in being reached but it was our avowed aim to start with what was evidently the minimum amount of clearing which might achieve success instead of a wholesale attack on the general forest which is known to be effective but is excessively costly and from every point of view to be avoided if the desired end can be attained while the bulk of the woodland is preserved.

Another interesting point in connection with the untouched primary focus and a neighbouring secondary focus which are now almost surrounded by clearings has been the extraordinary density of *morsitans* during the recent rains compared with previous years. Thus in the primary focus the highest catch per boy-hour (average over a month) that had previously been recorded was 125 in VIII .26, and similarly in the secondary focus 62 in X .25, but in the rains of 1927 the corresponding numbers were—in the primary focus 190 in August and 167 in September, and in the secondary focus 129 in September. These are instructive figures which show that though the wet season spread is still occurring the flies have to some considerable extent been confined to the bush which is now being cut down.

Apart from these clearings around the forest pools, of which the most detailed records are being kept, other clearings which have been made near Sherifuri include six miles of the Kiyawa River, narrow fringing forest, and about three and a half miles of the Katagum River, broad fringing forest and thicket, straddling the Azare-Hadeija Road. (*See* Fig 2.)

The general shortage of food militated against new settlement in the clearings during the present year but a few pieces of the cleared ground have been put under crops by the natives (Fig. 3) and three villages which were on the point of being deserted have received small influxes of settlers.

Clearing on streams near Kaduna for the control of *G. palpalis* was also carried out, about four miles of stream being dealt with.

We have also commenced an important clearing in Gombe Division in the Matyoro Valley which holds a series of small lakes and extends for about fifteen miles. (*See* Figs. 4 and 5.) This unfailing supply of surface water and the potential grazing it affords are rendered inaccessible by tsetse to the large surrounding herds of cattle in a country where they have to be watered from deep wells and sustained on poor grazing in the dry season or trekked long distances in search of sustenance. This clearing is in the main an investigation into the possibility of making unnecessary the undesirable annual treks of the stock. Three and a half miles of the valley were dealt with during the season, about 500 acres of fringing forest being completely cut down at a cost of about 14s. an acre. The Emir of Gombe is enthusiastic about the project and the number of volunteers for work was considerably greater than we could supply with tools.

The importance of the proper use of fire in the clearing is great. When the cutting is done early in the dry season before the grass is burnt it is possible to put a very effective fire through before the rains begin when most of the slash is consumed (*see* Fig. 6), but when the cutting is done later in the dry season it is better to leave the slash lying till

the grass is thoroughly dry in the next dry season and a fierce uniform fire can be put through. In most cases it is necessary to go over the ground again in the second dry season after the fire has passed and to slash back new growth and re-fire as much as possible round the stumps. It appears that stacking the slash round the stumps when the bush is first cut is uneconomical owing to the amount of labour this absorbs which is about half that of the cutting. The figures in the following table show this to some extent. The labour involved in the first and second slashings is shown for five blocks of clearing in two of which complete stacking was done, in two half was stacked and in one there was no stacking. In the last the labour involved in the second slashing was greater than in the others but the difference was much less than that which the stacking absorbed. The reasons for the variation in the amount of labour used in the first slashings are various, the main one being the proportion of thorn thicket in the block.

MAN-DAYS WORK PER ACRE.

			First Slash.	Second Slash.
I. Stacking complete	...	...	32.4	4.8
II. Stacking complete	...	...	30.2	5.5
III. Stacking partial	...	...	18.8	3.0
IV. Stacking partial	...	...	42.8	7.4
V. No stacking	...	...	40.4	9.0

The selection of an axe which takes a handle fitting like the helve of a pick as the main tool of clearing has thoroughly justified itself. It is a well balanced tool supplied by Messrs. Blakemore & Co., of Birmingham and the natives take to it quickly. Previous to its adoption when we were using the ordinary woodman's axe the supply of handles and wedges was a constant source of anxiety and we were frequently running short of them. With the new type the helves are rarely broken and when necessary new ones can be fashioned locally. We have almost given up the use of the matchet as these axes, with the handles shortened somewhat, are more effective in dealing with woody thorn creepers.

FENCING EXPERIMENT.

Full details of the experiment dealing with the exclusion of game from a focus of *G. morsitans* and *tachinoides* have been published in the Bulletin of Entomological Research, Volume XVII, and as the findings in the present year have been confirmatory of what is there written it is not proposed to deal further with it here except to state that the main conclusion was summarised as follows: "It is considered that game destruction, if it could be accomplished, would lead to a disappearance of *morsitans*, but not of *tachinoides*, and for this reason no policy of game destruction is recommended, but a policy of *laissez faire* towards the game in Northern Nigeria, so that there may be no increase in the wild Ungulata, which results in increase and spread of fly."

DEFERRED GRASS BURNING.

The experiment in postponing the burning of the grass till late in the dry season as a means of tsetse control was not successful this year. The area concerned was somewhat reduced by an accidental fire early in the season and this penetrated some way before it could be stopped. The rest of the area was fired at the end of March. The point selected for the examination of the flies was one where the short grass of the mud plain comes down to and interdigitates amongst the thicket near the river bank. The fire this year did not penetrate the thickets but stopped short at their margins and samples of *morsitans* and *tachinoides* caught after the fire gave the same analysis as those collected previously so that no reduction in numbers could be detected.

ENZYMES IN TSETSE-FLIES INFLUENCING THE COAGULATION OF BLOOD.

Cornwall and Patton record the presence of an anticoagulin in the salivary glands and a coagulin in the gut of several Indian blood-sucking flies. Similar bodies have been found by us to exist in *G. morsitans* and *tachinoides* and while their properties have been studied *in vitro* a parallel study of the movements of the blood mass in the living fly has been carried out in order to discover their purposes.

PROOF OF THE PRESENCE OF THE ENZYMES.

The material to be tested was dissected out and collected in a small quantity of .5% NaCl. This was allowed to dry overnight as drying did not appreciably reduce the potency. It was then ground up with a glass rod in a little saline, a measured quantity of saline was added and a homogeneous emulsion was obtained which was more potent than any that could be obtained with fresh material as this emulsifies badly. When large quantities of emulsion had to be divided the Agla Micro-meter syringe was used to ensure accuracy. The emulsions were added to 1 cc. of blood in small test tubes which were constantly agitated for half-an-hour and then at intervals, or until coagulation took place. The end point of a test was judged to be the moment when the blood became so solid that no flowing movement was perceptible. Tests were carried out at room temperature, usually 80-85°F.

The addition of an emulsion of twenty-five salivary glands to 1 cc. of blood delayed coagulation in the slow clotting bloods of sheep and monitor lizard by half to one hour and in the quickly clotting bloods of fowl and toad by three to six minutes.

The addition of an emulsion of 12½ midguts to 1 cc. of blood accelerated coagulation in the bloods of sheep and monitor lizard by two to five minutes. In these tests the whole of the midgut was used and it was subsequently found that when this organ is subdivided into three equal parts the first portion contains anti-coagulin and the two hinder parts only contain the coagulin. The proventriculus also contains the anti-coagulin. It was proved by the following experiment that the anti-coagulin which occurs in the anterior parts of the alimentary tract is derived from the overflow of the salivary secretion and is not an inherent property of these regions. The salivary glands were removed as described below from ten living *G. tachinoides* and these were given a meal of blood to flush out the gut. The next day they were dissected and it was found that the emulsion of the ten proventriculi was quite inert and that of the ten first thirds of the mesentera was practically inert, retarding the clotting of .5 cc. of sheep's blood from 3'45" to 7'45" as against 79' which was the equivalent time with the same parts of the mesentera from ten normal flies.

PROPERTIES OF THE ENZYMES.

It was found that the coagulin and the anti-coagulin had all the ordinary properties of enzymes, the former being rather the less stable of the two. A water extract filtered is practically as potent as the original emulsion. Whereas the potency of both is only partially destroyed by prolonged drying they lose power rapidly in watery emulsion. That this is due to bacterial action was proved by adding a little arsenious acid to the emulsions when such loss of potency did not occur. Unless the test with the anticoagulin is carried out under sterile conditions clotting occurs ultimately whatever the concentration owing to the bacterial action. For example when the equivalent of 300 salivary glands was added to 1 cc. of sheep's blood coagulation occurred in thirteen-and-a-half hours but when a little arsenious acid was added clotting was postponed indefinitely with much lower concentrations.

The anticoagulant enzyme is not much affected at temperatures below 90°C. and can even resist 100°C. for a very brief time, but the coagulin is destroyed almost completely at 80°C. in 15' and completely at 90°C. in a few minutes. From this it might be supposed that if the enzymes, mixed as they are when the whole mesenteron is emulsified, are raised to a temperature of 80°C. complete destruction of the coagulin would occur leaving the anticoagulin. This does not happen, however as an emulsion of this nature so treated becomes inert in coagulation so that the two enzymes must combine in some way to form an inactive compound and it seems probable that the union is a form of weak chemical action rather than of adsorption.

THEORY OF THE NATURE OF THE ENZYMES.

If a varying amount of a standard emulsion of salivary glands is added to a constant quantity of blood and the times of coagulation are plotted in a curve it is seen that its form resembles what would be obtained by a proportionate diminution in the concentration of the fibrin ferment in blood. This indicates that a given quantity of salivary enzyme will neutralise a proportionate amount of one of the substances involved in normal clotting.

The time between instantaneous and normal clotting is too brief for accurate sub-division so no equivalent series with the coagulant could be obtained. It was found however that when a mixture containing a constant quantity of the salivary emulsion, to delay the clotting, and a varying quantity of gut emulsion is added to a constant amount of blood that the activity of twenty-five salivary glands is equivalent to and neutralises the power of two to three mesentera: with less mesenteron emulsion clotting is progressively delayed and with more it is rapidly accelerated. If, however, the anticoagulant is allowed to act on the blood before the coagulant is added, as takes place in the living fly, there is a substantial lengthening of the coagulation period. Thus when an interval of one minute is allowed between the adding of twenty-five salivary glands and ten mesentera to 1 cc. of sheep's blood (normal clotting in 3' 40") coagulation is delayed by 15' 20" but when the same quantities are added mixed the reaction is accelerated by 1' 20". This seems to indicate that when the anticoagulin is allowed to act first it neutralises the free kinase present and the remainder goes into combination with some element in the blood so as to be less accessible to neutralisation by the coagulation enzyme.

The following is a simplified account of the accepted theory of the coagulation of blood. The blood plasma contains three active elements, namely, fibrinogen, the precursor of fibrin, prothrombin, the precursor of thrombin, and thirdly calcium salts. The tissues and leucocytes supply another enzyme, kinase. There are two stages in coagulation: firstly, the kinase acts upon the prothrombin in the presence of calcium salts to form thrombin; secondly, the thrombin acts upon the fibrinogen to form fibrin.

The coagulin of the gut is not an equivalent of thrombin because it has no effect on blood from which the Ca has been removed by citrating. It must therefore be more or less akin to kinase and accelerate the coagulation by speeding up the formation of thrombin, that is:

Gut enzyme Ca Prothrombin = Thrombin.

That the salivary enzyme also intervenes in the first phase of clotting is proved by the fact that it does not retard the coagulation of fibrinogen when thrombin extract is added to it. Thus when two drops of thrombin extract were added to 1 cc. of fibrinogen solution clotting occurred in 4' 30" while with the same quantities and the addition of an emulsion of twenty-five salivary glands the fibrinogen coagulated in 5' 35", the small difference being readily accounted for by impurities in the solutions used. It is therefore not an antithrombin as hirudin, the anticoagulant of the leech, is supposed to be.

To summarise the matter briefly it appears that the anticoagulant enzyme of the salivary glands and the coagulant enzyme of the mesenteron are complementary and owe their activity to their influence on the formation of thrombin and not to any direct action on thrombin itself. The gut enzyme being equivalent to kinase accelerates the reaction while the salivary enzyme retards it. The latter substance is equivalent to antikinase and any excess of it seems to be adsorbed by the prothrombin so that as more kinase is formed it can only act on the prothrombin after the adsorption compound is split up.

THE FUNCTIONS OF THE ENZYMES.

The function of these enzymes can be understood by a study of Figs. 7 and 8 which are semi-diagrammatic drawings of the gut of the tsetse made immediately after a full meal and after the lapse of two-and-a-half hours respectively. The fly feeds rapidly, generally filling itself in from one to three minutes and during this brief space it imbibes about one-half times its own weight in blood. At first blood passes into the midgut which is in a contracted state. Owing to the folds of the gut the blood is at first more or less restricted to regions where it forms bulges of which the posterior one is the largest. As quickly as the fly can be opened it is found that a small clot has formed at the posterior end of the meal at a point where the mesenteron narrows suddenly and circular muscle fibres increase in the wall. One of the purposes of the coagulin is therefore to hold up the fluid meal and prevent it from passing too far backwards. The narrow portion of the mesenteron ends in a sphincter muscle and this is normally closed except when the detritus of food passes but on two occasions when the flies were fed on citrated blood it has escaped through the anus, in one case the whole meal was lost and in the other a few drops only. The clot is thus a safeguard against such possible loss of food. As soon as there is any back pressure from the blood taken into the midgut the imbibed blood begins to flow into the crop and distends it very rapidly, bubbles of gas which it contains being compressed. The replete tsetse now flies heavily away and lightens itself as quickly as possible by draining off the surplus water from the blood. The exudation of clear fluid from the anus during this phase is well known and the fluid has been conjectured to be serum but this is not the case. It is simply urine which has been excreted by the long Malpighian tubes, shown only at the base in the figures. This is evident when the flies are fed on a solution of hæmoglobin (laked sheep's red cells) through a piece of skin, or on normal saline solution containing a dye: in each case clear fluid passes in the early stages of draining. The speed of drainage was estimated by weighings and it was found that during the first fifteen minutes after the completion of a meal the fly has voided 28.5% of the blood as urine and in one hour 42.8%, and in twenty-four hours it excretes actually more than its initial body weight. While active draining is proceeding the mesenteron is relaxing and the blood from the crop is passing rapidly in by way of the proventriculus probably aided by pressure of the gas. By the end of two-and-a-half hours practically all the blood has gone from the crop and the relaxed state of the mesenteron involving even the muscular hinder part is shown in Fig. 8. One purpose of the anticoagulin of the salivary glands is to keep the blood fluid in the crop for the interval before the midgut can receive it. With quickly clotting blood this is not always achieved as the discovery of impacted clots of avian blood in the crops of wild flies is not uncommon. The formation of such a clot naturally impedes the fly and renders the crop useless, wholly or in part. One of us has shown also that longstanding clots of avian blood may permanently distort the ovaries and cause abortion.

That it is also the function of the anticoagulant enzyme to keep the blood fluid in the proboscis and œsophagus was proved by depriving tsetse of their salivary glands and keeping them alive. The glands are drawn out through two cuts on the dorsal surface of the abdomen.

Fig. 7.

Semi-diagrammatic Drawing of the Alimentary Tract of a Tsetse-Fly ten Minutes after a Meal.

- | | | |
|------------------------------------|---------------------------|----------------------|
| 1. oesophagus. | 4. mesenteron (Midgut). | 7. Malpighian tubes. |
| 2. proventriculus (pumping organ). | 5. clot of blood. | 8. prorectum. |
| 3. Crop containing blood and gas. | 6. sphincter mesenterici. | 9. valva prorecti. |
| | 10. mesorectum. | 11. metarectum. |

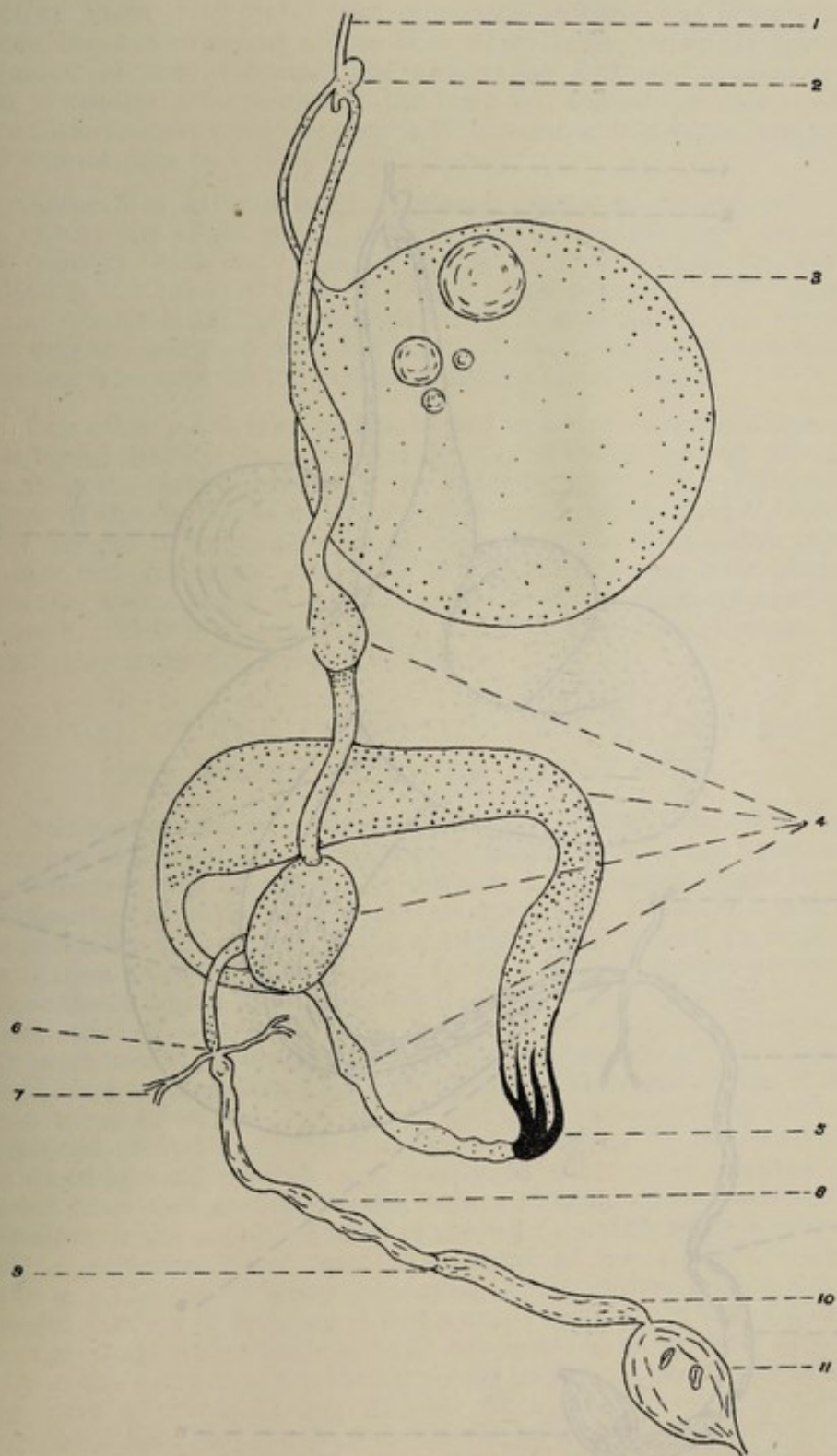


Fig. 8.

Semi-diagrammatic Drawing of the Alimentary Tract of a Tsetse-Fly 2½ Hours after a full Meal.

- | | | |
|------------------------------------|-------------------------|----------------------|
| 1. oesophagus. | 4. mesenteron (Midgut). | 7. Malpighian tubes. |
| 2. proventriculus (pumping organ). | 5. clot of blood. | 8. prorectum. |
| 3. Crop containing blood and gas. | 6 sphincter mesenteri. | 9. valva prorecti. |
| | 10. Mesorectum. | 11. Metarectum. |

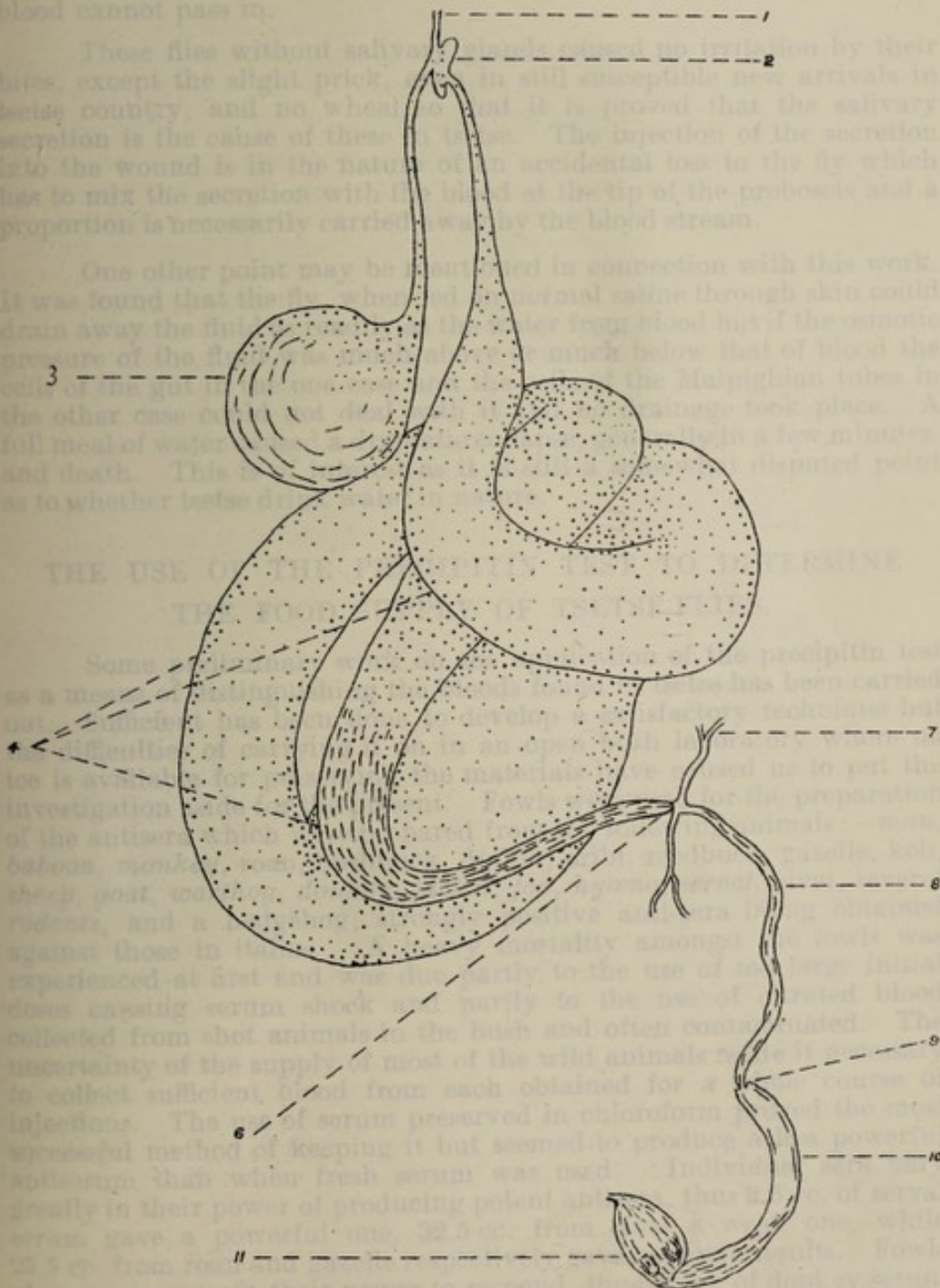
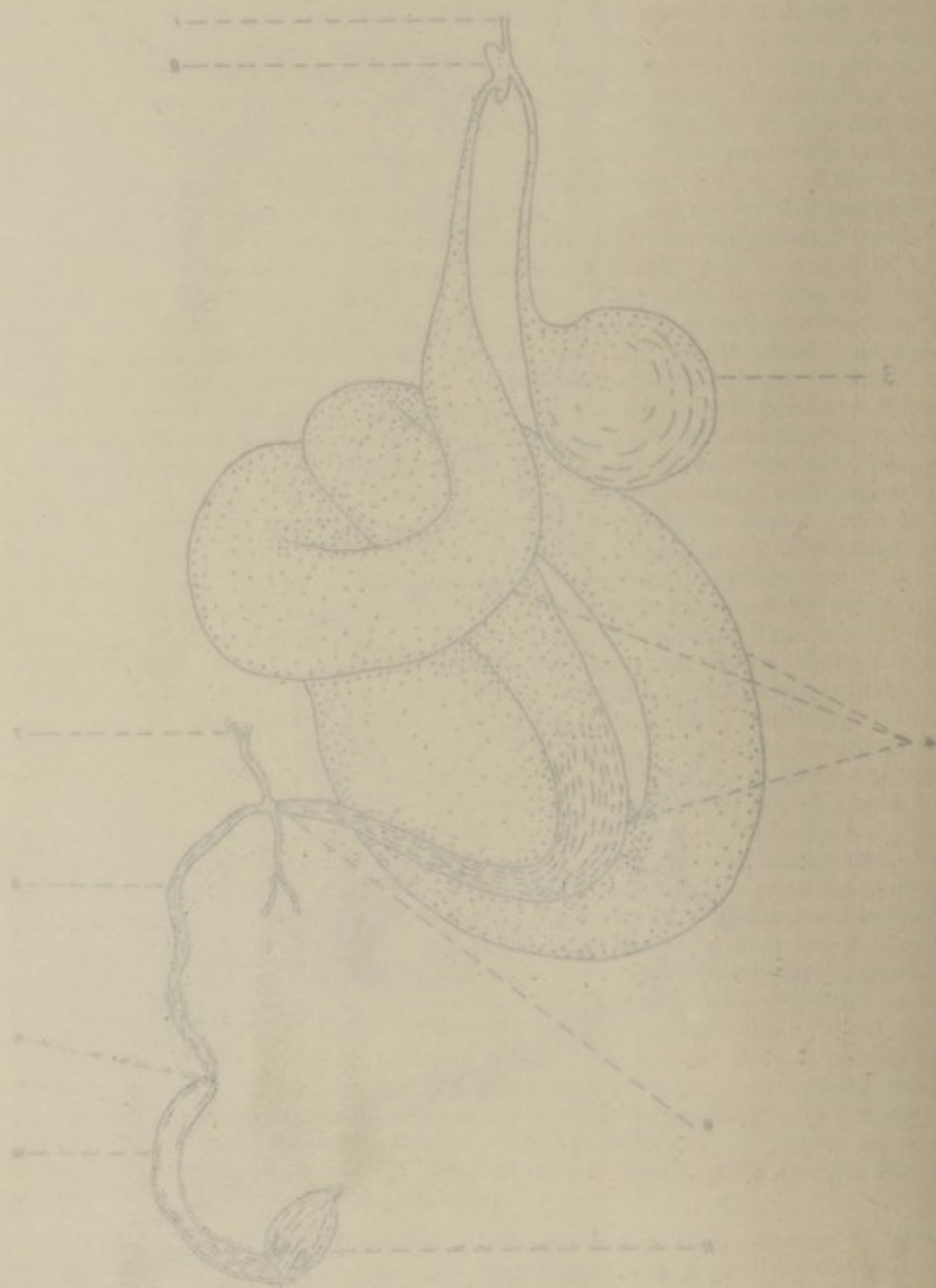


Fig. 8.
Semi-diagrammatic Drawing of the Alimentary Tract of a Tsetse-Fly 24 Hours after a Full Meal.

1. Oesophagus.
2. Proventriculus (gizzard) & clots of blood.
3. Crop containing blood and gas.
4. Mesenterium.
5. Malpighian tubes.
6. Proctodaeum.
7. Valves proctodaei.
8. Mesenterium (Midgut).
9. Sphincter mesenterii.
10. Mesenterium.
11. Metarctodaeum.



There is little breeding from the wounds, and little shock, and provided the operation is not blundered the flies are prepared to feed almost at once after the glands are removed. They thrive better on mammalian blood than on avian but one *G. tachinoides* survived the operation for fourteen days taking thirteen meals from a fowl and among seven flies which lived for at least five days with a minimum of meals of human blood one lived for fifty-eight days taking twenty-six meals and produced four perfect larvæ. This is enough to show that the tsetse can draw blood without injecting salivary secretion into the wound and that the salivary glands supply no ferment essential to the digestion of blood. Sooner or later flies so operated on find it impossible to feed and on dissecting them it is found that abnormal clotting has always taken place in the anterior part of the alimentary tract, generally involving the lumen of the proboscis, the œsophagus and the proventriculus. There is usually a large clot in the crop but sometimes this is empty and in these cases it would appear that its narrow duct is blocked so that blood cannot pass in.

These flies without salivary glands caused no irritation by their bites, except the slight prick, even in still susceptible new arrivals in tsetse country, and no wheal so that it is proved that the salivary secretion is the cause of these in tsetse. The injection of the secretion into the wound is in the nature of an accidental loss to the fly which has to mix the secretion with the blood at the tip of the proboscis and a proportion is necessarily carried away by the blood stream.

One other point may be mentioned in connection with this work. It was found that the fly, when fed on normal saline through skin could drain away the fluid as readily as the water from blood but if the osmotic pressure of the fluid was much above or much below that of blood the cells of the gut in the one case and the cells of the Malpighian tubes in the other case could not deal with it and no drainage took place. A full meal of water caused a dramatic collapse, generally in a few minutes, and death. This is of interest as it is still a somewhat disputed point as to whether tsetse drink water in nature.

THE USE OF THE PRECIPITIN TEST TO DETERMINE THE FOOD SUPPLY OF TSETSE-FLIES.

Some preliminary work on the application of the precipitin test as a means of distinguishing the bloods found in tsetse has been carried out. Sufficient has been done to develop a satisfactory technique but the difficulties of carrying it on in an open bush laboratory where no ice is available for preserving the materials have caused us to put the investigation aside for the present. Fowls were used for the preparation of the antisera which were prepared from the following animals:—*man*, *baboon*, *monkey*, *roan*, *bushbuck*, *duiker*, *oribi*, *reedbuck*, *gazelle*, *kob*, *sheep*, *goat*, *warthog*, *donkey*, *jackal*, *fox*, *hyaena*, *serval*, *civet*, several *rodents*, and a *hedgehog*; strongly positive anti-sera being obtained against those in italics. A heavy mortality amongst the fowls was experienced at first and was due partly to the use of too large initial doses causing serum shock and partly to the use of citrated blood collected from shot animals in the bush and often contaminated. The uncertainty of the supply of most of the wild animals made it necessary to collect sufficient blood from each obtained for a whole course of injections. The use of serum preserved in chloroform proved the most successful method of keeping it but seemed to produce a less powerful antiserum than when fresh serum was used. Individual sera vary greatly in their power of producing potent antisera, thus 9.5 cc. of serval serum gave a powerful one, 32.5 cc. from civet a weak one, while 29.5 cc. from roan and gazelle respectively gave negative results. Fowls also seen to vary in their power to respond, thus 36 cc. of donkey serum gave a powerful antiserum with one fowl whereas 30 cc. injected into

a fowl little lighter in weight gave a weak one; similarly 42 cc. of monkey serum gave a positive antiserum in one case and 44 cc. gave a negative one in another. The dosage employed by Sutherland and Mitra (1) in producing potent antisera from fowls proved fatal to the small African fowl and reduction of dose gave weak antisera. The use of repeated small doses as recommended by Nuttall (2) was more effective. With the experience gained by using nearly 100 fowls, the following routine will be adopted, the weight of the fowls being $1\frac{1}{2}$ -2 lbs.

1st day	1 cc.	fresh serum	intraperitoneal.
2nd day	4 cc.	" "	intravenous.
5th day	4 cc.	" "	intravenous.
9th day	6 cc.	" "	intraperitoneal.
13th day	8 cc.	" "	" "
17th day	8 cc.	" "	" "
22nd day	10 cc.	" "	" "

The fowl is killed on the 32nd to 34th day. With small mammals such as rodents it may be more convenient to use citrated blood but we prefer to give this by the intraperitoneal route only.

As we were working with numbers of closely allied sera it was found more convenient not to attempt to obtain specific antisera but potent ones which would distinguish one group from another with certainty but which, while giving a strongly positive reaction with its homologous serum, also gave group reactions. The group reactions varied with the strength of the antisera—thus Messrs. Burroughs Wellcome's anti-sheep serum gave strong reactions with sheep and goat sera, slight with bushbuck, and none with the other antelope, but our own anti-sheep serum gave strong reactions with sheep and goat sera, a weak reaction with gazelle, and a slight reaction after twenty-four hours with the other antelope and warthog, while our anti-goat serum was strongly positive to goat and sheep, gave a distinct reaction with bushbuck, duiker and oribi, less distinct with reedbuck, gazelle and warthog, and only a slight reaction after twenty-four hours with roan and kob.

PRESERVATION AND STORING OF ANTISERA.

We have found it impossible to preserve the antisera in the absence of ice. Preserved in sealed tubes at laboratory temperatures it gradually lost potency, preservation with chloroform gave little better results and drying also causes loss of potency and a haze when the product is tested against the control saline. Under field conditions each batch of antiserum has to be used as soon as it is collected. The sera, however, can be kept indefinitely dried on filter paper.

TECHNIQUE OF THE TEST.

The serum to be tested (whole blood dried on filterpaper) was dissolved in 1.8% saline to make roughly a 1/500 dilution, producing a fine froth with small bubbles on shaking. To 0.3 cc. of this solution in a Dreyer's tube 0.05 cc. of antiserum was added and the resulting haze or precipitate noted after half and twenty-four hours. As controls the serum dilution has always been put up alone and also the antiserum has been added to saline. Readings were made by transmitted light.

APPLICATION OF THE TEST.

The quantity of blood found in the gut of a wild fly is usually small and the average amount of fluid in 1/500 dilution which can be obtained from a single fly gut is only 3.0 cc. This is sufficient for testing against nine antisera and one control. Experiments were also made with the faeces of the fly but no precipitin reaction could be got with them. In order to limit the number of antisera against which one blood had to be tested the bloods were divided into two groups according to

the size of the red cells and a third group to include bloods recognised as mammalian but too broken to otherwise class, *i.e.*, Group I, bloods with red cells more than 6.2 in diameter includes man, monkey, dog, horse and all the other mammals we have examined which do not fall into the next group; Group II, bloods with red cells less than 6.2 in diameter includes cattle, sheep, goat, all antelopes and wild cats; Group III, indefinite bloods.

The first series of tests was carried out at Sherifuri and included twenty-six bloods from *G. tachinoides* and forty-four from *G. morsitans*. Of these eight and seven respectively fell into Group I and were set up against the relative antisera. Among the eight bloods from *tachinoides* six gave positive reactions to man, one to hyæna and one to a rodent; of the seven from *morsitans* five were positive to man and two were negative to all the antisera. As no strongly positive antisera had been obtained for antelope bloods those of Group II were set up against goat antiserum for group reactions and out of thirteen bloods from *tachinoides* seven gave a marked group reaction and six a slight reaction while in thirty-seven from *morsitans* thirty-one gave a marked reaction and six a slight reaction, indicating that all were derived from the antelopes or pigs.

The second series of tests was done at the Matyoro Lakes in Gombe Division (*see* Figs. 4 and 5) a small valley with abundant surface water bordered by heavy fringing forest in which clearing was being carried out. Baboons are very numerous in the valley. Clearing disturbed the antelope which were coming to drink by night and the usual state of starvation in *morsitans* the accompanies clearing was found, about 25% of those examined being under-nourished. The proportion of bloods of Group I was also unusually high for this species, 30% of those examined falling into this group. Tests were only made with bloods of Groups I and III (indefinite) which were set up against the antisera of man, baboon, and monkey (*Cercopithecus*) the reactions of these three being quite distinct although a group reaction occurs. The results were as follows:—

Species of fly.	No. examined.	Total containing Mammal Blood.	Proportion proved to be		
			Man.	Baboon.	Monkey.
<i>G. Tachinoides</i>	679	60=8.8%	10=16.7%	17=28.3%	2=3.3%
<i>G. Morsitans</i>	2,408	99=4.1%	9=9.1%	8=8.1%	0

It will be seen that the proportion taken from baboons was larger in the case of *tachinoides* than it was in the case of *morsitans* in which about the same amount was obtained from man and baboon. Amongst the bloods of Group I in *tachinoides* one among twenty-two, and in *morsitans* nine among twenty-one were derived from neither man, baboon or monkey and as horses, donkeys and dogs do not visit the area the source remains problematic.

It is thus proved that the presence of a large number of baboons in a locality provides a source of food for both *tachinoides* and *morsitans* and that it can to a certain extent replace ungulate blood. The former fly feeds more readily on baboons than the latter does and this is probably the reason why it is better able to maintain its nutrition during a period of game scarcity in this district than is *morsitans*. The small monkeys seem to be less accessible, the agile *tachinoides* succeeding on them sometimes but the more clumsy *morsitans* rarely if ever gets a meal from them.

CONCLUSION.

The difficulties in the preservation of blood and antisera without ice have hindered the development of the experiment. As, however, the blood found in the flies can be preserved indefinitely when dried on

filter paper strips the precipitin test is likely to be of real value in determining the food of tsetse. The antisera can be prepared and stored in a properly equipped laboratory and the tests can be made there of bloods collected from the flies during field work.

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- (2) Nuttall; Blood Immunity and Blood Relationships, Camb. Univ. Press, 1904.

THE TREATMENT OF SLEEPING SICKNESS.

During the year 364 cases of sleeping sickness have been treated at Sherifuri with a known mortality of six cases. The actual mortality is probably considerably in excess of this figure as it has not always been possible to follow up the cases after treatment. The discharged patients are instructed to present themselves for re-examination at frequent intervals though only a small proportion of them do so, and, as the inhabitants of the surrounding districts are partly itinerant people, it is often impossible to trace them by enquiry at their villages.

Over 90% of the cases were in the later stage of the disease with an average history of about nine months sickness and the diagnosis could be almost always confirmed by an examination of the fresh cervical gland juice. These late cases are given a course of trypanamide, 1 gm. being injected intravenously on the first day, 2 grms. on the fourth day, followed by 2 grms. at weekly intervals till a total of 13 grms. of the drug has been given. The results of this treatment have in general been good as usually in all but the moribund cases there has been a very well marked improvement after the first sterilising dose. In very few cases has it been necessary to extend the course. The small number of cases having a very short history and in whom trypanosomes could be demonstrated by an examination of fresh blood were given a course of Bayer 205, a weekly intravenous injection of 1 gm. being given for five weeks.

The subsequent history of the four natives on the Staff of the Investigation who contracted the disease some years ago and received the routine course of Bayer 205 soon after onset is of interest. One has remained perfectly well for nearly five years and the other three for four years. This speaks well for the efficacy of the drug in the early stages of the disease but in later cases trypanamide gives better results.

Owing to a shortage of Staff not much travelling in the sleeping sickness districts was possible till recently and this always leads to a great increase in the number of cases found. Travelling in sleeping sickness areas is particularly valuable, not only for the actual number of cases found by the travelling officer, but also because it advertises the facilities for treatment offered at Sherifuri and so leads to a greater number of cases voluntarily attending the clinic. Some cases come seeking treatment from as much as seventy or eighty miles distance from the clinic.

Since the arrival of the Sleeping Sickness Officers much more travelling has been done. Dr. Brander made two short tours in the Sherifuri area and then went to Rano, an ancient town near Kano where an epidemic of the disease was reported and within a few days of his arrival there he had sixty cases under treatment. While he is remaining to follow up the treatment he is clearing the dangerous bush about the town and the affected streams. Dr. Paisley is doing similar work in the neighbourhood of Gwarum where the disease has appeared in recent years. Dr. Chantler toured the country south of Gombe and found cases in seven of the towns visited by him.

APPENDIX C.

ANNUAL REPORT OF THE AFRICAN HOSPITAL
LABORATORY, LAGOS, 1927,

BY

G. G. BUTLER, B.A., M.D.BC., (CANTAB.) M.R.C.S., L.R.C.P.
Pathologist.

APPENDIX B

ANNUAL REPORT OF THE AMERICAN HOSPITAL
LABORATORY LABOR, 1911

O. G. BUTLER, M.D., Director
Pathologist

REPORT ON THE WORK OF THE AFRICAN HOSPITAL LABORATORY, LAGOS, FOR THE YEAR 1927.

EUROPEAN STAFF.

The work of the Laboratory has been carried out single handed throughout the year 1927; except for the period April 20th to October 1st, inclusive, when Dr. Burnie relieved me for my period of home leave, the work has been in my hands. I am very grateful to Dr. Burnie for his keenness and continuing the routine methods employed in the Laboratory.

NATIVE STAFF.

Three Laboratory Attendants-in-Training have been employed for most of the year; the most senior has become a reliable Post-mortem Technician and the others will be slowly advanced in the work ultimately expected from them in proportion as evidence is obtained that trustworthiness and reliability has been acquired in the more menial and uninteresting duties which have to be carried out in a Laboratory. The opportunity for these Laboratory Attendants to be present at classes of instruction in elementary chemistry and physics during the year 1928 can only add to the understanding of procedures and apparatus under their observation in the Laboratory.

The scope of Work remains as in 1926 and I do not think any demand from the hospital staff has failed to be met and after all the type of work required is in their hands. There has been an increase in the amount of work done for out-stations in the form of sectioning tissues and Sachs-Georgi reactions.

The report from this Laboratory for 1926 was a fairly full general survey of the types of disease as I met them during my first tour in Lagos and as the work of a routine laboratory must of necessity be much the same for each year, it would be tedious to repeat at length my findings for 1927, and I propose therefore to cut down this report to the smallest dimensions compatible with a general report of the work: this is the more necessary owing to the fact that for five months of the year I was not in actual contact with the work and a difficulty in picturing the cases has been found.

I.—EXAMINATION OF BLOOD.

The examination for parasites has been performed during 1927 for practically all patients whether suspected to be suffering from malaria or not. The occurrence of apyrexial cases of malaria infection in Europeans has shown the necessity for the procedure among them. The necessity of the examination among natives is not so obviously necessary, for while the majority of juvenile patients show the presence of malaria parasites irrespective of their illness it is with comparative rarity that they are discovered among adults: presumably this is the result of a very high immunity acquired during childhood and one wonders first, to what extent if any of the adult Lagos population actually suffer from malaria and whether quinine treatment amongst them is of any real value or necessity and secondarily whether the regular administration of quinine amongst the children would not produce eventually a relatively non-immune population with correlated disabilities in its wake unless the quinine administration could be done wholesale over wide areas.

Malaria.—A total of 3,385 slides have been examined for parasites, two less than for 1926, and of these 1,031 have shown the presence of

parasites, excluding crescents, making a percentage of approximately 30%. The various types of parasites have been in the following proportions.

Subtertian	...	...	...	93.2%.
Quartan	...	...	...	6.7%.
Benign Tertian	...	...	...	.1%.

Out of the total quoted above (3,385) 775 films were obtained from Europeans and this routine examination irrespective of the illness of the patients yielded a catch of over 21% positive results.

I am unable to state what percentage of cases clinically malarial fever in Europeans gave positive findings but I understand that the percentage is probably as high as 80% in spite of the fact that many individuals have already partially treated themselves before appealing to their medical attendant.

Infection with crescents has been found to occur in 2% of all the films examined but the percentage increases to 6% when only the positive malaria slides are considered.

Quartan malaria infections have not reached quite so high a percentage as in 1926 but the tendency to show a higher incidence during the less rainy months of the year has been repeated during 1927.

Benign Tertian has been much scarcer than during 1926.

Relapsing Fever.—If one may judge by the Lagos cases, this infection appears to be dying down for only two cases have been diagnosed during the year.

Trypanosome infections form an interesting reminder occasionally that the disease may crop up in Lagos in spite of the distance from infected areas five cases have been diagnosed on blood film examinations and as a rule without any clinical suspicion of the condition: they were all native cases.

Microfilaria infection occurs in about 3% of the bloods examined all but two cases being in natives. Three or four distinct types can be found.

Age incidence in Malaria.—Out of a total of 428 children of five years and under that have been examined for parasites, irrespective of any illness, no less than 321 have shown the presence of malaria, that is 75%. As this figure is given on a single examination of each patient, we can assume that every native in Lagos is infected with malaria within a few months of birth and as the infant mortality has dropped, I understand, from over 300 per thousand to 150 per thousand in spite of this malaria incidence remaining as high as it possibly can it would seem scarcely possible that malaria infection in infants has been a factor in the previous high mortality rate.

Other Examination of Bloods includes the usual laboratory procedures such as total and differential leucocyte counts, hæmoglobin estimations, blood culture and agglutinations but none of them warrant comment, nor are they numerically important. One case of splenome-dullary leukæmia was discovered. Lymphocytosis in children has been noted in more than the usual frequency and an investigation of these states I believe would reveal cases of interest.

Sachs-Georgi Reactions.—We still unable to tackle Wassermans reactions and I see no prospect of doing so until the new laboratory is completed and until then Sachs-Georgi reactions must take their place.

Their simplicity is valuable and I think the results have been satisfactory.

The introduction of boric acid as a preservative for sera has made a great difference to the state of arrival of sera from a distance.

A total of 385 sera have been examined, 114 from European patients and 271 from natives.

The native cases have yielded 57% positive cases while the European positive cases come to 35%.

II.—EXAMINATION OF FÆCES.

The routine examination of fæces has been carried out as in previous years and while they are of great value in guiding treatment they rarely yield findings of great interest. Numerically the total examined is rather lower than in 1926, namely, 1,015 as against 1,081, European patients supplied 488 specimens, the balance of 527 coming from natives. *Entamoeba histolytica* or their cysts have been found in 7% only of the native cases and in 4% of the European cases which is practically the same findings as for 1926.

Ascaris infections are always found to be high amongst natives and the percentage of infected cases has risen to 71%.

Eight cases have been found amongst Europeans which is perhaps low considering the probable high percentage among native servants. I am inclined to think that *ascaris* is not such an innocent parasite as it is commonly regarded and in my view they are more often the cause of serious symptoms among children than many other illnesses. Tangled masses of *ascaris* have been found in the intestine of post-mortem cases where death from convulsions has occurred and where any other causative factor is extremely difficult to find or believe.

Ankylostoma infections have been found to occur in over 50% of the native cases but this probably is a much lower figure than obtains amongst natives living in the protectorate compared with Lagos island. *Schistosoma mansoni* infections have not been found with much frequency only four having been detected.

Tænia infections having been found in eleven native patients and two European patients.

One native of Northern Nigeria was found to be infected with *hymenolepis*: it is the only case I have met with in West Africa at present.

Bacillary Dysentery.—In the report for 1926 I mentioned that I proposed asking the Lister Institute to examine certain organisms isolated from dysenteric stools as there had been considerable doubt as to the existence of bacillary dysentery in Nigeria or even the other West African Colonies.

The following is an extract of a report from the Curator of Type cultures:—

- “Nos. 18, 63, 13, 50 and 48 are genuine *B. dysenteriae* Shiga, giving typical cultural reactions and agglutinating with standard Shiga serum.
- “Nos. 27, 62 and 51 are genuine *B. dysenteriae* Flexner type Y. They give typical Flexner reactions and agglutinate with a standard Flexner—Y serum.
- “Nos. 8 and 3 also give typical Flexner reactions—No. 8 is slightly agglutinated by Y serum but No. 3 not at all. They probably belong to some of the other groups.
- “No. 10 gives all the cultural reactions of *B. schmitz* and may be classed as such.”

This should dispose finally of the question of the occurrence in Nigeria of most types of bacillary dysentery.

Fifty-one stools from cases suspected as possibly being bacillary dysentery have been examined bacteriologically during the year 1927. Nineteen of these have yielded organisms of the dysentery group, eleven being Shiga type and eight Flexner Y group. Of the thirty-two specimens from which negative results have been obtained seven, I think, may be classed as missed cases but the remainder have possessed characters which militate against positive findings such as staleness or evidence suggestive that the symptoms have been caused by a violent native anti-helminthic. Only in two of the cases has the finding of *entamoeba histolytica* subsequently proved that the case probably was not a bacillary infection.

From a study of a good many hundreds of samples of stools I am inclined to think much emetine is administered on insufficient grounds and I believe the statistics as to the frequency of proved amœbic liver abscess cases among natives would confirm this point.

The frequency, however, with which amœbæ (apparently non-pathogenic) are found in the non-dysenteric stools of natives does indicate the opportunity for research into their morphology and characters. It has not been my experience to find simultaneously double infections of *B. dysenteriae* and *entamoeba histolytica*.

III.—EXAMINATION OF URINES.

A total of 540 specimens have been examined only forty-one of which came from European patients.

Albuminuria associated with the presence of casts was found in 14% of the native cases.

Only one case of glucosuria was recorded.

Pyuria of course is very prevalent and usually due to some form of venereal disease.

Schistosoma hæmatobium infections have only reached 5.5% but a higher percentage than this is found at post-mortem examinations.

One case of hæmoglobinuria occurred in a native and the details will be mentioned elsewhere.

Bacteriological examinations have been confined chiefly to the detection of enteric infections. Two samples have yielded pure cultures of *B. typhosus*.

IV.—EXAMINATION OF SPUTA.

A total of 343 specimens have been submitted for examination, of these forty-eight came from European patients.

Fifty-six samples from natives and twelve samples from Europeans showed the presence of tubercle bacilli.

Bacillus pestis was discovered in the sputum of two in-patients during November.

Miscellaneous.—Under this heading is included a large number of the usual routine examinations carried out in a laboratory such as the examination of pus from various sources, serious effusions and cerebrospinal fluid material from the throat, skins, ulcers and abscesses.

It is unnecessary to mention them in detail, but a large proportion is made up from urethral smears, gland punctures for *B. pestis* and many smears from post-mortem material brought to the laboratory for the exclusion or confirmation of plague infections.

Numerically they total 376 specimens but this total does not include the many smears from lungs, glands and spleen of suspected plague cases which were brought to the Laboratory by the plague authorities.

VI.—EXAMINATION OF TISSUES.

By far the greater part of this procedure is carried out in connection with the post-mortem work.

Of the 476 portions of tissue that have been sectioned and stained only twenty-three were obtained during life.

Most areas of the body appear to be included as will be seen in the list attached.

Liver	127	Thymus	5
Kidney	96	Pituitary	5
Spleen	45	Adrenal	5
Lung	34	Thyroid	3
Heart	30	Breast	3
Intestine	29	Pericardium	2
Glands	25	Cerebellum	2
Skin	15	Pons	2
Cerebrum	12	Ovary	2
Pancreas	7	Testis	1
Bladder	7	Diaphragm	1
Uterus	6	Prostate	1
Stomach	6	Parotid	1

Tumours of doubtful origin 4

Malignant disease has been diagnosed in fourteen cases and were classified as follows:—

Carcinoma

Liver, primary	5
Breast	1
Uterus	1
Mouth	1

Sarcoma

Scapula	1
Thigh	1
Eye	1
Maxilla	1

Lymphosarcoma 2

It will be noticed that while malignant disease is not unusual among natives the more common types are not the usual type met with among European races.

The relatively common occurrence of primary carcinoma of the liver among natives is probably associated with cases of gross cirrhosis of liver met with for these frequently show considerable evidence of hyperplasia or regeneration of liver tissue, in fact each of these cases has occurred in association with an advanced cirrhotic condition of that gland.

VII.—POST-MORTEM WORK.

As far as possible this has become a routine procedure so that diagnoses are confirmed and much material for study obtained.

A total of 298 has been reached during 1927 and they are classified into the following groups and in their order of frequency.

Deaths from unnatural Causes:—50 or nearly 17%.

Injuries 20: accidental in eighteen, homicidal in two.

Drowning 17: all males except one.

Burns 6: four in young children.

Suicide 6: hanging in three, cut throat in two, stabbing in one.

Poisoning 1: Inhalation of kerosine.

Deaths from Natural causes—236 or 79%.

Respiratory diseases (excluding tuberculosis) 35 nearly 15%.

Dysentery and diarrhoea ... 35 „ 15%.

Tuberculosis (various forms) ... 34 or 14.4%.

Circulatory system diseases ... 22 „ 9.0%.

Central Nervous system diseases ... 20 „ 8.4%.

Nephritis ... 19 „ 8%.

Abdominal diseases (other than dysentery) 14 „ 6.3%.

Plague ... 12 „ 5%.

Sepsis ... 10

Genito urinary (other than nephritis) ... 7

Malignant disease ... 6 or 2.5%.

Tetanus ... 5

Marasmus, starvation and senility ... 5

Various ... 12

Unknown including " found in the sea " ... 12

During these post-mortems the urinary bladder is generally examined for bilharzia infections and among the 181 so examined no less than 12% show evidence of that disease which is a much higher figure than given under urine examination.

(a) THE CAUSE OF DEATH AMONG CHILDREN.

I think these are of interest from the point of view of infant mortality and I have distributed the fifty-nine examined into age groups: one case of a stillborn child discarded into the lagoon has been disregarded in the grouping.

	0 to 1 year	13 months to 5 years	6 to 15 years.
Broncho-Pneumonia ...	13	3	2
Burns, Injuries and Poisoning	2	3	4
Marasmus and Neglect ...	2	3	—
Tuberculosis ...	1	3	—
Dysentery and Diarrhoea ...	—	2	4
Plague ...	—	—	2
Tetanus ...	—	—	2
Ascariasis ...	—	2	—
Convulsions ...	—	1	1
Nephritis ...	—	—	1
Lymphosarcoma ...	—	—	1
Status Lymphaticus ...	1	—	—
Imperforate Anus ...	1	—	—
Unknown ...	3	1	—
Total ...	23	18	17

Of the unknown cases, three were in a very advanced state of decomposition, two having been recovered from the lagoon: the fourth case had been regarded as syphilitic and while she was under treatment (N.A.B.) for that condition was admitted with much œdema of the face: a very heavy ascari infection was discovered at the post-mortem and no evidence of active malaria but marked anæmia.

(b) WEIGHT OF BRAINS.

During 1926 the weights of various viscera were collected in order to obtain a rough idea of the state of affairs in Lagos but only nineteen brains were included in the series mentioned in the report for that year. During 1927 I have been able to make up that deficiency to a certain extent.

The brains of 148 West African native men have given an average weight of 45.9 oz. while the average of twenty-seven native women works out at 40.7 oz.

The brains of thirteen adolescents and twenty-six children of both sexes were also obtained but they represent too wide a variation in years to yield any reliable average.

I have classified the brain weight into the language groups quoted by Amaury Talbot but I hardly think their numbers are sufficient to warrant their inclusion here and in the meanwhile have classified them as follows in case they may be of anthropological interest.

1. Sudanic Tribes of Southern Nigeria :

Average for eighty-one men = 46.2 oz.

Average for twenty-one women = 40.5 oz.

2. Sudanic Tribes of Northern Nigeria :

Average for twenty-five men = 45.6 oz.

Average for two women = 39.75 oz.

3. Semibantu (Calabar) :

Average for seven men = 45.6 oz.

4. Kroo Races :

Average for sixteen men = 44.8 oz.

(c) THE WEIGHT OF THE THYMUS GLAND.

I have mentioned elsewhere the occurrence of a lymphocytosis amongst native children, one that is more marked than the usual lymphocytosis occurring in infants.

As a preliminary to any observations on the matter I have collected the weights of apparently normal thymus glands in as many instances as I can : there numbers are few and I only give them for the sake of record in the following age groups.

0-12 months.	13 months to five years.	6-15 years.
.68 oz. average of four;	.86 oz. average of nine	1.12 oz. average of six.

INTERESTING CASES MET WITH IN THE POST-MORTEM ROOM.

1. A case of *medicolegal* interest was met with when the body of man was found floating with a 60lb. iron weight wired on to the legs : the immediate cause of death was due to drowning though the man had five severe cuts in the head and many broken ribs caused before death, presumably he had been thrown into the lagoon after being rendered unconscious.

2. *Plague Cases*.—Whereas during 1926 fifty cases of this condition were examined after death, during 1927 only twelve cases were dealt with of which six were hospital cases.

There was one pneumonic case during March, the right lower lobe showed grey consolidation over a large area and similar patch about the size of a walnut was present in the right upper lobe but no consolidation was present in the left lung. The consolidated areas exuded, on section, much watery material swarming with *B. pestis*. Of the remaining eleven cases, which were classified as septicæmic in type,

four showed infarct like nodules in the lungs, that is in 33%. One of the septicæmic cases is described as showing a gangrenous patch in the small intestine three inches in length.

Another septicæmic case was very hæmorrhagic in type for besides petechiæ in the stomach giving rise to altered blood in the stomach there was an extremely hæmorrhagic condition of the glands along the course of the Inferior Vena Cava with petechial hæmorrhages into the intima of that vessel and some thrombosis.

3. *Tuberculosis cases.*—A total of thirty-four cases. A pulmonary condition was the outstanding feature in fifteen cases two of which died as a result of miliary spread.

It is unusual to get very marked pulmonary lesions in children but it was found in the case of one child aged one-and-a-half years where very large areas of both lungs were affected and included a two inch diameter cavity in one lung and ulceration in the larynx. The more common type met with is a general glandular tuberculosis usually more marked in the abdominal glands: cases were found in patients at all ages from five months to forty years old.

The more interesting cases have been as follows:—

Tubercular Pericarditis.—A native of Northern Nigeria aged twenty-two who only complained of being ill for eight days showed slight jaundice and only moderate fever for the three days he was in hospital.

The heart and pericardium weighed twenty-six ounces and were inseparable, large tubercular masses were present in the thickened pericardium.

A terminal miliary spread was present. There were masses of caseous glands in the abdomen and mediastinum and the pericardial condition was probably not primary.

Tuberculosis of Adrenals.—This is an unusual finding: it occurred in a native who was found to have tuberculosis of the sacrum and the main secondary involvement occurred in the adrenals which on section were found to be almost entirely caseous nodules and weighed two ounces and two-and-a-half ounces respectively.

Tuberculoma of Brain.—A female native child of two years was admitted and died within two hours of admission. The main feature being apparently Jacksonian convulsions and a very high temperature. On section the brain weighed thirty-seven ounces and seven cerebral tumours of the size of a small walnut were found: two were imbedded in the left cerebral cortex, one was in the cerebellum and the others were loosely attached at the base of the brain. Caseous bronchial glands and miliary tubercles in the lungs were the other main findings.

Amyloid disease in a very advanced form occurred in one patient who died of an extremely advanced chronic pulmonary tuberculosis. The liver, spleen and kidney all showed advanced waxy change: it is not a usual finding for tuberculosis is, as a rule, too rapid a disease in the native.

4. *Diseases of the Circulatory System.*—During 1926 no case of *malignant endocarditis* was found but two have to be recorded for 1927.

(a) A native man aged twenty-seven who stated he was working as a sawyer up to a week previous to admission. During his five weeks in hospital fever was trivial except at the beginning of his illness. He died with the symptoms of a failing heart. The heart weighed twenty-five ounces and its muscles was œdematous and thickened. The aortic cusps showed marked vegetations and one of the mitral valves was completely ulcerated through. There were no syphilitic changes noted.

The kidneys showed a chronic mixed nephritis: there were no infarcts discovered.

(b) A native aged twenty who was a naval rating with a five weeks history of gonorrhœa and arthritis and a recurrence of pyrexia for a week: the patient died within forty-eight hours of admission. The heart was not enlarged but showed gross ulceration of one of the mitral valves with much adherent fibrin: the aortic cusps were healthy: infarcts were present in the spleen.

Several interesting cases of *myocarditis* have occurred:—

(a) A Gold Coast native aged forty-five was admitted with a two years history of œdema of the legs and very slight pyrexia.

The heart at the autopsy was found to be much enlarged and dilated and the muscle was poor. There was gross syphilitic disease of the aorta and from the microscopical appearance of the heart muscle it would appear as if the whole condition was a syphilitic one. There was one old infarct in the spleen but no appreciable kidney disease.

(b) A local native aged about thirty years found dead. The heart was enlarged and the wall forming the apex was markedly fibrotic with adhering fibrin. There was some aortitis but no infarcts and the condition was probably syphilitic.

(c) An elderly native with a fairly long history of general anasarca was found at the autopsy to have a very enlarged heart and the apex of the left ventricle showed an area with an extremely thin wall.

There was practically no disease of the aorta and the Sach's-Georgi reaction was negative.

The kidneys show some interstitial change but the heart muscle shows considerable fibrosis.

(d) A young native aged fourteen was admitted as a result of a syncopal attack but only had ten days history of illness.

The heart was found to weigh over thirteen ounces and was large and flabby.

A large area of the pars membranacea septi was ballooning as from a commencing aneurysm: the wall of the septum in that area showed fine granulations and small opaque yellow areas as if necrosis was present. The liver was very fatty and the kidney showed several small infarcts. The heart muscle showed fibrosis in places with small celled infiltration and eosinophilic cells.

One case of *Angina* was met with in a prisoner aged forty who died suddenly. Both coronary arteries showed almost completely obliteration at their orifices and there was very considerable atheromatous disease extending well down into the descending aorta.

Two cases of *Mesenteric Thrombosis* were discovered: both occurred in oldish individuals. In one case a three foot length of small intestine was black from early gangrene, the vessels in the mesentery in this region being markedly thickened. There was considerable atheroma of the aorta and in the region of the scar of the ductus arteriosus there was a tuft of adherent fibrin and clot: possibly therefore the condition may have been one of infarct.

In the other case only a six inch length of small intestine was affected being black and œdematous and no cause for the condition could be discovered and there was not much aortitis. Both cases died very shortly after admission.

Aneurysm.—These are always an interesting feature of the post-mortem room of the tropics. A total of severe cases have been examined

—two were cardiac, three affected the ascending portion of the aorta, one on the arch itself and one involved the descending aorta.

A case of Cardiac Aneurysm.—A native of Northern Nigeria aged twenty-eight was admitted with a three weeks history of cardiac pain.

The heart weighed thirteen-and-a-half ounces and the pericardium was adherent to the heart surface by thin but old adhesions. Below the right coronary artery was an opening in the aorta about the size of a pencil which lead into a saccular aneurysm of the interventricular septum rather anterior to the undefended space: this aneurysmal sacculle was perforated at its apex leading into the right ventricle by an opening one-eighth of an inch across. There were no congenital abnormalities and the aorta was not diseased. No other important finding was made except an infection with *schistosoma mansoni* and *hæmatobium* but I scarcely think they can have had any relation to the cardiac condition.

A second case of Cardiac Aneurysm.—A native of Southern Nigeria aged forty-four was admitted with a three months history of cardiac pain and there was generalised anasarca. Death took place shortly after admission. There were signs suggestive of old syphilis or yaws in the form of a sunken bridge to the nose, a bossy skull and old ulceration of the legs but the aorta showed no sign of disease. The heart and a certain amount of adherent pericardium weighed thirty-two ounces. At the apex of the left ventricle an old round edged opening was discovered which would just take a little finger; this led into an aneurysmal cavity about the size of a cricket ball the wall of which were much thinned. No others findings were made except a considerable fibrosis of the liver and kidney.

Aneurysms of the ascending Aorta were found on three occasions, two being Coroner's cases because of sudden death, in each case the aneurysmal sacs were small in size and arose just above the aortic valves, rupture into the pericardium had occurred in one case. Each showed gross disease of the aorta.

Aneurysm of the arch of the Aorta occurred in one case and it was of interest in showing commencing erosion of the 3rd thoracic vertebra and was commencing to ulcerate into the trachea. Considerable disease of the aorta was present.

Aneurysm of the Descending Aorta with rupture into the œsophagus occurred in a native man aged about thirty-five. The aorta was grossly diseased and a saccular aneurysm about the size of a small tangerine orange was present in the first part of the descending aorta. Rupture had occurred suddenly with an opening almost like an incision in the œsophagus.

5. *Chronic Renal Disease* is common cause of death.

The large white type of kidney and the very small contracted granular kidney are frequently met with and the latter seems to be the more common: the latter has been found in adolescents but it is more usually found later on in life.

I have not met with an acute nephritis such as is met with in Europe. Until some further evidence is forthcoming in the form of biochemical tests probably not much progress will be made with the treatment or the classification of these cases.

Six cases can probably be classed as parenchymatous nephritis cases and nine placed in the chronic interstitial nephritis group. In the latter group fibrosis elsewhere such as a cirrhosis of the liver is not an uncommon association and I am surprised how frequently an enlarged spleen is met with in these cases.

A study of this disease in the tropics might well shed light on the ætiology of the disease when compared with their features in Europe.

The presence of lime casts is not a rare finding and has been noted in three of the nineteen cases.

A case showing Hæmoglobinmia.—A big powerfully built native from the Niger District, who was in training as a police constable, reported sick complaining of abdominal pain of four days duration and was given castor-oil: seen again on the next day a sample of urine was obtained which contained coagulated blood but no hæmoglobin in solution, ova or casts. He was admitted and the next specimens of urine showed oxyhæmoglobin in solution, no casts but a good many leucocytes: the blood showed no malaria parasite. The urine was stated in the notes to be clearing forty-eight hours after admission and a laboratory report on the urine on the fifth day in hospital stated that there was no hæmoglobin but a good deal of albumen and no casts. There was slight pyrexia for the first two days in hospital and the urine output was greatly decreased and he died with marked suppression thirteen days after admission. At the autopsy there was no œdema or jaundice. The brain and heart were apparently healthy. There was slight œdema of the larynx and lungs and a few petechiæ over the visceral pleural surfaces. The liver which weighed sixty-seven ounces was a rather a pale sandy colour though microscopically it did not appear to be fatty but a definite fat stain was not employed.

The spleen which weighed twenty-nine ounces was of a raw beef colour and did not give any evidence of malaria pigment.

The kidneys were approximately seven ounces each in weight with the cortex indistinct in out lines and swollen but not very reddened and the capsule stripped easily: the pelvis of the left kidney showed the presence of a few petechiæ and some urine with a brownish sediment. Microscopically the kidney tubules show great destruction being distended with fragmentation and desquamation of their epithelium. The glomerular tufts are swollen but separated from Bowman's capsule by albuminous material and some of the tubules show early lime casts.

Congestion of the vessels is present but not very gross.

The bladder showed an hæmorrhagic patch about the size of a sixpence but no bilharzia infection was discovered.

The urine collected at the post-mortem had a thick brownish deposit amongst which were some very large casts consisting of unhæmolyzed red corpuscles and dark brown granular ones.

I scarcely think that this is a case of blackwater in a native and with that view enquiry was made at the onset of the illness whether some drug had been taken and the drinking of some bark decoction in gin was admitted as a prevalent method of obtaining aphrodisiac effects: whether that is the real explanation of the case I am unable to say.

6. *Cases of Malignant Disease.*—A single case of *Carcinoma of the Stomach* alone has been met with and it is not a very common finding. The patient was an emaciated old native man sixty-eight years old with a large soft malignant growth encircling the pylorus and with many secondary nodules in the liver.

Three cases of primary *carcinoma of the liver* were found at autopsy in the Lagos hospital but two further cases occurred in portions of tissue sent from out-stations the details of which are unknown. The first case occurred in an old native man aged about sixty years who died suddenly due to a hæmorrhage into the abdominal cavity. Practically no disease was found except in the liver which weighed forty-four ounces

and the surface was markedly hob-nailed and on section showed a marked cirrhosis. The lower surface of the left lobe showed a bulging necrotic tumour about the size of a medium sized orange. Most of the necrotic material could be shelled out leaving the edge of the tumour and a large vessel was found to be ulcerated into. Microscopically the tumour is a liver celled Carcinoma and there was marked proliferation of the bile ducts in the cirrhotic areas.

The *second case* of this disease was found in a native youth aged about nineteen years with a two months history of swelling in the abdomen. The liver was found to be grossly diseased at an exploratory operation. Loss of weight and an increase in size of the tumour were noted while the patient was in hospital.

At the autopsy there was no jaundice and no disease was discovered except the liver condition; that gland weighed 119 oz. and was almost completely replaced by tumour substance which was fairly hard, white with occasional streaks of hæmorrhage and showed necrotic change in its deeper parts. There was a small secondary sub-peritoneal nodule in a neighbouring coil of small intestine and in the neighbouring glands but no other disease was discovered.

Microscopically the growth is a liver celled carcinoma and the remains of the liver tissue shows much fibrosis.

The *third case* occurred in a native man aged thirty-six years who gave a six months history of swelling of the abdomen.

There was slight jaundice and much ascites and the body was wasted. The abdominal cavity held many pints of a reddish bile stained fluid. The liver weighed eighty-seven ounces and its right lobe contained masses of soft whitish growth, smaller, nodules of which spread over to the left lobe so that most of the liver was affected. The liver tissue was greenish and fibrotic and abundant patches of regeneration tissue was present in this part of the liver. There appeared to be no invasion of the lymphatic glands and no other disease of note was detected. Microscopically this was a liver celled carcinoma and growth was invading even some of the vessels.

A *case of lymphosarcoma* occurred in a native of Northern Nigeria aged about thirty-five who gave a nine months history of enlargement of the glands of the neck. There was no pyrexia while in hospital and the glands of the neck, axillæ and groins were all markedly enlarged and discrete—those on the right side of the neck received X-ray treatment and diminished in size quite considerably. There was no evidence of a leukæmia.

At the autopsy masses of glands were found everywhere from the neck to the pelvis and before being cut into many appeared as bluish round masses and their sectioned surface almost looked like splenic tissue while others were of more ordinary colour but even these showed whitish areas like the malpighian bodies in the spleen. The spleen weighed thirty-two ounces and the malpighian corpuscles were very prominent: there were masses of glands in its hilum. The bronchial glands showed old caseous areas and there was an old caseous area in the liver and a few miliary tubercles on the diaphragm in its neighbourhood but no other tubercular condition was found.

The various tissues sectioned all showed more or less an increased cellular infiltration especially in the neighbourhood of vessels and serous coats.

A second case of lymphosarcoma.—I have included this case under this heading though I really am not sure that the case is not more likely to be an acute lymphatic leukaemia: the case occurred in my absence and I have only two portions of tissue on which to base the diagnosis.

A native female child aged fourteen died suddenly outside the hospital. There was no jaundice and apparently no noticeable glands externally. There was a severe tonsillitis present. The heart showed a few petechial and the spleen weighed twenty-five-and-a-half ounces and showed hæmorrhagic areas. The kidney also showed small white areas but the bronchial and abdominal glands were enlarged soft and hæmorrhagic. The liver was a dull yellow colour and on section shows an extensive and remarkable large round celled infiltration particularly in the portal canals but there is invasion also in the reticulo-endothelial system: the heart muscle to a slighter extent shows a similar invasion close to the vessels in the heart muscle. No blood films are available to help the diagnosis.

7. *Cases of Intestinal disease.*—Two cases of *enteric fever* were recognised at autopsy and a third case during life and they are mentioned because the disease is not commonly recorded.

The first case died the day after admission and the autopsy revealed typical lesions of the lower part of the ileum and a pure culture of *B. typhosus* was obtained from the spleen and gall bladder. The second case was a longer period in hospital and slowly because more toxic and afebrile: at the autopsy well marked oval ulcers of the lower part of the ileum were discovered as well as a few in the upper portion of the large bowel. The only other feature found was the condition of the kidneys which showed many pyæmic abscesses of the size of a small pin's head. The case was not clinched by the isolation of the causative organism.

Three cases of *dysentery showing uncommon complications.*

One case of bacillary dysentery showed at the autopsy a rather swollen elbow joint which was found to contain a thin greyish pus but staphylococci were the only recognised organisms found therein.

The large bowel was very extensively ulcerated and the mucous membrane was black in places.

The other two cases were examples of *perforation in Amoebic dysentery*. The first case occurred in a native aged forty-eight who gave a ten days history of pain in the right loin. An incision over a large lumbar abscess was made while in hospital. At the autopsy the cæcum and ascending colon were found to be a thickened and adherent mass and firmly bound down to the posterior abdominal wall: on separation of this mass a perforation on the posterior wall of the cæcum was discovered which led into a large necrotic lumbar abscess cavity. The whole of the cæcum and ascending colon showed numerous ulcers from some of which *entamoeba histolytica* were recovered.

The second case occurred in a native man aged forty-five who gave a few days history of dysentery and died the day after admission with deep jaundice. Areas of localised peritonitis were found at the autopsy and these were found to be in connection with small perforations of the large bowel, one perforation being found in the cæcum and two in the descending colon. The large bowel showed many irregular shaped sloughing ulcers several of which were also on the point of perforation.

Smears from the ulcers showed numerous *entamoeba histolytica*.

8. *Two cases showing pancreatic necrosis.*—The first case occurred in an European who was found dead in a railway coach and death appeared to have occurred during an alcoholic bout. The liver showed a very marked fatty degeneration but there was no similar degeneration in the kidneys. The pancreas showed no hæmorrhage nor was there any fat necrosis: microscopically the pancreas stained very irregularly, patches of pale unstaining areas indicating areas of necrosis.

The second case also occurred in an European in whom there had been a history of epigastric discomfort for some days ending in a picture suggestive of subacute intestinal obstruction. At the autopsy no fat necrosis was noted nor was the pancreas hæmorrhagic but that gland felt hard and swollen and on inspection its surface showed irregular shaped opaque white areas which were also very evident on the sectioned surface and the gland then gave the appearance as if it was rather imbedded in fatty tissue and had the general colour and appearance of a soft malignant growth.

Microscopically the liver showed gross fatty degeneration but the fatty degeneration was not quite so marked in the kidney. The pancreas showed marked unstained areas of necrosis with barriers of polymorphonuclear leucocytes and the tissue gave the well-marked distinctive fatty changes usual in these cases when stained by Nile Blue sulphate.

9. *Some cases of sudden death in Children.*—It is so easy to jump to the conclusion, in the absence of autopsy, that the cause of death in this type of case is cerebral malaria that I think the cases are worth recording.

I note that a well-known text book mentions the occasional failure to find definite lesions in the brains of patients who have died from *what is called cerebral malaria*. (*Italics mine*) I am disinclined to accept any diagnosis of cerebral malaria without definite evidence to that effect for I think that position indefensible on scientific grounds and will only lead to unsatisfactory diagnosis.

The six cases now quoted for the total cases of sudden death in children met with during 1927.

Case 1.—A male native infant aged eighteen months, was brought to Massey Street Dispensary with the complaint of suffering from worms: the child was given a mixture containing three minims of oil of chenopodium but within half an hour he had convulsions and died. The brain, heart, lungs, kidneys and intestines were healthy but the latter contained many ascaris worms. The spleen weighed over nine ounces, and was dark red and contained malaria pigment but there was no other evidence of malaria. The thymus appears not to have been weighed.

Case 2.—A native female child aged ten years, was admitted to hospital in a condition of tetany and died within a few hours but I am unable to obtain any notes on the case.

At the autopsy the brain was very congested but the membranes and cerebral tissue appeared to be quite healthy and there were no signs of tuberculosis, hæmorrhages or malaria parasites.

The heart, lungs, and kidneys were healthy.

The thymus weighed two ounces though there was no general enlargement of the lymphatic glands but the bronchial glands showed some scar tissue of healed tubercular infection.

The liver was rather palm-oil colour and fatty and microscopically one or two small tubercle like areas were found which showed barriers of eosinophiles and one showed a giant cell which I think is of foreign body type. The thymus on section showed nothing very unusual. The spleen weighed over ten ounces but showed no unusual excess of malaria pigment and there were no malaria parasites in the blood. The duodenum showed slight small ecchymoses and there were many ascaris present in the duodenum and further down the intestine.

Case 3.—A native aged three years who died suddenly but no history was available and the body was examined under a Coroner's order. General nutrition was good and there were no evidence of disease in the brain, heart or kidneys. There was possibly slight bronchopneumonia. The spleen weighed two-and-a-half ounces and was brownish in colour but smears from that gland did not yield much evidence.

A very heavy infection with ascaris worms was discovered.

The thymus appears not to have attracted attention for it was not weighed.

Case 4.—A native boy aged seven years went with a playmate to play close to the water side and was found dead there shortly afterwards.

The brain appeared tumid and the cortical vessels were congested but there were no malarial parasites in the small vessels of the cerebrum. The heart, lungs, liver, kidneys were all healthy. The stomach held a recent meal and there was no evidence of disease in the intestines but a large number of ascaris worms were present.

The thymus only weighed $\frac{3}{4}$ ounce but looked large.

The spleen weighed $5\frac{1}{4}$ ounces and was rather muddy coloured and microscopically showed malaria pigment and one crescent was found in the smear.

Case 5.—A male native child aged two-and-a-half years was admitted with convulsions and died shortly afterwards. General development and nutrition were good. The brain showed no congestion or signs of disease. Both lungs were congested but there was no consolidation. The intestines were healthy but there were very many ascaris worms present including three in the appendix. There was nothing unusual noted in the liver and kidneys.

The spleen weighed four-and-a-half ounces and section showed malaria pigment.

The thymus weighed one ounce but there was no unusual enlargement of the lymphatic glands.

Case 6.—A male native child aged six months was dead on arrival at hospital having died suddenly: the mother in her distraction cut her own throat and no history concerning the child was discovered.

The child was very well nourished. The brain showed no congestion or evidence of disease. The heart, lungs, liver, kidney and intestines similarly appeared normal.

The thymus weighed just over one ounce and was very prominent. On opening the chest and its sectioned surface exuded a milky fluid. The bronchial and abdominal glands were all hypertrophied. The spleen weighed $1\frac{1}{4}$ ounces and was rather paler than usual and the sectioned surface showed a rather unusual hypertrophy of the malpighian corpuscles so that they looked like unusually large tubercles.

There were no ascaris worms present.

The blood, brain smears and spleen all gave no evidence of malaria.

The thymus and the malpighian bodies of the spleen each appeared to be unusually densely packed with lymphocytes but the other organs showed no unusual change.

What can be said about a diagnosis for these cases? They make up the whole group of sudden deaths met with in children during 1927 and I do not think there is, in any of them, any more evidence of a malaria infection than would be found in a child dying of a ruptured spleen or plague, that is to say any more than one would normally expect in Lagos.

Case 6 must suggest status lymphaticus I think: in the others however the only common feature appears to be a heavy ascaris infection though possibly there is a suggestion of thymus hypertrophy even in some of these. I cannot think that the oil of chenopodium given in the first case can have had a fatal effect in *half an hour*.

In conclusion, I wish to thank the Director of the Medical Research Institute for his aid in regularly supplying me with culture media and also for Dr. Smith's help in sectioning tissues when an urgent report was necessary. I am also deeply indebted to the Pathologists of the Rockefeller Yellow Fever Commission for their help in the fat staining of tissues which at the time was impossible for me to carry out.

G. G. BUTLER.

APPENDIX D.

**ANNUAL REPORT ON THE AFRICAN HOSPITAL
LABORATORY, KADUNA, 1927,**

BY

H. MORRISON, M.A., M.D., B.CH., (CANTAB), M.R.C.S., L.R.C.P.

Pathologist.

APPENDIX D.

ANNUAL REPORT OF THE AFRICAN HOSPITAL
LABORATORY, KADUNA, 1922.

BY

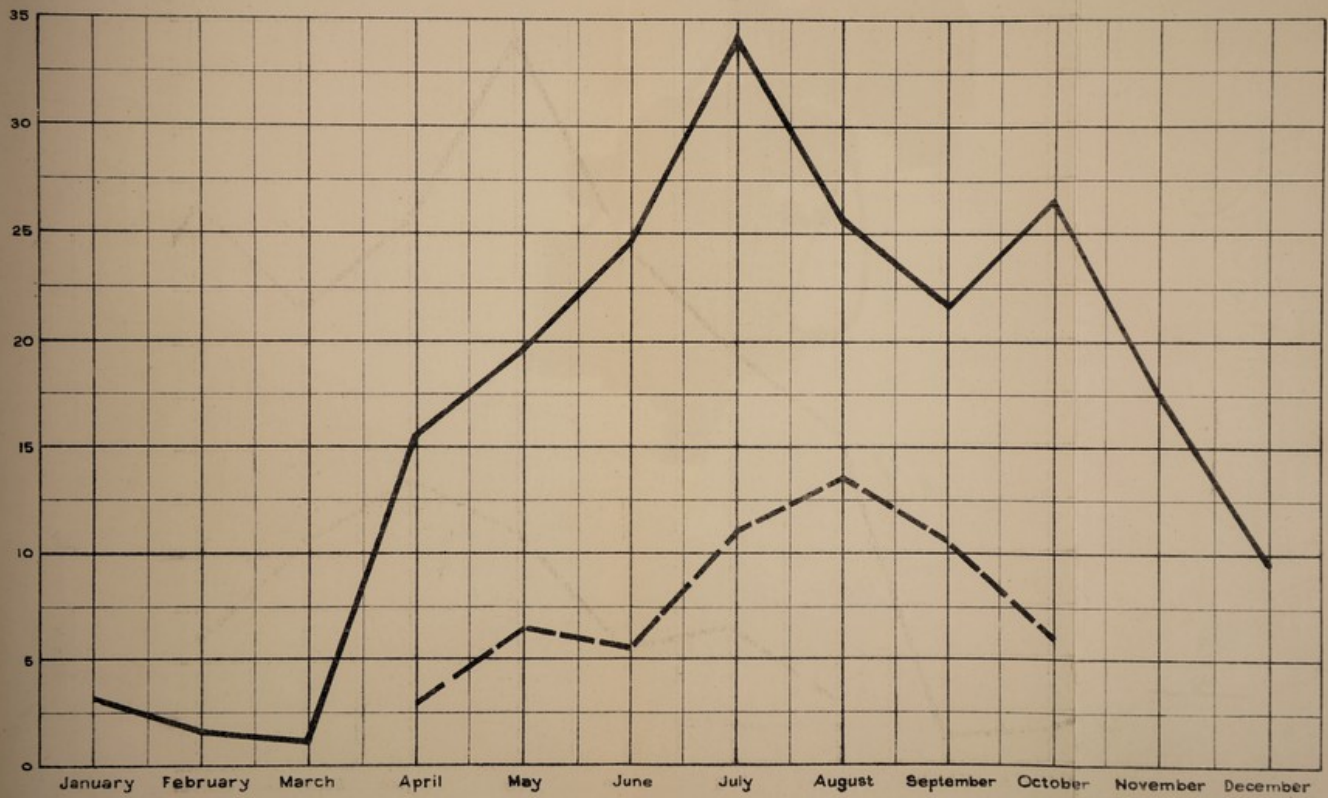
H. MORRISON, M.D., M.B., F.R.C.P. (LOND.), F.R.S. (LOND.), F.R.S. (EDINB.), F.R.S. (GLASGOW).

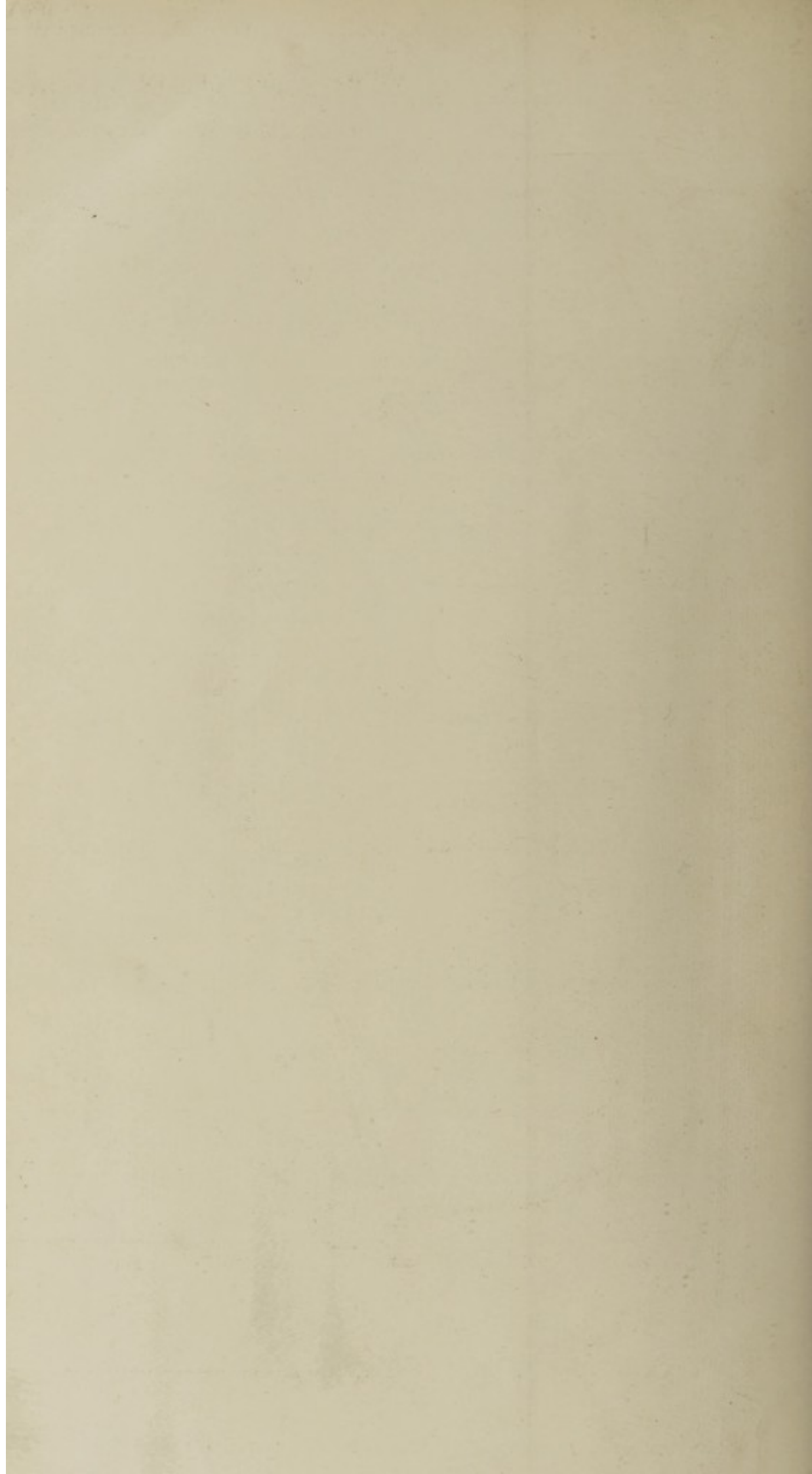
Pathologist.

KADUNA - 1927.

Monthly percentage of infection by Malaria in slides examined

" rainfall curve in inches





ANNUAL REPORT ON LABORATORY, KADUNA, 1927.

The year under review has been satisfactory in showing a distinct increase in the work done in this laboratory.

The high percentage of hospital and out-patients for whom some pathological examination is required proves the real need, there is for a laboratory in connection with all the larger hospitals in the country.

The Laboratory remains *in statu quo* apart from a few minor additions in the way of shelving and cupboards. It is rather small, and, although not conforming to the ideal design of a laboratory will no doubt be improved upon in time. A separate room is shortly to be erected for the Pathologist; it will be connected to the main Laboratory by a covered verandah. This will be an immense improvement, as in a communal room where all the glassware is washed two yards away from one's microscope an atmosphere of irritation is bound to occur.

The water supply is unsatisfactory. It is pipeborne from the Kaduna River into settling tanks and serves the hospital by gravity. It comes out of the taps in fits and starts. One of the few rain tanks in Kaduna is adjacent to the laboratory and this is jealously guarded and kept solely for our own uses during the greater part of the dry season. In the near future, however, an efficient water supply will be available for the township.

During the year water has been laid on to the mortuary. To conform with modern ideas the mortuary should be replaced by a better building. Considering the urgency of other hospital requirements, this could be postponed for the present, particularly as the number of autopsies in the Northern Provinces is always very limited.

The disposal of waste water into sumps is unsatisfactory. There is a slight slope of the hospital site. In collaboration with the Public Works Department, it has been suggested to abolish all sumps and to inaugurate a system of surface drainage, which I think could be made quite effective.

Staff.—This consists of the Pathologist and two African Laboratory Attendants. For over six months of the year I have been on leave; Dr. A. Robertson deputed for about two months.

It is always satisfactory to be appreciative of native work, and it is with a certain degree of pleasure that I can speak, quite frankly, of the considerable improvement in my two attendants. Together they have constituted a loyal staff who are genuinely interested in their work. The junior attendant was trained in this laboratory for Kano and proceeded thither in December. A Nurse-in-training has since been appointed temporarily for a period of three months probation. I must concur with Dr. Butler, who, in his report for 1926, refers to the arithmetical deficiency in his attendants. I do not think, however, that this vacancy in knowledge is common to laboratory attendants alone.

Work.—The pathological work performed has been chiefly connected with the European and African hospitals in Kaduna. The increase in the European work is noticeable.

A circular was sent by the Assistant Director of Medical and Sanitary Service to all stations in the Northern Provinces at the beginning of the year to the effect that pathological work could be sent to Kaduna. The response was satisfactory, but I still think more work might be sent in and the consideration of tumours worked out upon a higher basis of figures than in the past.

The rains lasted to the end of October and were much heavier during this month than in the corresponding one of last year.

A glance at the accompanying chart shows a well-marked secondary peak in the malarial incidence curve.

The post-mortem examinations remain about the same in number.

About twenty rats (all *rattus rattus*) caught by traps in the Public Works Department store adjacent to the railway, were examined and were negative for plague.

All media are now made in this laboratory.

Apparatus, for the more simple and short tests in biochemistry, is due out in the near future. As this science is becoming so highly specialised, one can hardly be expected to have more than a smattering of knowledge in connection with it.

When the necessary ingredients and glassware arrive, I hope to substitute the Kahn test for the Sachs-Georgi. The relative merits of the two tests are discussed in a later section.

Demonstrations have been occasionally given to the native nursing staff in connection with clinical teaching upon a particular case. By this means one can work out a logical sequence of events, in the history of the case, which can be associated with the findings under the microscope.

I.—EXAMINATION OF BLOOD.

The slides of 1,696 patients have been examined. Two or more films from each patient has formed the routine.

Of the above total 177 were Europeans.

(a) *Malaria*.—The incidence of malaria varies considerably with the time of year. A chart is attached showing the monthly malarial incidence as compared with the monthly rainfall in inches. The striking difference is well shown between the healthy and unhealthy periods of the year.

In a total of 177 examinations in Europeans, infection by subtertian parasites was 13.5%.

Out of a total of 1,519 native blood films were found :

Subtertian in 274 or 18.03%.

Quartan in 16 or 1.05%

Benign Tertian 2 or .13%

Crescents were seen in .77% of all films examined.

It will be noticed in the accompanying chart that the monthly malarial incidence rises as high as 33% in July and drops down to about 5% at the beginning of the year, and still shows a decline up to the end of March when the figure is just a little over 1%.

(b) *Relapsing fever*.—There has been only one case during the year; it occurred in the month of February.

(c) *Microfilaria*.—In nearly 1.5% of all blood films examined, microfilaria have been found. The "sheathed" type totalled fourteen—*bancrofti* and *loa* being seen in equal numbers. The "unsheathed" total ten and are most likely perstans.

(d) *Blood counts*.—For the past two years a differential white count has been done as a routine in nearly every film examination. So many factors—food, syphilis, helminths, etc., help to alter the count of the different white cells that a normal differential count is a rarity; and, being a rarity, is it normal? A percentage of over thirty in the lymphocyte count is very common and occurs in 75-80% of examinations. The lymphocytic increase is at the expense of the polymorphonuclear cells. Eosinophilia is, of course, a common occurrence in connection with any helminth.

On the whole I have come to the conclusion that the differential count is only of occasional value, and when other routine examinations are made, its value is less still; it becomes merely a factor of interest.

Total red and white counts number	...	34
Differential white counts total	...	1,578
Hæmoglobin estimation	...	1,647

(e) *Trypanosomes*.—In only two films were found trypanosomes, and both in course of routine examination.

(f) *Blood cultures and agglutinations*.—These are few in number. Two blood cultures were done; one was positive (staphylococci) in a European with septicæmia.

Ten agglutination tests for the typhoid group of fevers were performed; seven in Europeans with one positive (paratyphoid B) and three in natives with negative results.

Sachs-Georgi reactions, with a commentary on other flocculation tests, are given elsewhere.

(g) *A case of myeloid leukæmia*.—In Osler's Medicine (tenth edition) it is stated that myeloid leukæmia is "not very rare. There were twenty-four cases in the John Hopkins Hospital in fifteen years. It is not more frequent in malarial regions."

I have looked into the Annual Medical Reports of Nigeria for the past few years and although there have been a few cases of leukæmia recorded, the particular form, whether lymphatic, myeloid or leukanæmia, is not given. For myself I have neither seen nor heard of a definitely proved case in a native of this country.

The patient, a Hausa man of thirty-two years of age, was admitted into the Kaduna hospital for vague abdominal pain. On examination his spleen was found to be considerably enlarged and extended down a little below and to the right of the navel. He complained of feeling unwell for the previous two months, but, had no hæmorrhage at any time

His blood was examined and the following picture revealed:

Red count	...	3,500,000	per cmm.
White count	...	168,000	,, ,,
Differential white count			

Polymorphonuclear	39
Lymphocyte	... 10
Myelocyte	... 45
Large Mononuclear	2
Eosinophil	... 3
Basophil	... 1
	100

The Sachs-Georgi reaction was negative.

II.—SACHS-GEORGI AND OTHER FLOCCULATION TESTS.

A total of 324 Sachs-Georgi reactions were done during the year.

In Europeans twenty-nine with ten positive reactions.

In Natives 295 with 134 positive reactions.

On the whole the laboratory results fitted in quite well with the clinical findings.

I think there is no doubt that if a flocculation test could be devised whereby accuracy, simplicity and sensitiveness went hand in hand, the complicated complement fixation test would disappear in the tropics. The slightest departures from the scientifically correct make the latter test frequently impracticable, and when in tropical laboratories electric ice safes cannot be utilised on account of the absence of electricity and certain requirements for the Wassermann test are not always obtainable, one is forced to rely on one of the flocculation tests now in vogue.

I have never regarded the Sachs-Georgi as very satisfactory, and was therefore particularly interested, when doing my course at the West London Hospital this year (1927) to see a new publication on the Kahn test. Dr. Elworthy, Pathologist to the Hospital—suggested I should try the Kahn test and week by week compare results with the Wassermann. I found that in two other large hospitals in London the Kahn test was being done regularly (together, of course with the Wassermann) and, that if a hurried answer was required the Kahn test was relied upon, *pro tempore*, and the result confirmed, or not, by a Wassermann test later on.

At the Children's Hospital in Great Ormond Street, Dr. McClean, Assistant Pathologist, told me that up to the present the Kahn and Wassermann tests had always agreed in these emergencies. Dr. McClean had done a large amount of work on the Kahn test and I was frequently in his laboratory to compare our respective antigens and results.

I started by making my own antigen at the West London Hospital, following Kahn's method as laid down in his book. It consists of an ether and alcoholic extraction (cholesterinised) of powdered beef heart (Bacto—B. & T.—can be used). The antigen is then titrated to determine the proper proportions of antigen and such solutions to employ in the preparation of the standard antigen dilution for the tests. Technically, it is to determine the minimum amount of salt solution which, when mixed with antigen, will produce a precipitate capable of dissolving readily on further addition of salt solution.

Dr. McClean was sent a sample of antigen from Professor Kahn in America. We both compared this with our own productions and found no difference in the results. One point, however, upon which we were both unanimous in differing from Kahn was that we never did get that 'end-point' in the titration when the precipitate dissolved in the salt solution. There was always a very fine granulation present, detected only by hand lens. Further correspondence took place and Kahn replied that the titration end-point was not as important as indicated in his book and that if negative serum were used, instead of saline, to dissolve the antigen a cleaner solution resulted. We agreed, as we had already done the experiment.

I also tried a non-cholesterinised antigen. After titration with saline, a clear standard antigen dilution was produced. In the course of the test proper the only difference was in the flocculation. This was

not so marked as in the case of the cholesterinised antigen, but sufficiently so for diagnostic purposes. Meinicke recommended balsam of tolu for strengthening the reaction and a French worker suggests pure gum arabic in conjunction with Sachs-Georgi test. Both these 'intensifiers' were used with the Kahn antigen, but the results obtained did not lead one to regard any further experiment in this direction as necessary.

At the West London Hospital I did the Sachs-Georgi and Kahn tests, with cholesterinised and non-cholesterinised antigens, against the routine weekly Wassermanns. The results were very gratifying with the Kahn antigens: the weak positives and doubtful negatives tallying extraordinarily well (96%) with the Wassermann. The Sachs-Georgi did not show up nearly as well being nearly 10% less efficient.

After more experiments and upon cerebro-spinal fluids I have come to the conclusion that the cholesterinised antigen is the more satisfactory one with which to work. Even when saline is used in the procedure of titration the undissolved granulation is so fine as to have little or no influence in the reading of final results.

I propose to use the Kahn test in this laboratory in future, although ether extraction of the powdered beef heart is going to be a difficult matter in the dry season owing to the excessive evaporation that must take place; it will have to be repeated many times. I purposely kept my antigen when in London in a temperature of about eighty degrees F.: at the end of two months, the reactions in the tests were only slightly less definite. For the tropics I think one can safely come to the conclusion that the Kahn test will be satisfactory.

Professor Kahn has recently employed a more sensitive check precipitation test for spinal fluids, and, after further experiments, will publish results.

In the Fifteen Annual Report of the United Fruit Co., Medical Department, a number of series of tests have been carried out to compare the working efficiency of the Kahn and Meinicke tests in comparison with the Wassermann. The results were extremely satisfactory with the Kahn tests.

In a report on 300,000 Kahn tests (Kahn, Kendrick and Landan—*Journal American Medical Association* of 9th July, 1927) it is indicated that this test is a dependable laboratory method in the diagnosis of syphilis.

T. G. Hull (*Journal American Medical Association*, 11th June, 1927) reports on 26,000 Kahn tests and compares them with the corresponding Wassermanns. He states that Kahn's original test is so perfected that now it is apparently reliable for the serum diagnosis of syphilis.

As long ago as 1924 Osmond and Mclean in the *British Medical Journal* of 5th April, reporting from St. Thomas's Hospital, London, regard the Kahn test with considerable favour.

Other workers, Kolmer, Levin and G. S. Smith (in America) think the value of the Kahn test almost greater than that of the Wassermann.

There is no doubt that the consensus of opinion fully justifies one to appreciate the Kahn test as distinctly superior to other flocculation tests. That it will replace the Wassermann is, at present, doubtful: the latter test is weighed down by the anchor of scientific respectability;

while the Kahn is battling, in the solar firmament for the high position, the attainment to which is thought justifiable by its many protagonists in various countries.

III.—EXAMINATION OF FÆCES.

A total of 1,298 specimens have been examined, fifty-five from Europeans and the remainder, 1,243, from natives.

(a) *Europeans*.—*Entamœbæ histolytica* were found in 5.8% cases: the ova of ankylostomes in one case, and of *A. lumbricoides* in 3.9% cases. Infection by *tricocephalus dispar* was found in 5.8% cases and the cysts of *lamblia* in one specimen. The majority of stools that are sent for examination are evidence of mild intestinal irritation—presumably due to dietetic errors. A little blood and mucus with “cast-off epithelial cells” is all to be seen.

(b) *Natives*.—The incidence of rectal bilharzia and ankylostomiasis remains almost similar to that of last year. As I remarked in the report for 1926, rectal bilharziasis is—from a pathological point of view—rare in women. The figures for 1927 still further justify and corroborate the statement. The ova of *S. mansoni* were found fifty-four times in specimens from men and only twice in women. Allowing for the numerical difference in the examination of male and female cases (the males to females being in a proportion of about nine to one) the incidence of intestinal schistosomiasis is: (1) men 4.8%, (2) women 1.5%.

In the specimen from a Hausa boy, aged fourteen years, terminal spined ova were found. This may very likely be the species referred to in Manson's Tropical Diseases, where it states that, ‘Chesterman has reported from the Congo a much elongated variety of terminal spined egg which occurs in the fæces only and not in the urine. No signs of blood or ova were seen in the boy's urine.

Ankylostome ova were found in 528 cases or 42.5%.

Ascaris infections are not so common, the incidence being 17.4%. This is a slight increase on last year.

The percentage of infections by *tænia* is exactly the same as last year—6.9%.

Infections with *tricocephalus dispar* and *entamœbæ histolytica* (and their cysts) were found in 63 or 3% cases, and 89 or 7.1% cases respectively.

Ascaris and ankylostome ova together were found in 8.3% of all specimens examined in natives.

From Dr. G. G. Butler's report in 1926 it would seem that the comparative incidence of helminthic diseases varies considerably in Lagos and Kaduna. Climatic conditions, with the long period of drought in the dry season of the Northern Provinces, most probably explains the difference. *Ascaris*, common in the South, is less so by 60% in and around Kaduna. On the other hand ankylostomiasis is nearly twice as common here as in Lagos. The incidence of schistosoma and *tænia* is also higher in the North.

IV.—EXAMINATION OF URINES.

Invariably uninteresting from a pathological point of view, it becomes more and more difficult to make an interesting remark in this section. The urine reserves its affection for the very important but cold and soul-less science of biochemistry. In both clear and turbid amber-coloured depths lie the problems of the future when from this excretion in conjunction with others of the human body the biochemist will derive knowledge to produce his chemical "Robot" in the civilised world of the future.

The number of examinations made total 953. All these were from natives with the exception of twenty-five from the European hospital.

Albumen was present in 13.2% cases; but, casts were seen in only about half that percentage, or roughly 6%.

The incidence of *S.hæmatobium* is almost exactly similar to that of last year. The ova were seen in twelve cases—all males—giving a percentage of 1.27. This is considerably lower than the figure of 15% given in the Lagos laboratory report for 1926, and, forms an interesting comparison.

There seems little doubt that schistosomiasis, rectal and urinary, are quite common in most parts of Nigeria. In all probability rectal bilharzia is more frequently under-estimated than the urinary type, when the disease is diagnosed in the ward or out-patient department and no pathological examination is made.

Irrigation schemes for the arid places in the Northern Provinces will, most probably, be approved in the near future. If this happens it is more than likely that a local increase incidence of bilharziasis will result, as did happen in Egypt and the Sudan.

I have frequently hunted in the small streams in and around Kaduna, but, up to the present, have been unable to find a trace of any mollusc.

Bile was noticed on only four occasions.

Pus in the urine was not particularly common.

Sterile specimens were cultured on five occasions and each time almost a pure growth of *B.coli* was obtained.

No trace of sugar was found in any examination.

V.—EXAMINATION OF SPUTUM.

The total number of examinations made have been 189. Of these seventeen were in Europeans: tubercle bacilli were found in two cases. In the remainder (native) tubercle bacilli were seen twenty-seven times and the incidence works out to the same figure as in 1926—viz., 15.8%.

An old case of what appeared to be bronchial spirochætosis had his sputum examined on three or four occasions this year. Before treatment with arsenical preparations spironemata were found in large numbers in his sputum.

After a course of six injections, hardly one could be found, and, he would be free from a troublesome bronchitis for six to eight months when a recurrence of the old condition took place.

This state of things has been going on over a period of three years and in spite of all kinds of treatment no permanent cure seems possible. The bronchitis returns periodically and with it a host of spironemata.

VI.—MISCELLANEOUS.

Under this heading is a "pot pourri" of examinations, the majority of which are too few in number to warrant a special heading.

Urethral discharge ...	...	59	—Gonococci in ...	...	29
Hydrocele fluid ...	...	8	—Filaria in ...	...	6
Von Pirquet ...	...	2	—Positive ...	...	1
Cerebro-spinal fluid ...	...	8	{ —Meningococci in ...	...	2
			{ —Staphylococci in ...	...	1
Nasal smears ...	...	4	All negative for B. lepra.		
Skin-clips (for leprosy) ...	...	8	—Positive in ...	...	6
Vaginal pus ...	...	15	—Gonococci in ...	...	4
Gland punctures ...	...	6	—Trypanosomes in ...	...	2
Rats—blood, liver and spleen smears ...	...	40	—All negative for B. pestis.		
Throat swabs ...	...	5	—Vincent's organisms ...	...	1
Pus from eye ...	...	4	—Gonococci in ...	...	3
Pus from abscesses ...	...	24	{ —Staphylococci in ...	...	12
			{ —Streptococci in ...	...	3
Ulcers ...	...	18	—Spironema pallida ...	...	4
Fluids from joints ...	...	5	—Staphylococci in ...	...	1

VII.—POST-MORTEM EXAMINATIONS WITH A COMMENTARY ON MALIGNANT DISEASES AND CASES OF INTEREST.

A total of twenty-four post-mortem examinations have been performed on twenty-two males and two females. This compares with the total of fifteen for 1926. As I remarked in last year's report the Northern Provinces of Nigeria accept the faith of Mohamet. It is, therefore, only on Coroner's Orders and on other rare occasions when the family of the deceased is in agreement with one's wishes that an autopsy can be performed. This is unfortunate on not a few occasions, as I feel that in a certain number of cases the deceased carries an interesting cause of death to his grave—a hidden secret. When in Europe and America research proceeds unceasingly to find the cause of cancer, it is greatly to be regretted that one is handicapped in this country in compiling statistics (however imperfect) of the incidence of malignant disease, which in primitive races is more wide-spread than is generally believed to be the case at home. It cannot be counted against civilisation that cancer followed in its train. In Nigeria a pagan from the more hilly country is just as likely to have malignant disease as the English-educated native of the Southern Capital. Although it is most likely that in future—and quite possibly near future—when there is a more general adoption of European food and clothing that the incidence of malignant disease will show a definite increase in the coastal towns with no corresponding augmentation in the much less civilised parts of the interior.

From figures published in the Registrar General's Annual Returns the increase of cancer in England has for some time given rise to considerable anxiety and there seems little doubt that it keeps time with the progress of civilisation. In London, wherein now prevails an atmosphere constantly polluted by the exhaust fumes of countless motor vehicles, the rapid increase in primary cancer of the lung is startling. These conditions will never occur in tropical countries; but, at the same time, it would be interesting to prophesy as to the occupation of the first patient in this colony recorded and proved to have or have had carcinoma of the lung. He will probably be a mechanic in the employ of one of the largest motor companies. Apart from this, however, there is no doubt that with the increasing numbers of Africans assuming European methods of living and clothing, cancer will take its toll of an annually increasing number of victims. That is, there will be an added incidence of the disease over that prevailing and which I assume has prevailed from time immemorial.

In the description of post-mortem examinations immediately following it is of extreme and almost puzzling interest to notice how protean in its forms malignant disease is in the primitive African. There is no organ in the body which is immune: no rare type of cancer or sarcoma which does not seem to occur. The same histogenetic problems arise where cells do not run true to type, and embryonic theories may be considered out here, as at home. Not all material, that could be is sent from the out-stations for pathological examination. A far greater difficulty is to arrive at an even approximate figure of the incidence of malignant disease in this country.

The following are the more interesting of the post-mortem findings:

- (a) Thrombosis of the Superior Mesenteric Artery.
- (b) Lobar pneumonia (2).
- (c) Generalised tuberculosis.

Both lungs were affected with large cavities in the apices. Multiple abscesses found in liver, spleen and both kidneys. Mediastinal and mesenteric glands enlarged and in caseating masses.

- (d) Carcinoma of the pancreas (2).

1. The first case was that of a male (southerner) who was thirty-six years of age. Jaundice marked. The growth, not very large, was in the head of the pancreas and obstructing the common bile duct. The liver was considerably enlarged—(weight 81lb. 5oz.)—and its surface was completely covered with irregular lumps of new growth. When cut, the right lobe consisted of new growth alone, and in the left lobe there was to be seen only a small amount of liver tissue. The lungs were unaffected. On section, the original growth in the pancreas proved to be a spheroidal-celled carcinoma with a considerable amount of fibrous tissue formation. Sections from the liver showed new growth of a similar nature. There was no sign of any infiltration in the mesenteric glands.

2. The second case was in a Sierra Leone boy aged twenty-three years. There was no jaundice. The growth was found in the body of the pancreas; secondary deposits were numerous in the liver although the size of this organ was only a little above normal. This boy did not die from his cancer; intercurrent disease intervened.

On section the primary and secondary growths consisted of cells irregular in size and shape. The nuclei in some instances were very large. From Bland-Sutton's description of carcinoma of the pancreas in his "Tumours—Innocent and Malignant," it would seem that this particular growth originated in the islets of Langerhans.

(e) Traumatic rupture of the spleen.

This is of considerable interest on account of the history and the subsequent happenings.

A Hausa man aged thirty years, was hit by another man during the course of a quarrel with a stick; the blow landed just below the left costal margin in the mid-axillary line. He was brought into hospital about an hour later with all the signs and symptoms of internal hæmorrhage: although, these were not indicative of really extensive bleeding. He was put into bed and carefully guarded against making any movement; sand-bags were put into suitable positions. An hour later he was no worse, and Dr. Q. Stewart, who was in charge, decided not to operate at that moment. His decision proved eminently justifiable. The patient improved day by day to a fortnight later, when, his nurse having left him for a moment, and the sand-bags having been removed to allow of the exercise of his matutinal duties, the man, "feeling quite strong" raised himself up and sat on the edge of his bed. In a very short time he fell back on the bed in a collapsed condition, and, soon afterwards, died.

At the autopsy there was a considerable amount of blood in the peritoneal cavity. The spleen was carefully removed; it was about two and a half times the normal size. Directly opposite the hilum was a rupture one and a half inches into the substance of the spleen. Early scar tissue had formed around this area, and there seems no doubt that in the original rupture, hæmorrhage had been naturally arrested, and, that if the patient had remained for another fortnight in a complete state of rest, there would, most probably, have been complete recovery. The unfortunate man, however, in suddenly sitting up, caused the early scar tissue to break down. Death was due to the bleeding that followed.

It is interesting to note that in an article on traumatic rupture of the spleen (British Journal of Surgery of July, 1927) Hamilton Bailey refers to Professor H. M. Turnbull and his colleagues as having never seen, at a necropsy, a spleen containing the scar of an old injury.

(f) *Malignant Malaria*.—From the figures in the Annual Medical Report of Nigeria for 1926 the death rate from Malaria is .13% of all cases treated in natives. One can safely assume therefore, that, as a killing disease, malignant malaria is not very common in the native. The blood picture in life, of the case here described as an autopsy, is interesting and is given to complete a somewhat unusual pathological condition.

A Hausa boy, aged twenty-one years, came into hospital with fever. Blood films taken showed an extremely heavy infection with sub-tertian parasites. In a count of 500 red cells, no less than 34% contained parasites and multiple ring infection was common. All stages of schizogony were seen and crescents were numerous. He died soon after admission.

At the autopsy the body appeared ill-developed and badly nourished; the lungs were extremely pale—as was the heart also—and almost devoid of blood. The abdominal cavity was “dried up”: the peritoneum similar to thin parchment the abdominal contents, with the exception of the liver and spleen, possessed with a striking pallor. The spleen had no definite outline of shape and was simply one mass of extremely friable tissue of which it was difficult to get a suitable piece for section-cutting. The liver was extremely dark, almost black in colour, slightly enlarged, and a little friable.

Sections: the spleen showed malarial pigment in large quantities. The cellular contents of the pulp were reduced to a negligible quantity and replaced by degenerative and necrotic tissue.

The liver showed an even greater amount of malarial pigment. There were early degenerative changes in the portal areas with fatty infiltration general; and patches, here and there, of leucocytes and attempts at regeneration.

(g) *Cerebral hæmorrhage*.—Whilst on parade in Kaduna a police constable had an apoplectic fit, and, was brought immediately into hospital. He presented all the signs of cerebral hæmorrhage and died six hours later. He was a Hausa native, twenty-five years in age; large in stature and well developed.

At the autopsy there was a large amount of blood-stained fluid in the cranial cavity. The brain was removed and a large ragged tear, full of blood clot, was seen on the postero-lateral surface of the left hemisphere. On further examination it was found that the site of hæmorrhage was in the region of the basal ganglia, and, presumably the lenticulostriate artery had ruptured. Destruction of brain substance was considerable; the hæmorrhage broke directly through to the surface of the brain, and the lateral and fourth ventricles were full of blood.

The left ventricle of the heart was hypertrophied. The large vessels showed no sign of atheromatous changes. The liver was rather pale in colour with outward signs of early multilobular cirrhosis. The capsules of both kidneys stripped with slight difficulty and small infracts were present in both organs. No old or recent syphilitic scar was seen.

Sections: liver—multilobular cirrhosis with attempts—here and there—of organisation of fibrous tissue.

Kidneys: a general early fibrosis affecting the interlobular arteries, glomeruli and tubules: all the signs of chronic interstitial nephritis.

The case is of interest on account of the early age at which such an extensive hæmorrhage took place.

VIII.—EXAMINATION OF TISSUES.

No section-cutting was done for seven months of the year when I was away on leave. As has been already remarked the number of autopsies is very limited, and, as the mortuary furnishes the majority of morbid tissues for histological study, it is unfortunate that the most interesting and vital branch of pathology should be starved for material.

Eighty-three portions of tissue have been cut and examined. They include, chiefly, those of abdominal organs and new growths. The liver nearly always seems to provide some pathological condition for examination.

A short resumé is given of the following tumours as being of especial interest.

1. *Parotid gland*.—Yoruba girl aet. Eighteen. Alveolar carcinoma of low malignancy.

2. *Tumour of Orbit*.—(Two)—both in males, one forty years of age and the other thirty-two. In each case the growth was a round-celled sarcoma.

3. *Tumour of Pylorus*.—In a European of thirty-eight years. Adeno-carcinoma.

4. *Tumour of breasts*.—Pagan boy from the Plateau aged eighteen years. Growth was a mixed celled sarcoma.

5. *Inguinal gland*.—From a pagan aet. Twenty-five years. The pulp of the gland tissue was replaced almost entirely by fibrous tissue—dense in places. *Microfilaria bancrofti* present in moderate numbers.

The reports on some other tumours is given in the previous section.

H. MORRISON,
Pathologist.

MAP A
Reference
Cases of Plague found in Town of Lagos, 1927
1. Native Place - 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 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W. ALLEN

APPENDIX B

Part 1

ANNUAL REPORT ON PLAGUE IN NIGERIA, 1917

BY

W. ALLEN M. A., D. S. C., D. P. H., AND

Senior Sanitary Officer

REFERENCE

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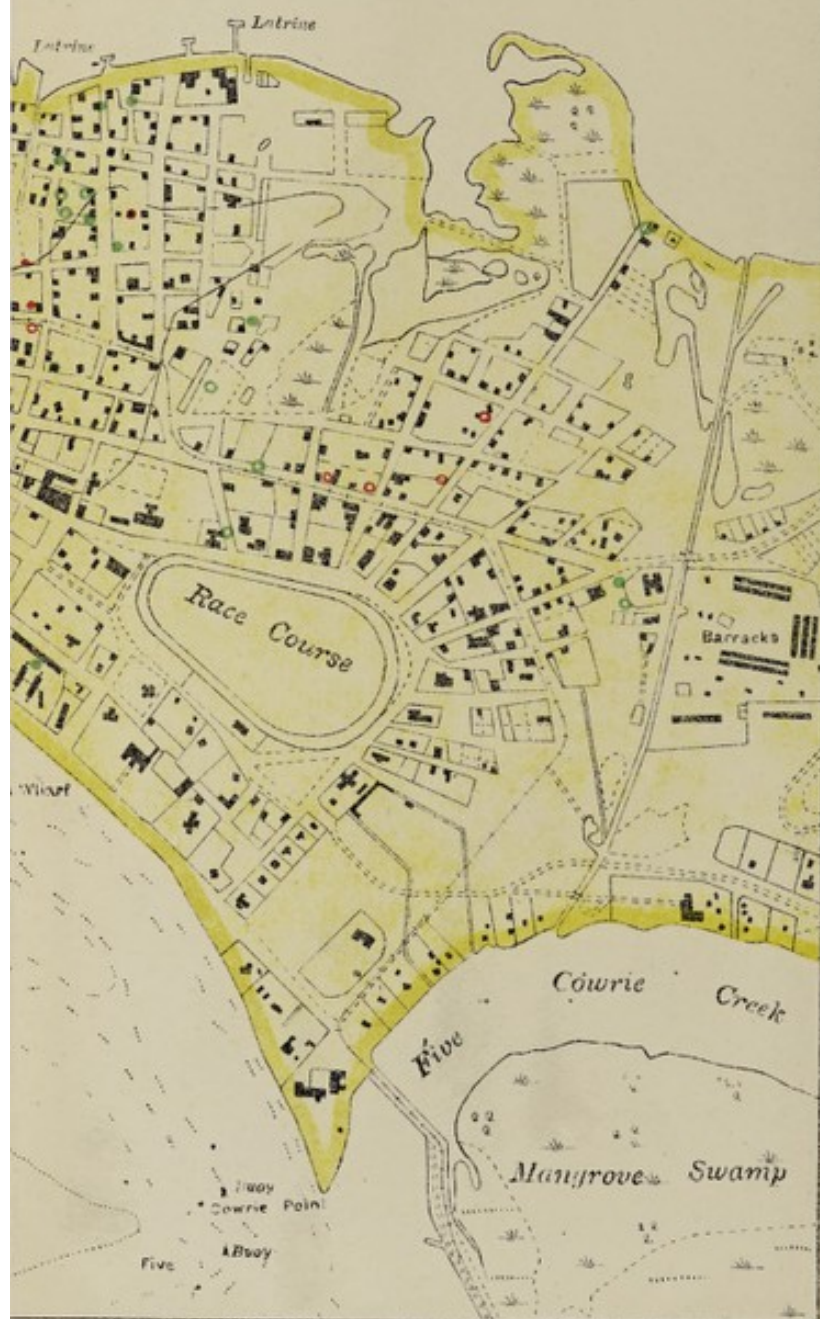
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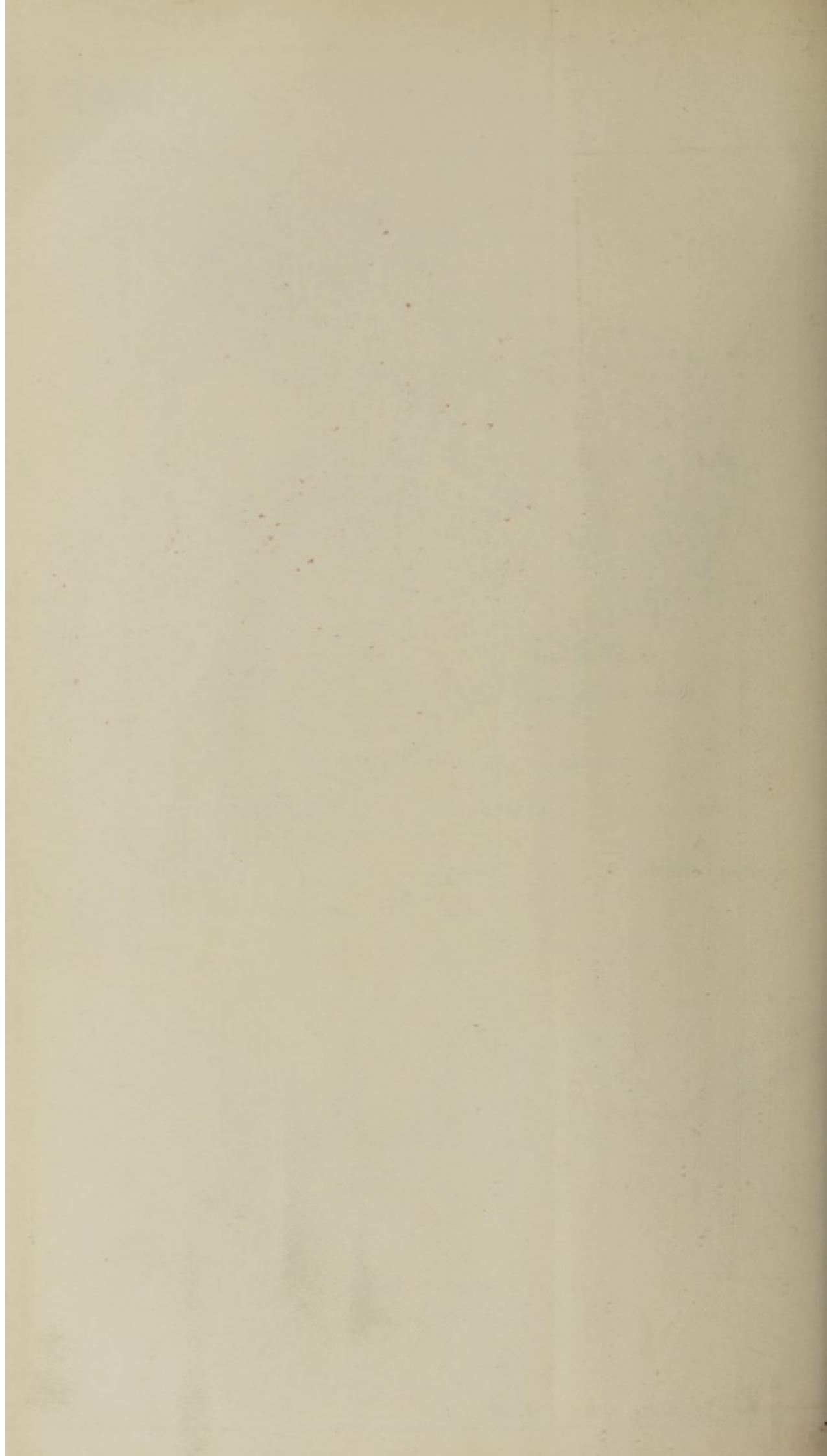
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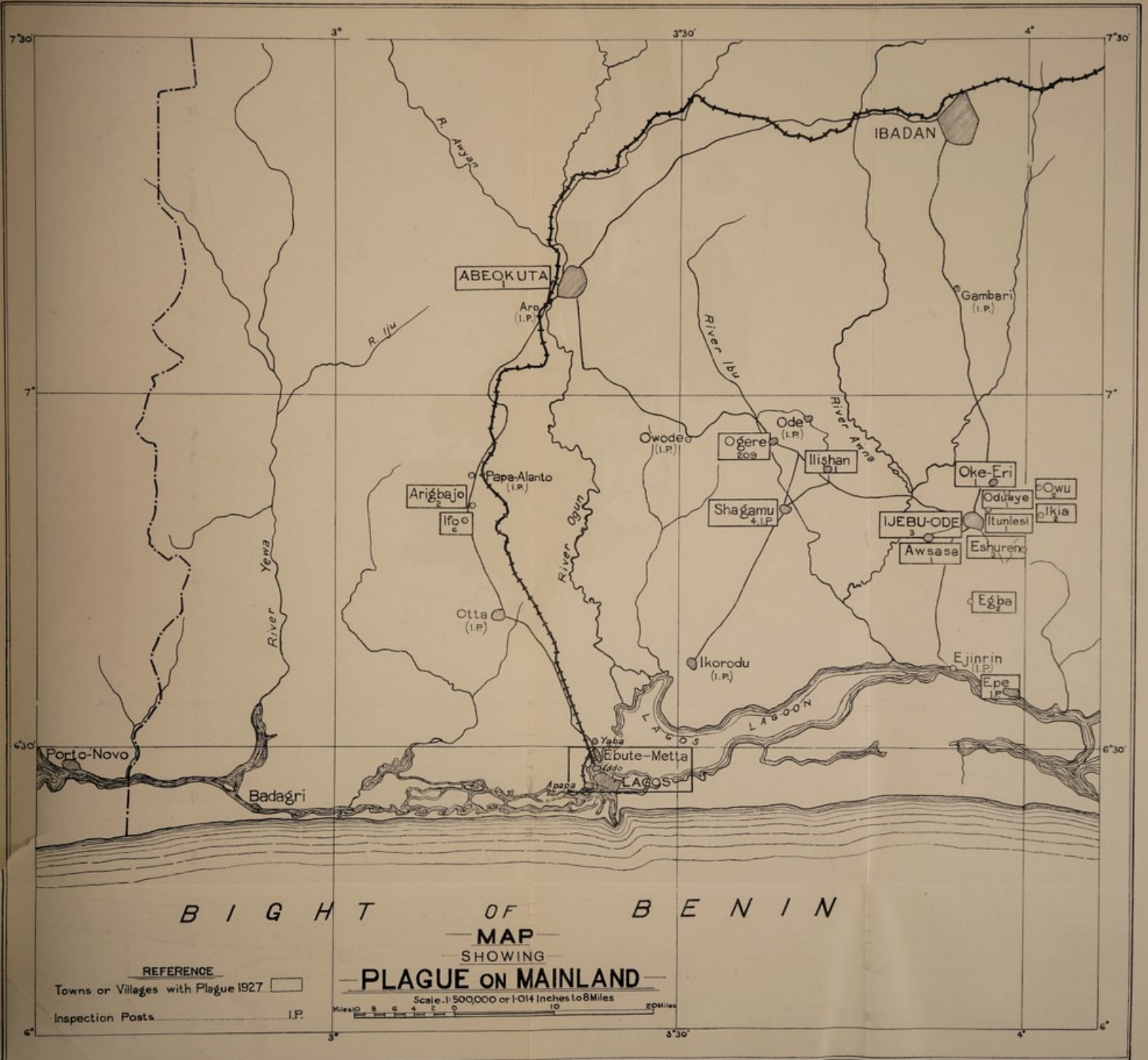


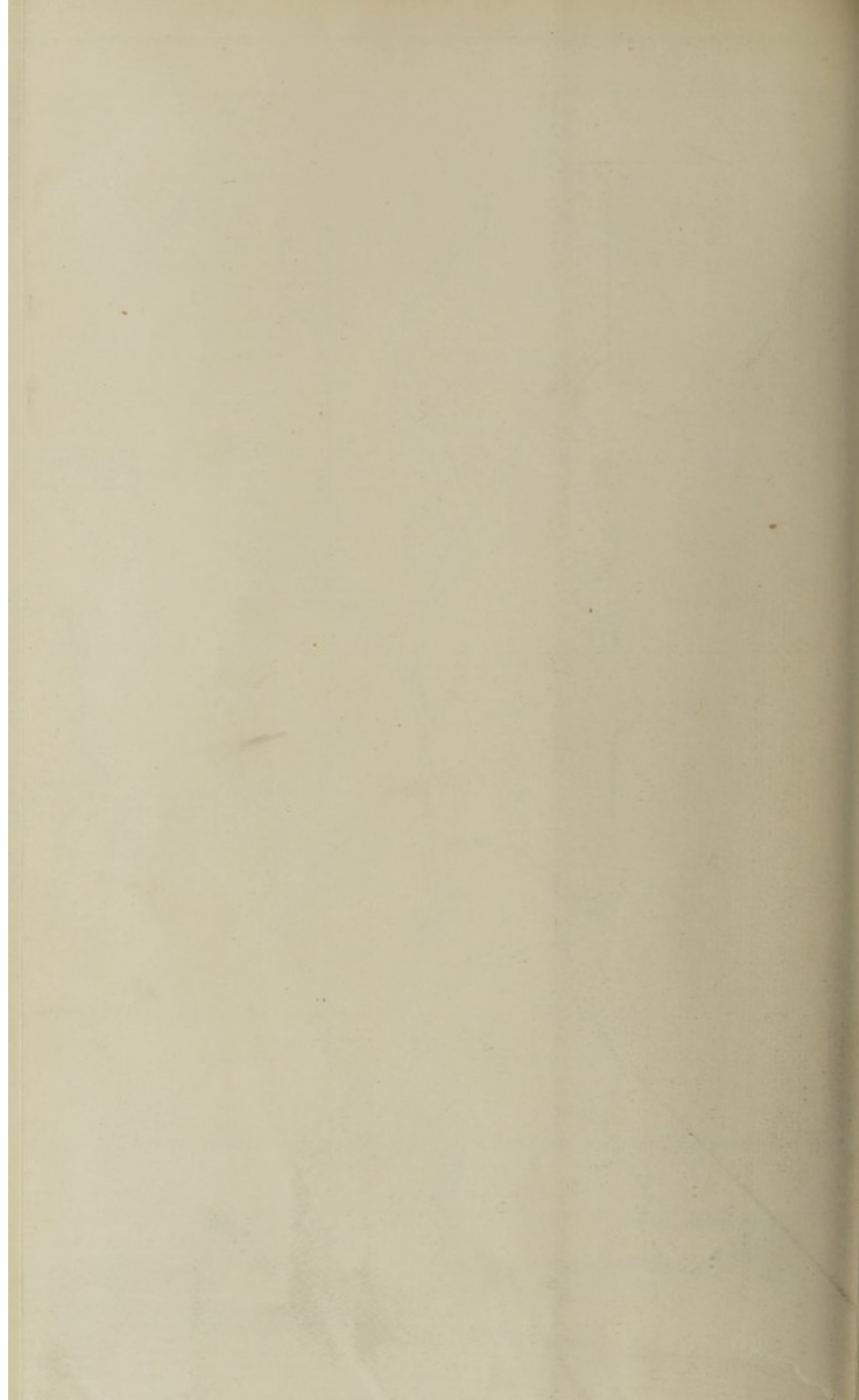
MAP "B"

PLAGUE CASES 1926









REPORT ON PLAGUE IN NIGERIA FOR THE YEAR ENDING 31st DECEMBER, 1927.

Compared with 1926 there was a marked diminution in the number of cases both in Lagos and on the mainland, but as the incidence has been low all over the world during 1927 it is impossible to interpret exactly to what the diminution is due, and if it is likely to be permanent. The figures were greater in Lagos than in 1925, but less than in 1924, the first year of the plague outbreak.

The figures for Lagos for the last four years are as follows:—

Year.	No. of Cases.	No. of Deaths.	No. of Recoveries.
1924	414	349	65
1925	104	88	16
1926	497	476	21
1927	155	151	4

The monthly figures for 1927 in Lagos are:—

Month.	Cases.	Deaths.	Month.	Cases.	Deaths.
January	31	31	July	5	5
February	10	10	August	7	7
March	13	12	September	15	15
April	8	7	October	22	22
May	6	5	November	16	16
June	3	3	December	19	18

All the cases were reported from Lagos Island with the exception of one from Ebute Metta, and the greatest number came from the crowded areas of Idunmata, Idunsagbe, Ebute Ero, Idumagbo and Alakoro at the north-west part of the island. The infection was very much less in the insanitary and congested areas of Ereko, Oko Awo and Faji which were very much affected in 1926. No cases occurred between Broad Street and the Marina. There was the usual drop of cases in May, June, July and August and the usual increase in September and October lasting until the end of the year. The location of plague cases discovered in 1927 is indicated roughly on the small map attached Map A and the cases for 1926 on the small Map B attached.

On the mainland a total of 242 cases of plague with 190 deaths were reported. This compares with 833 cases and 727 deaths reported in 1926. Cases were reported from Abeokuta, four; Ijebu Ode, three; Oke Eri, one; Osasa, one; Shagamu, four; Ogere, 209; Ilishan, one; Egbe, two; Eshure, three; Owu, two; Itunlesi, one; Epe, one; Ikija, two; Oduaye, one; Ifo, six; and Arigbajo, two. The approximate position of the villages from which plague has been reported is indicated in Map C. A survey of plague on the mainland forms the latter part of this report.

DEATH RETURNS.

2. The total deaths from all causes reported in Lagos and Ebute Metta shows a noteworthy and gratifying reduction compared to the last few years. The number is 2,309 compared with 3,054 in 1926, 2,748 in 1925, 3,265 in 1924 and is the lowest recorded number since 1919. It is difficult to determine to what this remarkable decrease was due. The efforts of the deratting gangs directed towards general sanitation and improvement of housing conditions may have had some effect on the general death-rate, although it is early to expect such marked improvement. The return of "deaths from respiratory disease" also shows a definite decrease the total being 432 with pneumonia a notifiable disease. This compares with 804 in 1923, 953 in 1924, 733 in 1925 and 646 in 1926.

Every death reported as due to pneumonia or broncho-pneumonia whether certified by a medical practitioner or not was investigated at autopsy, and a post-mortem examination was made in every case where there was no medical certificate. In two cases where the certificate of the responsible practitioner was not accepted and investigation was made, the condition was found to be plague. One case was certified as "cardiac asthma" and the other as "acute bronchitis." The general practitioners in Lagos most willingly co-operated in any doubted case and agreed readily to any post-mortem investigation which was considered necessary.

It is rather remarkable that the greatest number of deaths from "Diseases of the Respiratory System" occurred in the month of July when plague was at its minimum, but with the investigation of every suspicious known death, one can hardly conceive that many deaths from plague remained undiscovered; of course it is possible that a few mild bubonic cases escaped detection. In previous years the greatest number of deaths from "Diseases of the Respiratory System" occurred during the months when plague was at its maximum.

In Lagos inoculation was discontinued as a routine practice. 1,470 contacts were inoculated.

TYPES OF CASES.

3. The Medical Officer of Health on plague duty (Dr. W. C. Smith) who controls the Infectious Diseases Hospital and conducts the post-mortem investigations, reports as follows:—

"The following table shows the types of cases which were diagnosed at autopsy or admitted to Hospital.

Type.	No. of Cases.	Hospital.	Recoveries.	Deaths.
Bubonic	45	8	4	41
Septicæmic	93	7	—	93
Pneumonic	17	4	—	17

"Of the total deaths, 132 were diagnosed at the Public Mortuary in the routine examination of suspicious cases.

"(a) BUBONIC TYPE.

"Of the forty-five cases of this type

"the femoral glands were infected in 28 cases.

" „ axillary „ „ „ „ 9 „

" „ cervical „ „ „ „ 5 „

" „ inguinal „ „ „ „ 3 „

"In all cases the glands were enlarged and hæmorrhagic with periglandular infiltration.

"(b) SEPTICÆMIC TYPE.

"In this type the primary bubo was usually large and necrotic. The bacilli were more scanty than in the purely bubonic type and appeared more rounded than rod-shaped but still retained the bipolar staining reaction with carbo-thionin. In three cases in which the femoral glands were infected the glands along the course of the femoral iliac and abdominal vessels right up to the Inferior Vena Cava were infected, being enlarged and hæmorrhagic. The peritoneum covering these vessels were frequently stained with hæmoglobin. The spleen in all cases was large, congested and soft.

" The liver was usually found to be congested. In one case nodules scattered throughout the liver were found. A specimen of this tissue was sent to the Pathologist African Hospital for examination when it was found that nodules were similar to the infarcts found in the lungs in septicæmic cases.

" The lungs in a large number of cases showed definite infarcts in both lungs. In one case the infarct was large and had broken down and the bacillus was recovered from the contents of the bronchus.

" (c) PNEUMONIC TYPE.

" Two types were found.

" (1) Three cases diagnosed clinically at the Infectious Diseases Hospital showed, post-mortem, consolidation of one lung the other being intensely congested.

" (2) The remainder of the cases showed congestion of both lungs but no consolidation."

INFECTIOUS DISEASES HOSPITAL.

" Fourteen cases of plague were admitted, classified as follows:—

" 7 Bubonic of which 3 recovered.

" 3 Septicæmic } All died.
" 4 Pneumonic }

" In one of the cases which recovered, a large blister about 2" long and 1" broad developed on the side of the left leg just below the knee, and a puncture showed *B. pestis* in large numbers. The blister was excised and the base cauterised with lunar caustic. Two black necrotic ulcers resulted which were irrigated with hydrogen peroxide and Eusol. After a certain amount of sloughing the ulcers healed up."

Dr. F. Ross, Specialist, African Hospital, was accidentally infected while examining a case of plague; he most fortunately recovered.

RAT INFECTION IN LAGOS.

4. Examination of rats for evidence of infection was continued under the direction of the Director of Medical Research at Ereko Dispensary. The infection at the end of 1926, viz., 3% was high and fears were entertained that with the rat infection persisting so far into the dry season, another bad plague year would be experienced. Fortunately the percentage fell in February to under 1%, with a slight rise to 1.5% in April and a period during May, June and July of very low infection. The percentage rose slowly in August and September until as is usual in October the peak was reached (3.8)%. There was a gradual fall to 1% in December. The infection generally was lower for the year under review than for 1926 when the peak was 6.5% in October.

The total number of rats examined was 57,087 of which 675 were found positive. 568 were brought to the Collecting Stations and paid for. These could not be traced. 107 were caught by the deratting gangs and the African rat-catchers. Of these, five came from Ebute Metta, one from Iddo goods shed, one from Ikoyi and two from Ijora. Of the *R. rattus* examined 1.1% were found infected. Of the *R. norvegicus* examined 2.3% were found infected. This shows a reduction in the extent of infection in the *R. rattus* compared with last year.

The location of the places where infected rats have been found is indicated roughly in the small plan of Lagos attached. Map A.

The majority of the positive rodents found by the deratting gangs were reported from houses being treated for human plague infection.

FLEA INFESTATION OF HOUSES.

5. Certain experiments were carried out during the year by the Medical Research Workers in co-operation with the deratting gangs to ascertain to what extent certain houses were infected with fleas by allowing guinea-pigs to run about.

The first experiment was carried out on 28th November, 1927, and the time allowed for the guinea-pig to run about was two minutes.

(a) In a room just disinfected with kerosine emulsion and perchloride of Hg. No result.

(b) In a room not yet disinfected. One *Xenopsylla Cheopis* ♀.

(c) In a room from which a plague corpse had been removed. No result.

(d) In a room disinfected eight weeks previously. No result.

(e) In a carrier shed disinfected eight weeks previously. No result.

The experiment was again carried out in December, 1927, but this time the guinea-pigs were allowed to run about for from two-and-half to four hours. The six rooms selected were all dark and badly ventilated and none of them had been disinfected.

The results were negative except for one guinea-pig which picked up one *xenopsylla brasiliensis* ♀.

The rat flea surveys should of course be carried out during the height of the plague season and it is intended to continue the experiment month by month during the year.

FLEA INFESTATION PER RAT.

6. The flea infestation per rat was shown by the Research Workers to be highest about the period of the highest human plague incidence and when the rat infection was at its height. In October when there were the maximum number of plague cases and the rat infection had reached the peak, the greatest average number of fleas per rat was discovered, viz., 4.07 per rat. In June when the rat infection was at its minimum the average number per rat was 2.5 but it is interesting to observe that the smallest average was found in May, viz., .06 per rat.

RODENT DESTRUCTION.

7. A total of 243,511 rodents were caught in Lagos during the year, a marked increase over the number for 1926 (162,353). This increase was due chiefly to the deratting gangs which accounted for 60,960. 103,446 were brought into the collecting stations while African rat-catchers brought in 79,105. Of the total rodents caught 51,636 were *R. rattus* and 4,303 *R. norvegicus*. The remainder were mice. 3,452 Shrews (*crocidura manni*) were destroyed.

Every portion of Lagos and environs has been trapped daily.

GENERAL DERATTING AND DISINFECTING SCHEME IN LAGOS.

8. The general deratting and disinfecting scheme recommended by Sir Edward Thornton was embarked upon at the end of 1926. A private house at 207, Igbosere Road was equipped as an office and store, temporary clerks for finance, typing and records were arranged for, and most important of all the thirty European Rodent Inspectors who arrived during November and who when they arrived had little or no knowledge of deratting work, were put through a short course of training under Mr. Turnbull, European Sanitary Inspector, who had just returned from South Africa having undergone a course of instruction in anti-plague methods there.

By the beginning of 1927 the scheme was more or less under way, a commencement having been made at the eastern end of the island. At first the population viewed the deratting operations with grave suspicion and in one or two cases active hostility was encountered. This was not to be wondered at, as all the furniture was removed from every room to enable the premises to be thoroughly explored, deratted and disinfected.

As the work progressed the attitude of the house holders became more friendly and now the cordial co-operation of all sections is a welcome feature of the campaign.

The work proceeded steadily west-ward the deratting staff consisting of ten fully equipped gangs each under a European, with an extra gang standing by for emergency, and one gang working in the rear.

In a very few months retrapping proved that the areas in the rear were slowly but surely becoming reinfested and it was observed that Corrosive Sublimate was not having the deterrent effect anticipated, for rodents were being trapped in houses which had only been treated a few days previously. At the end of February, it was decided to increase the strength to 1 in 2,000, instead of the 1 in 3,000 recommended by Sir Edward Thornton. Even at this strength there was evidence that reinfestation was taking place and the strength has since been increased to 1 in 1,000, the strength used by the plague workers in Egypt in 1911.

During the initial stage of the anti-plague operations, earthen floors, double walls and other places which were found infested were treated by the deratting gangs, but where repairs or alterations to prevent re-infestation were considered necessary the matter was brought to the notice of the Medical Officer of Health with a view to having the work carried out by the owner or occupier through the operation of the Public Health Ordinance or the Building Bye-laws. The repairs required were however so numerous, and the difficulties in having them satisfactorily carried out so great that the whole scheme was being held up. In March, 1927, it was decided that all minor repairs to prevent re-infestation including removal of double walls should be carried out by the deratting gangs, and only major structural alterations should be carried out by the owner or occupier as directed by the Medical Officer of Health or Town Engineer. This was found to be much more satisfactory.

From the start of the campaign considerable difficulty was experienced in dealing with double walls and partitions of palm mid-rib, wood or galvanised iron which are to be found in a large number of the houses in Lagos. Double walls if at all dilapidated are by far the most popular resting places and breeding places for rodents. At first with the public feeling against the campaign only exploration and dis-infestation of the double walls and partitions were carried out but after a month or two when the confidence of the people had been secured, action was taken to have practically every double wall or partition done away with or so arranged that it was no longer a harbourage for rodents. This I am of opinion is the most important part of the deratting work and it is a matter of great satisfaction that the confidence of the people has so far been gained as to allow this very essential branch of the work to be carried out without obstruction.

Double walls in better class premises are seldom found infested, but in the poorer quarters it is necessary to look upon every double wall and double partition as a potential plague focus.

The necessity of having these premises (where double walls have been removed) inspected from time to time after treatment is recognised and a gang under a European Rodent Inspector is specially detailed for this.

1,519 premises have been reported as having had double walls or partitions explored and dealt with.

Rodents also favour holes in earthen or more popular still concrete floors and large numbers have been caught when the runs have been explored. Occasionally the floors are repaired and the holes filled up with broken glass by the deratting gangs, but as a general rule they are reported to the Medical Officer of Health to be dealt with as nuisances.

The importance of having concrete floors instead of earthen floors is being urged for two reasons.

- (a) More difficult for rats to burrow.
- (b) Natives dislike sleeping on concrete and are therefore compelled to use a bed.

It is a well known fact that plague is much more frequent amongst natives who sleep on the floor.

The present procedure in the treatment of a house is as follows :—

Before the house is dealt with the owner is informed of the intentions of the plague staff, and his assistance and co-operation is asked for by letter. Before disinfection is commenced the premises are trapped for two days. The whole house and furniture is being sprayed with kerosine emulsion followed by corrosive sublimate. A general inspection of the whole premises is then made for evidence of rat infestation and all rat runs and harbourages are fumigated with Capex Cartridges or the Horo Machine, sprayed and treated, double walls done away with if considered necessary, and rat holes in walls and floors filled up with broken glass and concreted. All dirty and insanitary compounds are dealt with and all refuse is burned.

Any condition requiring major structural work (including improvement of ventilation) is reported to the Medical Officer of Health for action. A complete and separate record is kept of all premises which have been treated by the deratting gangs.

The number of premises dealt with since the beginning of the campaign up to 31st March, 1927, is 4,488. This does not include the re-inspection of 1,826 houses behind the actual deratting line.

With regard to the major structural alterations (including demolitions) carried out by the Medical Officer of Health or the Town Engineer a European Sanitary Inspector along with the plague staff has been detailed for this work with no other duties. This has proved a most excellent arrangement as the following improvements show :—

Demolition carried out by the Medical Officer of Health on the recommendation of the Senior Sanitary Officer in charge Plague	20
Demolitions carried out by the Town Engineer	57
Partial demolitions carried out by the Medical Officer of Health on the recommendation of the Senior Sanitary Officer in charge Plague	17
Partial demolitions carried out by the Town Engineer	177
Thatched roofs removed	323
Number of premises where better ventilation has been installed	805

A demolition is only carried out when it is considered by the Senior Sanitary Officer, the Medical Officer of Health and the Town Engineer that the house cannot be properly treated by the ordinary methods.

The number of plans for new buildings submitted during the year was 317 compared with 222 in 1926. The plans submitted show a better type of house. The use of palm rib or bamboo is prohibited and the floors are concrete. The Town Engineer reports an increase in the number of houses erected within the township on the mainland.

In regard to the large commercial stores in Lagos a European Sanitary Inspector has been detailed for rat-proofing and to instruct the various firms on this very important subject.

No legal action has been taken up to the present, but letters of advice are addressed to the various agents, as their stores are inspected.

The smaller stores and collection of foodstuffs which abound in Lagos are being dealt with as a routine measure by the Sanitary Inspectors working under the Medical Officer of Health.

The position of the deratting gangs on the 31st December, 1927, is shown on Map A.

PREVENTION OF EXPORTATION BY SHIP, CANOE AND ROAD.

9. During the year all deck and third class passengers by ocean going vessels were disinfected and their baggage before leaving Lagos. The practice of keeping these passengers under observation and African saloon passengers under surveillance for five days previous to embarkation was discontinued in February when the plague incidence began to diminish. Inoculation was discontinued as a routine practice.

The periodical fumigation of craft was carried out as far as possible, but owing to corrosion of the gas pipes the new fumigation barge s.s. *Galen* has been out of action for some months and will remain so till a new set of pipes arrives from England.

The Port Health Officer anticipates with the regular supply of "Zyklon B" now available it will be possible to carry out regular fumigations of coasting vessels with cyanide gas and it is his intention to have this done.

Fourteen ocean going steamers and twenty-nine local craft were fumigated.

7,979 rodents were destroyed on the wharves, foreshore or harbour craft. Two rats were found infected both near the wharf at Ijora.

The s.s. *Capafric* (French) arriving from Duala on the 30th of August reported several deaths at sea from plague. Energetic measures to stamp out the infection were taken by the Port Health Officer. In all thirty-two dead rats were found, mostly in an advanced state of decomposition. Only two live rats were trapped before fumigation. No infected rats were discovered.

INSPECTION OF CANOE TRAFFIC.

10. This has been continued during the year and the position is now more satisfactory. Certain regulations made under the Quarantine Ordinance and published in the Gazette have been laid down in regard to

- (i) Places of departure of canoes.
- (ii) Permits necessary before leaving.
- (iii) Hours between which canoes can depart.

Twenty six owners were prosecuted and convicted for breach of these regulations resulting in fines of various amounts up to one pound.

Funds were provided under the plague vote to enable the police to purchase two canoes to assist in the more rigid inspection of the lagoon canoe traffic.

ROAD TRAFFIC, LAGOS.

11. The inspection post at Denton Bridge is in operation day and night. No plague cases were discovered.

RAILWAY TRAFFIC.

Native passengers continue to be scrutinised as before at Iddo Station and on account of the discovery of a plague case in the Ebute Metta area, inspections are also carried out at Ebute Metta Station and Ebute Metta Junction. The goods sheds at Iddo are watched for likely rat infested packages and all three stations are trapped regularly.

OUTLOOK IN LAGOS.

12. The intensive deratting and general improvement scheme has been in operation now in Lagos over twelve months. It might be assumed from the reduction in the number for 1927 that a certain measure of success has been attained, and it is to be hoped that it is so. As will be seen from Map A, out of a total of 155 cases, sixteen were reported from premises which had been treated by the Plague staff. Of the sixteen, ten had been resident in Lagos with no history of having been away. Four were reported as having come from outside Lagos a few days previous to illness. Two were accidentally infected. Of the ninety-nine plague infected rats reported with a known origin, eighty-six were in front of the gangs and thirteen behind.

It is not to be expected that complete success will be attained at once. Sir Edward Thornton, although optimistic in regard to the results from the deratting "drive" anticipated reinfestation and does not neglect to point out that "when cleansing operations are finished, the infected area will have to be kept under rigid inspection for a long period and small portions of such areas may have to be recleansed." The histories of such campaigns in other parts of the world are not very encouraging, but success has been attained in one or two places notably in part of the island of Java where severely infected districts have been cleared of plague and have remained free for a number of years. Here house improvement has been carried out in a considerable scale, and from experience gained in Lagos it is quite certain that much more than actual disinfection and rat destruction is necessary.

One can only trust therefore with the disinfection and rat destruction which is being carried out, and the extensive minor structural improvements being executed by the deratting gangs combined with the major improvements carried out under the direction of the Medical Officer of Health and the Town Engineer, that a definite permanent reduction in the plague incidence, if not actual eradication, will result along with an improvement in the health statistics generally.

PLAGUE IN MAINLAND.

13. Anti-plague operations on the mainland has been under the charge of Major R. B. Price, D.S.O., R.A.M.C., Senior Sanitary Officer, assisted by Major R. G. Martyn, R.A.M.C., and Captain T. H. Twigg, R.A.M.C., plague medical officers.

14. The cases and deaths reported are as follows:—

CASES.					DEATHS.				
Month.	Bub.	Pneu.	Sept.	Total.	Bub.	Pneu.	Sept.	Total.	Mortality. %
January ...	7	—	7	14	7	—	7	14	100
February ...	2	—	—	2	2	—	—	2	100
March ...	21	—	—	21	18	—	—	18	86
April ...	89	—	1	90	72	—	1	73	81
May ...	72	—	16	88	48	—	14	62	70
June ...	9	—	3	12	5	—	4	9	75
July ...	3	—	1	4	1	—	1	2	50
August ...	—	—	—	—	—	—	—	—	—
September ...	1	—	—	1	—	—	—	—	—
October ...	3	—	—	3	3	—	—	3	100
November ...	1	2	1	4	1	2	1	4	100
December ...	—	1	2	3	—	1	2	3	100
	208	3	31	242	157	3	30	190	78%

15. During the first two months of the year a number of sporadic cases occurred, widely scattered, and not discovered till the death reports were received—hence the high mortality shewn.

In March a severe epidemic in the village of Ogere, rising to a maximum in April and May, attacked 209 persons killing 160. It receded rapidly as the work of cleaning up the village proceeded, and the last case reported was early in July. A few derivative cases (included in the above total) appeared in neighbouring villages but generally speaking the measures taken succeeded in keeping the epidemic surprisingly localised.

In October and November there was a small outbreak, probably somewhat more extensive than the number of confirmed cases indicates, at Ifo, half way between Lagos and Abeokuta, in an area to which it would appear that the infection of the rat population had spread from the Agege, Agbado, or Kurere foci where there were outbreaks in 1925.

In addition to the above, throughout the year, there have been four sporadic cases at Abeokuta, all imported and unaccompanied till recently by any evidence of rat infection in Abeokuta.

The general case mortality throughout the year is 78%. The Ogere epidemic began with a mortality of 86% falling towards the end of the epidemic to about 75%. Most of the cases were bubonic in character.

During the month when no epidemic was raging, the first intimation of a sporadic case of plague was usually the report of death. Consequently the case mortality for these months appears as 100%. It is possible that a few mild recovering cases may have been missed.

A comparison with the previous year may be fallacious, and suggests unduly encouraging conclusions, having regard to the somewhat arbitrary incidence of human plague epidemics, depending on the state of the epizootic.

INOCULATIONS.

16. 15,141 persons have been inoculated during the year. Inoculation of contracts was carried out as far as possible during the Ogere and Ifo epidemics.

During the early months of the year no movement was allowed out of Ijebu Ode Province to Ibadan and Abeokuta except by inoculated persons. Inoculation was performed at Road Control Posts, and most of the migratory trading population were inoculated.

In the absence of any cases of plague in the Province during the latter part of the year, this practice was discontinued.

DERATTING OPERATIONS.

17. In accordance with Sir Edward Thornton's report deratting operations were at first concentrated in Ijebu Ode the largest town on the province.

In January eight Rodent Inspectors with gangs were employed in Ijebu Ode on systematic deratting, two carried out similar work in the villages of the N.E. district, Oru, Ago, Aha, Ijebu Igbo, etc., and two began deratting the village of Iperu in the Remo District.

In Ijebu Ode town as the gangs moved forward the deratting area was entrusted to rapidly trained Native Sanitary Inspectors, who paid a weekly visit to each house and took action to ensure that the inhabitants kept their houses and their precincts in a sanitary condition. Later as it became possible to train more of these inspectors, and to provide the necessary European supervision for them, this practice was extended to the whole of the rapidly increasing deratted area, and eventually in June became a comprehensive sanitary scheme for the whole province including all villages of over 2,000 inhabitants.

At the same time a number of rat-catchers was employed to trap a wide selection of villages in Ijebu Ode Province, and in the towns of Abeokuta and Ibadan, to obtain some idea of the prevalence of infection among the rats and the area to which it extended. The results were poor at first, but payment of bonuses increased the number of rodents caught, up to a maximum of 41,786 in four weeks in August. The results as regards prevalence of rat infection are shown in paragraph 18.

In March, one Rodent Inspector was deflected with his labourers to derat the village of Egbe, a small village which had had two cases of plague, and showed a very high percentage of infected rats. This work was completed during the month.

By the end of this month the deratting of the villages of the N.E. district has been completed.

In April the serious epidemic of bubonic plague in Ogere made it necessary to send the two Rodent Inspectors working under the Medical Officer in Charge of plague, Remo district, at Iperu to undertake the deratting of Ogere. This work, was completed by the third week in June, by which time the plague epidemic had subsided. The work in Iperu was then resumed by most of the Ogere personnel.

By the 11th June, every building in Ijebu Ode town had been thoroughly treated and all deposits of refuse had been cleared up. Two Rodent Inspectors remained in Ijebu Ode, the remainder commenced deratting work in Shagamu.

In October, an outbreak of plague at Ifo, midway between Lagos and Abeokuta made it advisable to detach two Rodent Inspectors and personnel to work in that district. The deratting at Ifo was finished early in December, and that of Arigbajo is now nearing completion.

Meanwhile the beginning of November saw the completion of Shagamu and Ilishan; Ikini and Ode-Remo were next attacked, and these were finished by mid-December.

The following places have therefore been systematically deratted :

Ijebu Ode Province.

				Approximate Population.
Central District.—	Ijebu Ode ...	...	...	22,000
	Egbe ...	...	...	300
N.E. District	Oru ...	...	...	4,900
	Aha ...	...	...	4,000
	Ago ...	...	...	7,000
	Ijebu Igbo and smaller villages ...	...	...	26,000
Remo District	Shagamu ...	...	...	9,700
	Iperu ...	...	...	8,700
	Ogere ...	...	...	2,900
	Ilishan ...	...	...	2,900
	Ikini ...	...	...	3,200
	Ode ...	...	...	3,800
<i>Abeokuta Province.</i>	Ifo ...	...	...	3,000
	Arigbajo ...	...	...	3,000

This comprises most of the villages attacked to any extent by plague during 1926 and 1927.

The work of maintaining these and the other villages in a sanitary state is still exercising the vigilance of numerous African Semi-trained Inspectors under supervision of a skeleton service of Rodent Inspectors, provided with motor bicycles.

With the return of Rodent Inspectors from leave in England in March, it should be possible to resume active deratting operations. The steady advance of infection among rats towards Abeokuta culminating recently in the finding of several plague rats for the first time in Abeokuta town, together with the occurrence of a small epidemic in the southern part of Abeokuta Province, point to Abeokuta as the next scene of operations.

The work of deratting a village on the mainland comprises the general cleaning up of refuse, and building of incinerators. Each house is then systematically dealt with. The entire contents are removed, and disinfected. A search for rat holes is then made, and those found are opened up or smoked up, and closed with mud and broken glass.

Insanitary double ceilings are removed and burnt; those in good repair are cleaned, and traps set above them. The entire premises are sprayed with kerosine-soap-cresol emulsion and corrosive sublimate, and the house is systematically trapped.

Bush is cut down in the vicinity of houses, and the neighbouring bush is regularly trapped. Rat catchers have also secured large bags by digging out rat burrows in the cornfields in the vicinity of villages.

The Ijebu villages are well spaced out, and as a rule fairly clean. Certain congested areas, and certain villages (*e.g.*, Ogere) furnish exceptions. Floors are mainly of earth, occasionally cement, and in the case of two-storied buildings of wood; roofs mainly of galvanised iron with matting or bamboo ceilings; thatch is becoming rare. Walls are of mud, and show large cracks, which give shelter to rodents. A favourite site for rat burrows is under the threshold of doors.

Not many rat nests have been found in the buildings, and the greatest number of catches is made in the surrounding bush rather than in the houses.

Double walls do not exist.

18. The percentage of infection has fallen fairly steadily in *Ijebu Ode Province*. The infection is higher among black rats and consequently higher in areas where more black rats have been caught, *i.e.*, usually where trapping in houses is more intensive than trapping in the bush. This was evident in the late summer when great activity in digging out rat burrows in cornfields in the *Ijebu Ode* central district produced large numbers of uninfected rats, reducing the positive percentage to a very low figure.

Ogere (Remo district) showed a high positive percentage during the epidemic, largely from rats found dead in plague infected houses. The Ifo district showed a similar local high rate during the epidemic there.

Percentage of Positive Rodents Caught.

					Black Rats.	Brown Rats.	All Rodents.
Abeokuta	...	...	...	...	0.04	Nil.	0.03
Ifo	...	...	...	...	0.75	0.48	0.60
Ibadan	...	...	...	...	0.01	0.01	0.01
Ijebu Ode Province	Central	...	...	...	0.44	0.36	0.40
	N.E.	...	...	...	0.52	0.28	0.66
	Remo	...	...	...	1.95	0.20	1.27

Total Rodents Destroyed During 1927 on Mainland.

Black.	Brown.	Shrews.	L. Stratus.	F. Mice.	Mice.	Total. Positive.
95,164	100,466	16,702	19,517	4,722	26,268	1,265

278 unclassified.

Average percentage positive 0.5%.

GENERAL SANITATION.

19. Since June in order to prevent overlapping of the work of the Anti-Plague Staff with that of the ordinary Sanitary personnel, the Senior Sanitary Officer in charge Anti-Plague Operations on the mainland has assumed responsibility for all sanitary work in the *Ijebu Ode Province*.

In all villages whose population exceeds 2,000—twenty-one in number—a general clearing up of refuse under the supervision of the Rodent Inspector in sanitary charge of the district has been ordered by the Native Administration. At the same time each of these villages has been provided with incinerators tended by a Sanitary Labourer.

The general sanitation of Ibadan has been in charge of the Medical Officer of Health, Ibadan, that of Abeokuta under the Medical Officer. There is a Rodent Inspector at Ibadan and a European Sanitary Inspector at Abeokuta. Next year, as soon as accommodation can be provided for the Senior Sanitary Officer in Abeokuta, he will be able to assume charge of sanitation in that Province as in *Ijebu Ode*.

ROAD AND CANOE POSTS.

20. Native Canoe Inspectors at Epe, Ejirin and Ikorodu have been established throughout the year, and have been a useful check on the efficiency of the inspection of canoes leaving Lagos. There seems to be very little evasion of inspection at Lagos, and the advisability of withdrawing the Canoe Inspectors on the mainland is being considered. Their position lends itself very readily to bribery and corruption, their proper supervision is impossible, and their services are not commensurate with the expense involved.

Traffic control posts have been established throughout the year at Gambari and Owode. At these posts all persons and goods leaving Ijebu Ode Province for the uninfected areas of Ibadan and Abeokuta are examined, and disinfected.

An inspection post on the Lagos-Abeokuta road was situated at Aro. In July it was moved to Papalanto in order to secure protection for the Ilaro Division, and disinfection was henceforth carried out here as at other posts. For greater facility of administration it was moved to Otta in August, but returned to Papalanto in October, in view of a plague epidemic at Ifo, and now remains at Papalanto.

A road disinfection post for the considerable traffic entering the Remo district from Lagos through Ikorodu was established in February at Ikorodu. It was closed in April, when the Ogere epidemic made the Remo district itself an infected area, and reopened at Ode for the protection of Ibadan from the Remo district.

In October, after three months freedom from plague it was moved to a point one mile south of Shagamu on the Ikorodu road, where it now is.

Inspection posts on the mainland are indicated in Map C attached.

OUTLOOK ON THE MAINLAND.

21. The present position on the mainland would appear to be more satisfactory than in Lagos and the outlook more promising.

In Ijebu Ode Province infection of the rats still exists but it is hoped if the present campaign of compulsory hygiene can be efficiently maintained with a skeleton framework of European supervision throughout next year, a general human epidemic will be prevented.

The recent presence of infected rats in Abeokuta is however disquieting. Positive rats have been found at Ifo about thirty miles from Abeokuta but none have been caught between Ifo and Abeokuta Town.

It is intended to organise the deratting of Abeokuta Town at an early date with an intensive campaign in the villages to the south similar to that carried out this year in Ijebu Ode.

W. ALLAN,
Senior Sanitary Officer.

Traffic control posts have been established throughout the zone at Gumbur and Oshana. At these posts all persons and goods leaving the Oshana Province for the antislavery zones of Ibadan and Abeokuta are examined and registered.

An inspection post on the Lagos-Abeokuta road was situated at Ago. In July it was moved to Ibadan to assist in the protection of the Ibadan Division, and distribution was hastened to carry out duty as at other posts. For greater facility of administration it was moved to Oshana in August, but remained at Ibadan in October, the site of a large epidemic in the antislavery zone of Ibadan.

A road distribution post for the antislavery zone was situated at Ibadan district from Lagos through Ibadan was established in February at Ibadan. It was closed in April when the Oshana epidemic broke the Ibadan district itself and infected goods and persons at Oshana for the protection of Ibadan from the Ibadan district.

In October, after three months' epidemic from Ibadan it was moved to a point one mile south of Ibadan on the Ibadan road, where it now

inspected goods on the Ibadan road and is situated in Map C attached.

OVERLOOK ON THE MAIN ROAD

21. The present position on the Ibadan road is as follows: more satisfactory than in Lagos and the antislavery zone.

In Ibadan-Oshana Province infection of the zone will exist but it is hoped if the present campaign of compulsory hygiene can be effectively maintained with a Ibadan Government of Ibadan epidemic throughout next year, a general human epidemic will be prevented.

The recent presence of infected rats in Ibadan is however dispensed. Positive rats have been found at the same time since from Abeokuta but none have been caught between the zone and Abeokuta Town.

It is intended to open the distribution of Abeokuta Town at an early date with an intention to open to the village in the antislavery zone to that carried out this year in Ibadan.

W. ALAN

Major Secretary (Ibadan)

APPENDIX F.

ANNUAL REPORT ON THE X-RAY DEPARTMENT,
LAGOS, 1927,

BY

A. ROBERTSON, M.B., CH.B., D.T.M., AND H.

Acting Radiologist.

APPENDIX B

ANNUAL REPORT ON THE X-RAY DEPARTMENT
LABOR 1921

BY

A. ROBERTSON, M.D., D.C., AND
J. C. ROBERTSON, M.D.

X-RAY DEPARTMENT, LAGOS, ANNUAL REPORT FOR
THE YEAR 1927.

The total number of patients examined in this department for the year under review was 593.

X-ray photographs taken numbered 533; in thirty-four cases screen examination was employed along with photographic record; and in eight cases, screening only was employed. The low number of simple screening cases is due to the lack of facility and protection for horizontal screening. A new horizontal table has now arrived. This will allow safe and easy screening methods in the future. The number of attendances for electrical and light treatment was 1,862. The apparatus has given no trouble during the year. The apparatus used for vertical screen examination is unsafe, especially for the operator.

A current stabilizer has been installed, this is of great value, it ensures steady working of the apparatus, and prevents possible damage from variations in the main supply.

As in previous years the majority of X-ray examinations was for fracture. There is a progressive increase in bone and joint injuries due to street accidents.

There is nothing of interest to report in this work examinations as a rule being purely routine.

X-ray treatments are few but conditions benefited by this treatment excepting some skin diseases are apparently rare in Nigeria.

One interesting case was one of Myelogenous Leukæmia the immediate results were very good; though in this disease relapses occur from time to time which may respond again and again to further treatment but in the end the disease baffles the remedy. The Ultra Violet Ray apparatus has proved of great value. Many ulcers respond well to this treatment, others are most intractable. Some inflammatory skin conditions and surface burns have been satisfactorily treated.

Tuberculosis joint and gland conditions benefit considerably, but not to the same extent as they would in Europeans.

The Diathermy apparatus has been used in the successful treatment of certain joint conditions, sciatica and lumbago.

Continuous current treatment was used for neuritis, and to keep in tone the musculature of patients suffering from spinal diseases.

A. ROBERTSON,
Acting Radiologist,
African Hospital.

X-RAY DEPARTMENT, LAGOS ANNUAL REPORT FOR THE YEAR 1937

The total number of patients examined in this department for the year under review was 523.

X-ray photographs taken numbered 523 in thirty-four cases. Screen examination was employed along with photographic record; and in eight cases, screening only was employed. The low number of simple screening cases is due to the lack of facilities and provision for horizontal screening. A new horizontal table has now arrived. This will allow safe and easy screening methods in the future. The number of attendances for electrical and light treatment was 1,582. The apparatus has given no trouble during the year. The apparatus used for vertical screen examination is unsafe, especially for the operator.

A current stabilizer has been installed. This is of great value. It ensures steady working of the apparatus, and prevents possible damage from variations in the main supply.

As in previous years the majority of X-ray examinations were for fracture. There is a progressive increase in bone and joint injuries due to street accidents.

There is nothing of interest to report in this year's examinations as a rule being purely routine.

X-ray treatment is few but conditions benefited by this treatment excepting some skin diseases are especially rare in Nigeria.

One interesting case was one of Myelodysplasia. Treatment the immediate results were very good, though in this disease relapse occurs from time to time which may respond again and again to further treatment but in the end the disease kills the patient. The X-ray treatment apparatus has proved of great value. Many cases respond well to this treatment, others are most intractable. Some inflammatory conditions and certain bone have been satisfactorily treated.

Tuberculosis joint and gland conditions benefit considerably, but not to the same extent as they would in Europe.

The high-voltage apparatus has been used in the successful treatment of certain joint conditions, sciatica and lumbago.

Continuous current treatment was used for neuritis and to keep in line the musculature of patients suffering from spinal disease.

A. ROBERTSON

Medical Radiologist

Lagos Hospital

APPENDIX G.

REPORTS ON INTERESTING CASES BY MEDICAL OFFICERS.

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CASE OF RECURRENT APPENDICITIS.

DR. C. MACKEY—MEDICAL OFFICER.

Patient was a well-nourished "Benin" policeman aged about thirty-five years. He complained "something hold me for belly."

History.—His only illnesses have been pain from time to time in the right iliac fossa. He puts his finger on McBurney's point as the place where the pain was most intense: then spreads the flat of his hand over right iliac region saying "all this go swell up when my belly go hold me." During these attacks he vomited and was constipated. The illnesses have troubled him since he was such a height—he holds his hand about four feet six inches from the ground—he is now about five feet ten.

Present condition.—The patient now complains of pain in right iliac region: temperature, 97; pulse, 60; there appear some tenderness fullness and on percussion want to resonance in appendicular area. The tongue shows a whitish coating.

10th August, 1927. He was admitted into hospital and kept under observation for five days during which time he was given *Ol. Chenopodii* as ova of *Trichuris trichiura* were found in his stools. His temperatures were between 97 and 97.6 and pulse rates from 60 to 76.

15th August, 1927.—Operation. Chloroform was given after Morphine and Atropin. On opening the abdomen the omentum was found matted and adherent to an extensive Jackson's membrane. These had to be divided before the cæcum and terminal four inches of the ileum could be reached and freed. The greater part of the appendix was buried and bound down by fibrous tissue in the inferior ileo-cæcal fossa, where it was curled forming about one and a quarter circles. The tip of the appendix was free. There was no ileo-pelvic band. The cæcum did not appear dilated. The uninvolved part of the ileum seemed of slightly wider calibre than that underneath Jackson's membrane. The appendix was removed and the abdomen closed. Evening temperature rose to 99.8—pulse rate 84—after which the temperature and pulse rates have been normal. Convalescence was uneventful. The appendix was $5\frac{1}{4}$ long and drum stick in shape. Its superficial blood vessels were conspicuous. There was a small oval ulcerated area in the mucous membrane. The body contained two worms (*trichuris trich*) and the distal end two stercoliths.

PRIMARY MALIGNANT GROWTH OF LIVER.

DR. C. MACKEY—MEDICAL OFFICER.

An Ijaw man aged thirty-eight years came to out-patient complaining of weakness. He was intelligent and could speak English fluently. He said he used to be a hunter. He was admitted into hospital 12th August, 1927.

History.—Always had had good health: no dysentery.

Present condition.—Patient was very spare and said he had lost much weight: scleræ yellowish: liver reached two inches below lower costal margin in right ant. axillary line and a hand's breadth in right mammary line: outline of liver felt smooth: spleen slightly enlarged: no ascitis: urine contained bile: stool were light brown in colour.

Progress.—Punctures of liver yielded no result: courses of treatment with Mercury, Pot. Iodid. and 914 and Emetin were useless. The uniform enlargement of the liver rapidly increased and sclerotics became a deeper yellow colour: patient lost flesh. He had no pain.

4th September, 1927.—Patient said he wished to leave the hospital as he felt he was getting worse and wanted to reach his own country before he died. The liver now almost filled the abdominal cavity. It was well below the umbilicus and the enlargement still seemed uniform. No other primary malignant tumour could be found. The patient was discharged from hospital, 4th September, 1927.

BLACKWATER FEVER IN A NATIVE CHILD.

DR. C. MACKEY—MEDICAL OFFICER.

Patient was an active strong healthy boy aged $2\frac{1}{2}$ years. Born in Onitsha and had lived the last year of his life in Warri.

History.—"Several attacks of 'fever'" from time to time, but soon recovered after salts and quinine; was given quinine only when he complained of feeling "cold" solution of quinine hydrochloride was taken 11th August, 1927. 11 a.m. 17th August, 1927, child ate a hearty breakfast with his parents.

Present attack.—1 p.m. 17th August, 1927, rigor. 2 a.m. 18th August, 1927, passed dark brown urine, became very restless and thirsty. 9 a.m. 18th August, 1927, slight jaundice, vomiting, restlessness and thirst more intense: skin hot and dry: 10.30 a.m. 18th August, 1927, admitted into hospital.

Temperature 102, pulse 166, respiration 30 tongue furred: sclerotic yellow, passed four ounces brown urine which gave very slight reaction for bile salts and pigment, but gave positive evidence of blood with guaiacum and spectroscope: blood films showed some malarial parasites and gave following differential counts:—

Polymorphs	...	...	...	23
Small Lymph	...	...	...	18
Large Lymph	...	...	...	13
Large Mononuclears	...	...	...	20
Transitionals	...	...	...	2
Eosinophils	...	...	...	2
Basophils	...	...	...	1

11 a.m.—Very profuse sweating after bath and pack: less restlessness: patient slept: passed brown watery motion in bed: vomiting continued.

Noon.—Temperature rising; patient stuporose; sclerotics a deeper yellow; pulse uncountable.

1 p.m. 18th August, 1927.—Death—no post-mortem examination could be held. The Acting Director of Medical Service (Dr. Leonard), kindly saw the case with me and made and examined blood preparations. His results are given.

HYDATIFORM MOLE.

DR. C. MACKEY—MEDICAL OFFICER.

Sobo woman aged forty was admitted. She stated she was six months pregnant and during the last three months she had been suffering from colic and irregular losses of blood. The hæmorrhage on day of admission was said to have been more profuse than on previous occasions. She had given birth to four healthy children.

The patient looked a strong healthy woman. The uterus reached four inches above the umbilicus and felt very doughy. It underwent strong contraction at frequent intervals. Blood was flowing from vagina.

Temperature 99, pulse 100. The cervix felt firm but the os was dilated to the size of half a crown.

About six hours after admission the bleeding suddenly became very profuse. The patient was given chloroform: the os was dilated by the fingers and then the uterus could be felt to contain a large spongy mass. This was removed and found to be a typical hydatiform mole. During evacuation of the uterus the patient showed symptoms of hæmorrhage. She was given constant intracellular saline: also quinine, pituitrin and camphor, etc. The uterus became firmly contracted. The following day the patient appeared much better and her friends insisted upon taking her home.

A CASE OF ATRESIA OF THE UPPER TWO-THIRDS OF THE VAGINA WITH ABSENCE OF THE UTERUS.

DR. E. W. ADCOCK—MEDICAL OFFICER.

The patient a well-developed Jekri girl name Oluyemi aged about eighteen years was brought to the hospital for examination and operation for "stoppage of the womb."

She was in quite good health, the breasts were normally developed she had periodical monthly backache, but she had never menstruated. Examination showed the external genitals developmentally normal and no appearance of any vulval swelling.

Under an anæsthetic it was found that the vaginal canal was normal for about the lower third and then rapidly tapered off funnel wise until the passage was obliterated, a bimanual examination with two fingers in the rectum revealed the absence of the uterus and that the upper part of the vaginal canal was replaced by a hard seemingly fibrous mass. Treatment had been attempted in the bush by forcible dilation with a stick and by other methods which had left their mark in the form of vulval chancre. The girl's friends were anxious that operation should be undertaken to admit of her functioning to a limited extent, but they were advised to rest content with a clearing up of the chancre with N.A.B. and mercury.

SOME AFFECTIONS OF THE HANDS DUE TO YAWS.

DR. E. W. ADCOCK—MEDICAL OFFICER.

Cases of serious disability owing to scaliness, thickening of the skin and subcutaneous tissues and later of contractures in the palms of the hands often present themselves for treatment in this station (Benin City) and in all of these the condition is traceable to a previous attack of yaws, a disease extremely common hereabouts. For the most part the more advanced cases have been found in adult males who do heavy manual work and the condition has occurred in its most severe form in the right hands of masons, bricklayers and carpenters employed by the Public Works Department in building operations in the station. It has also been noted that in the majority of cases, the eruption in the initial stages of the disease has been stated to have been scanty. The earliest stage of the condition is a simple hypertrophy of the epidermis with scaliness which causes but slight disability, by way of diminution of the sense of touch. This is common in women and children also. An intermediate stage is met, where the thickening occurs not only in the epidermis but extends to the true skin, causing stiffness and limitation of movement, and a difficulty in grasping and maintaining a firm hold of objects. In

later stages the thickening extends to the palmar fascia with subsequent contraction, which ultimately results in flexion of the fingers at the metacarpophalangeal and to a less extent at the interphalangeal joints, causing serious disability and a condition not unlike Depuytron's contraction. In addition, in any of these stages, ganglion formation on the dorsal aspects of the wrist and hand is found, frequently giving rise to considerable pain. For the most part the tendon sheaths themselves do not seem to be much implicated and the condition appears to be a granulomatous infiltration of the subcutaneous tissues of the palm and of the palmar fascia. Treatment is simple and its results gratifying. One, two or at most three injections of 0.45 gm. N.A.B. cause rapid improvement with disappearance of ganglions if present. In the more advanced cases Pot Iodid gr. X t.d.s. is a useful addition whilst for the scaliness and stiffness, massage with a five to ten *per cent.* Ointment of Salicylic Acid in Vaseline (or a similar strength solution of this in palm oil) removes the scales and limbers the hand.

THREE INTERESTING CASES.

(Illustrated by Photographs.)

DR. CLIVE J. SHARP—KANO.

Case 1.—This Pseudo-Hermaphrodite, a native of Katsina Province presents for examination the following points.

Age, five years.

Sex.—Male characteristics predominate.

Physical signs.—No testicle to be detected on the left side. A testicle is to be felt high up in the inguinal canal on the right side. The scrotal sac has a bifid appearance. The penis is quite distinct and fairly well developed. The condition of Hypospadias Penis is present. The opening of the urethra is at the junction of the penis and scrotum. (Peno-scrotal variety).

The patient hates being examined and is slightly mental.

I am indebted to Dr. W. E. McCulloch of Katsina and the Emir of Katsina for sending me this case.

Case 2.—This case is reported as it presents three different Congenital Malformations in the one individual.

The child, a female, aged about four years presents the following points of interest:—

- (a) Hare-lip of the lateral type complicated by a cleft alveolus.
- (b) The eye is represented by a mobile globe, the anterior aspect of which is covered by thin skin. There are no signs of any Cornea, Pupil or Iris. The eyelids are perfectly developed.
- (c) The left ear is represented by two distinct parts an anterior globular mass and a posterior semilunas mass. They are separated by a deep vertical cleft.

Case 3.—This case of elephantiasis of the breast in a Fulani woman is reported because it is far from common amongst the natives of this province. It will be seen from the photograph that the breast reached down below the left hip.

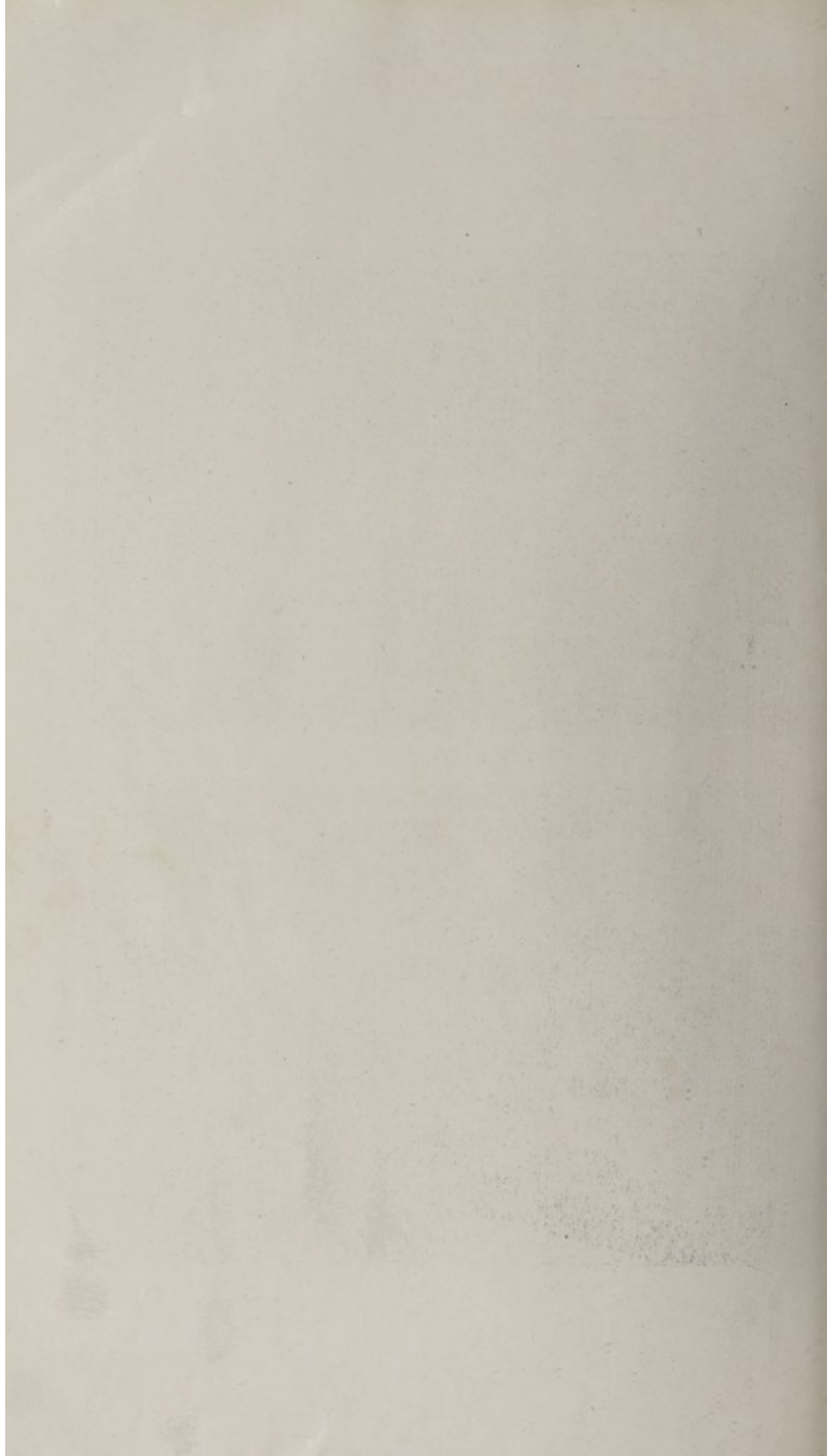
The breast was removed under a general anæsthetic and the patient had an un-eventful convalescence. The right breast was apparently perfectly normal. No micro-filaria were found in the blood.



Case II.—Congenital Malformations.



Case I.—Pseudo-Hermaphrodite.



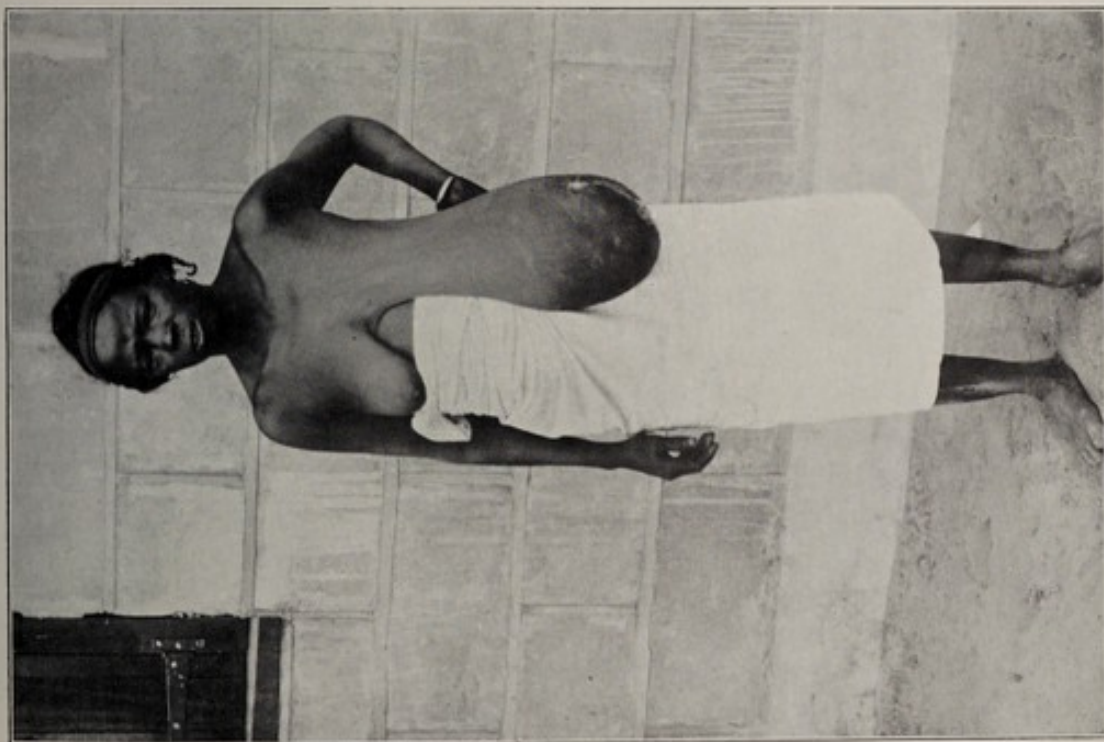
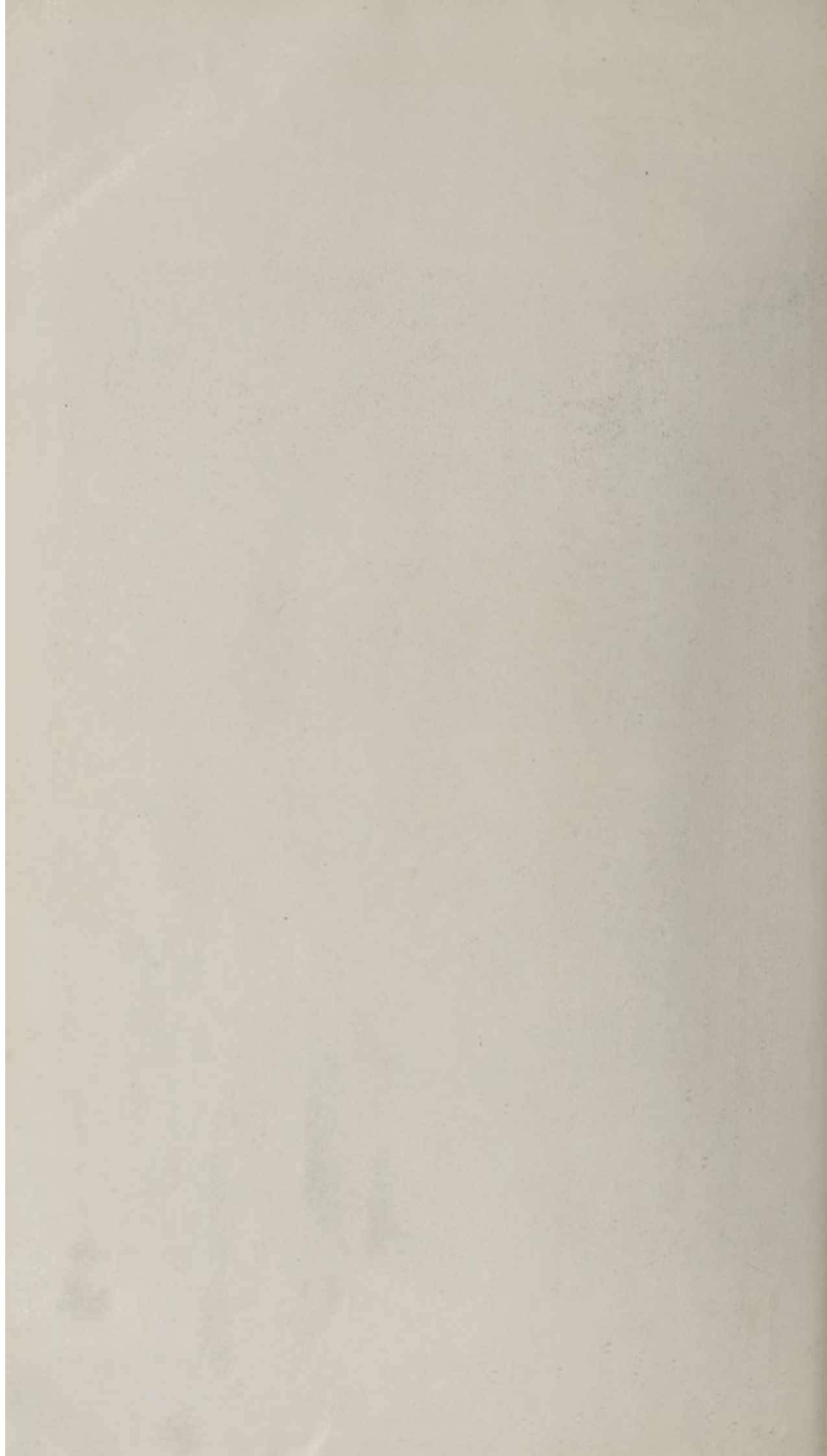


Fig. 1.—Before operation. Case III.—Elephantiasis in Fulani woman.



Fig. 2.—After operation.



REPORT ON CASES OF CLIMATIC BUBO TREATED BY PROTEIN-SHOCK.

BY

DR. R. N. HALL, ZARIA.

The protein-shock was produced by intravenous injection of a mixed typhoid-paratyphoid vaccine. 1 cc. of the vaccine was taken into a 10 cc syringe, and diluted with distilled water five times, and the requisite dose then worked out and injected.

The injections were given every five days.

The first was 50 million organisms. The second 75 million and the third 100 million.

Case 1.—A European aged forty, who had been in this country thirteen years and had been out on this tour eight months was admitted into hospital.

He was complaining of a painful swelling in the left groin. He had noticed it about three weeks and it was gradually getting worse.

On examination the oblique inguinal glands were found to be enlarged and inflamed and adherent to the surrounding tissue. No sign of gonorrhœa or sore on the penis could be found, and no septic focus on the foot or the leg. There was no suggestion of plague or filarial adenitis. The diagnosis of climatic bubo was made.

Treatment.—The patient was put to bed and rested, and on the third evening while in his bath the swelling burst. On the fourth day an intravenous injection of T.A.B. vaccine was given.

Two hours afterwards he had a rigor and complained of severe headache, and four hours after when his temperature was taken it was found to be 101.4.

On the fifth day patient felt fairly fit.

The discharge was much reduced in amount, and the swelling less, and the pain had gone. On the ninth day another injection was given, the reaction was not so great, nor was the improvement in the bubo so noticeable.

On the fourteenth day after admission to hospital a final injection was given with fairly marked reaction.

By this time the swelling in the groin had completely gone down, and there was no sinus, and only a slight thickening remained. The patient was discharged a week later.

Case 2.—A native soldier reported sick.

He was complaining of a painful swelling in his left groin, noticed about two days. *On examination* the oblique inguinal glands were found to be considerably enlarged and tender. No active gonorrhœa could be found, no sore on penis and no other septic focus was found.

He was excused duty for one week, but no improvement took place. The glands were painted with Iodine during this time. He was admitted into hospital and given 100 mill. T.A.B. vaccine intravenously. He had a severe reaction, the temperature rising to 104° two hours after the injection and gradually coming to normal by the next day.

The glands were markedly reduced in size on examination the next day, and the patient said that the pain and tenderness had gone.

Five days later a second injection of 150 mill. was given again followed by a severe reaction, and the glands were again reduced in size. On the tenth day after admission to hospital an injection of 200 mill. was given.

The patient after this claimed to be quite well but he still had slight swelling of the groin glands. He then broke hospital for one night and went to the barracks. He returned the next day with the glands enlarged again and tender and a small discharging sinus. It was then decided to give the injection every other day, so that we might keep him in bed. Four more injections of 250 mill were then given at intervals of one day, and then the patient was discharged, with just slight thickening along Pauparts ligament. This case was rather spoilt by the patient breaking hospital. He was always a difficult patient to control.

Case 3.—A native policeman was kept in hospital for one month with gonorrhoeal arthritis. He was discharged because he appeared to be becoming chronic, and we were short of beds.

The arthritis was localised to the two knees mostly. He was excused duty for three weeks, during which time he just crawled to hospital and back each day.

After the three weeks the arthritis was a little better, but two large buboes appeared in each groin, these were tender and caused a constant throbbing pain. He was admitted into hospital and given 50 mill T.A.B. vaccine intravenously. This was followed by marked reaction and also diminution in the size of the glands. The pain left the glands and also the patient was able to walk better. On the second day another injection was given, also of 50 mill. The reaction was again severe.

The following day the glands were found to be the size of a ground nut, and the patient was able to walk without pain.

These three cases demonstrate the value of protein-shock in chronic swellings of the groin glands, and in chronic arthritis. As regards the groin glands, the most noticeable feature is the improvement the day after the first injection.

A CASE OF CARCINOMA IN AN AFRICAN NATIVE.

DR. P. J. CAFFREY—BORNU.

6th November, 1927.—Male patient, Kabi, a Kanuri, aged about forty years, came to hospital for treatment of a tumor growing from right side of upper lip.

History.—Tumor started about fourteen years ago. Has increased in size a good deal in last two years.

Examination.—Tumor size of a duck's egg with narrowed pedicle at edge of lip. It was ulcerated, very septic, soft in consistency and with a definitely malignant appearance. Cervical glands all enlarged and felt nodular. No other signs of invasion.

16th November, 1927.—*Operation*—Tumor totally excised, removing part of upper lip. Bleeding profuse. Cervical glands untouched.

Section of tumor sent to the Medical Research Institute at Yaba. Dr. Smith reported as follows:—

"This is a splendid example of a polypoid growth showing malignant changes. It is a squamous carcinoma and has infiltrated the mucous gland of the lip. If it has lasted fourteen years I should think it has penetrated to the lymph glands in the neighbourhood. The surface is ulcerated and septic."

31st November, 1927.—Patient seen. Lip wound healed. Cervical glands increased in size, and becoming unmovable.

A CASE OF ANEURYSM OF THE ASCENDING ARCH OF THE AORTA.

DR. P. J. CAFFREY—BORNU.

History.—A W.A.F.F. soldier, Hausa, suddenly died while cleaning his rifle in the fort. He had not previously complained, and was on daily duty.

Post-mortem.—On opening the thorax, bulging of the pericardium was observed. The latter on being opened, was found to be full of bloodclot. When all the blood was washed away, the point of bleeding was found near the commencement of the aorta.

Examination of the heart and big blood vessels revealed a small saccular aneurysm, $\frac{3}{4}$ " in diameter, with an aperture on the aortic wall $\frac{1}{2}$ " in diameter, and situated immediately above the aortic valve. A probe passed through a tiny hole in a depression of the thin walled sac of the aneurysm, entered the pericardial cavity. There was no post-mortem evidence of syphilitic or other casual disease in the aortic wall.

Remarks.—The case illustrates the rule that intra-pericardial aneurysm of the ascending arch of the aorta rarely attains any size, the sac commonly rupturing before marked pressure signs become evident.

MELANOMA OF HEEL.

DR. E. C. BRAITHWAITE—WARRI.

Patient was a Sobo woman aged twenty-seven following occupation of a farmer. She was admitted into Warri Hospital 7th June, 1927, suffering from a large fungating foul-smelling tumour over right heel of over a year's duration: femoral glands enlarged discrete but not tender; liver and spleen not enlarged: no signs of secondary deposits in lung; heart normal; general health fair; growth black almost jet-black in places.

Treatment.—Under chloroform anæsthesia growth widely excised and base well cauterised by pure phenol. Dr. Braithwaite operated.

1st July, 1927.—0.6 gm. Neosalvarsan given intravenously.

28th July, 1927.—Heel almost well—only small area remaining unhealed. Patient insisted upon leaving hospital to-day so had to be discharged. A portion of the growth was examined at Yaba Research Institute and pronounced to be *Melanoma*.

EPITHELIOMA OF CERVIX UTERI.

DR. C. MACKEY—WARRI.

Patient was a Sobo woman said to be forty-six years of age. She looked to be quite sixty, was thin and anæmic. Complained of bloody discharge from vagina and said she was free from pain. Cervix uteri was seat of nodular growth which extended along cervical canal and into vaginal fornices. Growth was fixed to rectum and bladder and much thickening could be felt in lateral walls of vagina.

Treatment.—Growth seemed too wide-spread to admit of removal. It was cauterised with iodo-phenol. After patient had been in hospital sixteen days she suddenly became maniacal and had delusions of persecution and hallucinations of sight. Her relatives took her away from hospital and nothing further has been heard of her.

Diagnosis: *Epithelioma of Cervix Uteri*.

CARCINOMA OF CERVIX UTERI.

DR. E. C. BRAITHWAITE—WARRI.

The patient, a Jekri woman by name Egbaye and a native of the Warri District, was about fifty years of age.

She reported sick at the Warri Hospital on the 31st of March last complaining of weakness and a foul discharge.

She had had five children of whom two died in infancy and the remaining three were alive now.

On examination the woman was emaciated and obviously seriously ill. There was a very foul bloodstained vaginal discharge and the cervix uteri was extensively involved in a hard nodular ulcerating growth which was adherent to the base of the bladder in front and the rectum behind. The body of the uterus did not appear to be invaded. There were no secondary deposits felt in the liver. There were no signs of previous syphilis.

Complete removal of the tumour being out of the question palliative measures were adopted and under chloroform the growth was well curetted with a sharp curette and as much removed as possible and the raw surface was well cauterised with Iodised Phenol.

The patient was discharged from hospital on the 9th of April.

Two pieces of growth were sent to the Director of the Medical Research Institute, Yaba, who was kind enough to report as follows:—

“ Your Diagnosis of *carcinoma* is confirmed.”

NOTES ON A CASE OF GOUNDOU.

BY

DR. E. J. CRAWFORD—MEDICAL OFFICER.

An Ibo native from Abakaliki, district of Ogoja Province, admitted to Enugu Native Hospital in August, 1927. He was an obvious case of Goundou, but of interest on account of the large size of the tumours and the extreme deformity produced. It will be seen from the photographs (Figs. 1 and 2) that the tumour growth involved the nasal and alveolar processes of the maxillæ. Both rami of the mandible were also involved in a similar change. The enlargement of the maxillæ interfered with vision, the patient having to lower his head and look over the tumour masses. There was also double facial paralysis.

Operation.—On account of the large size of the tumours excision on each side was carried out through an incision similar to that for excision of the upper jaw. The mandible, at the request of the patient, was not touched. Little difficulty was met with during the operation, the tumours consisting of fairly spongy bone. Branches of the facial nerve were necessarily sacrificed, but this was of little importance on account of the pre-existing double facial paralysis.

Figs. 3 and 4 show the after result. The cosmetic effect is to some extent spoiled by the bagginess of the skin below the eyes. The naso-labial angle, which was troublesome to reproduce, has been fairly well reconstituted.

AN OUTBREAK OF BERI-BERI IN KANO CITY, CENTRAL CRIMINAL PRISON.

BY DR. F. McGRATH.

Between August 8th, and November 1st, 1927, there were twenty-eight cases with nine deaths.

All these cases were admitted to prison not later than 1926.

A.—The following were possibly predisposing factors:—

(1) *Overcrowding.*—The prison should normally hold about 600, but the average daily resident from May until the outbreak was as follows:—

May	...	...	1,033
June	...	...	861
July	...	...	824
August	...	...	884

It was difficult to deal with the overcrowding as the outbreak occurred during the rains, and building operations could not be carried out, but it will be seen that some reduction in numbers was effected.

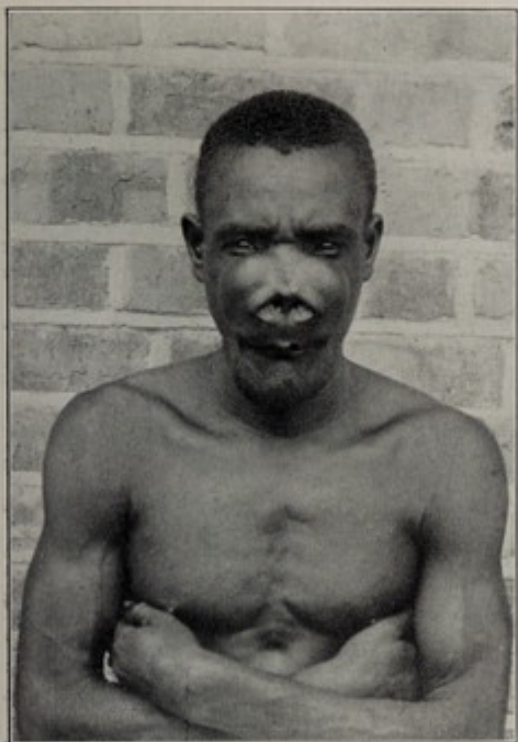


Fig 1.

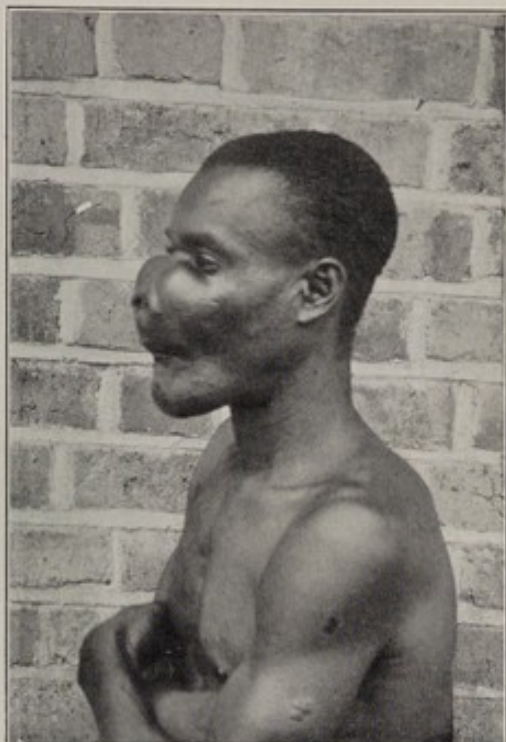


Fig 2.

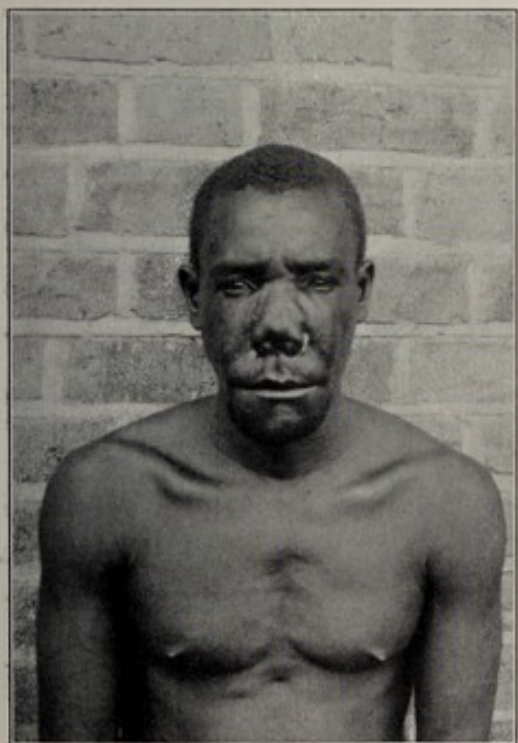


Fig 3.

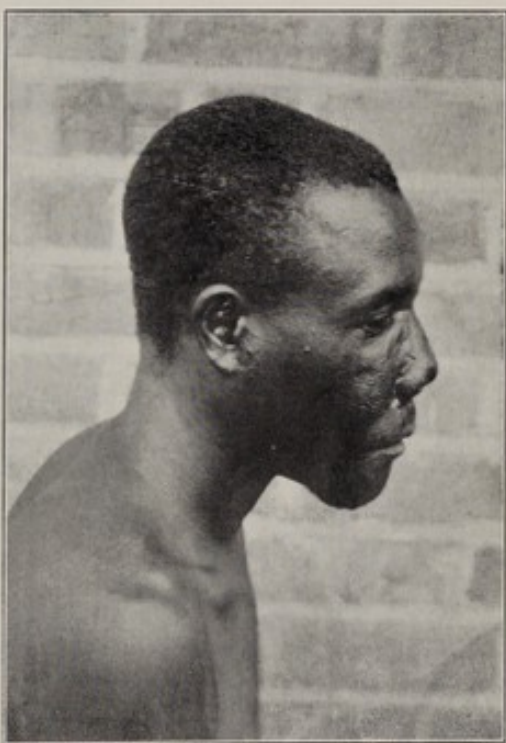
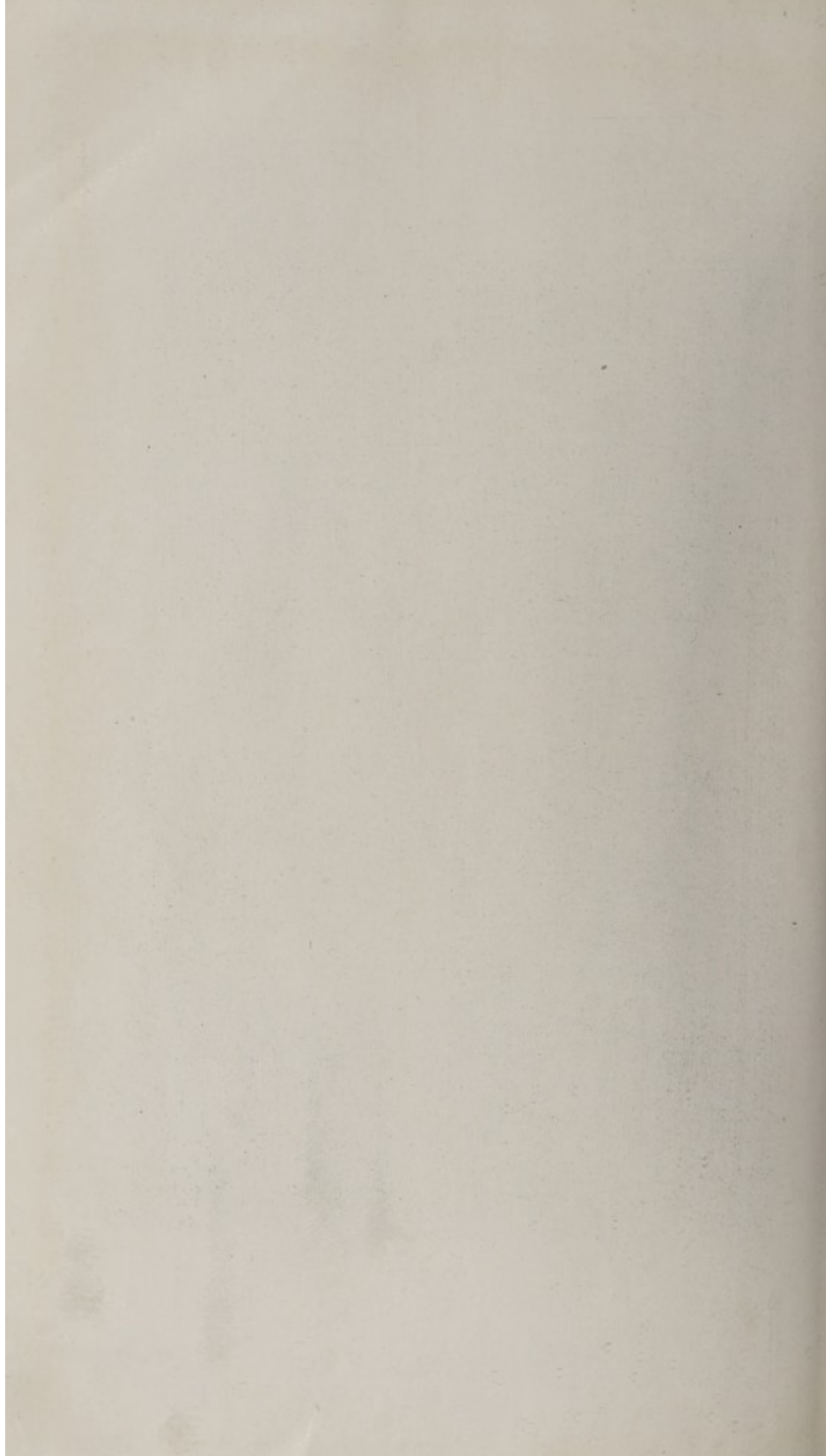
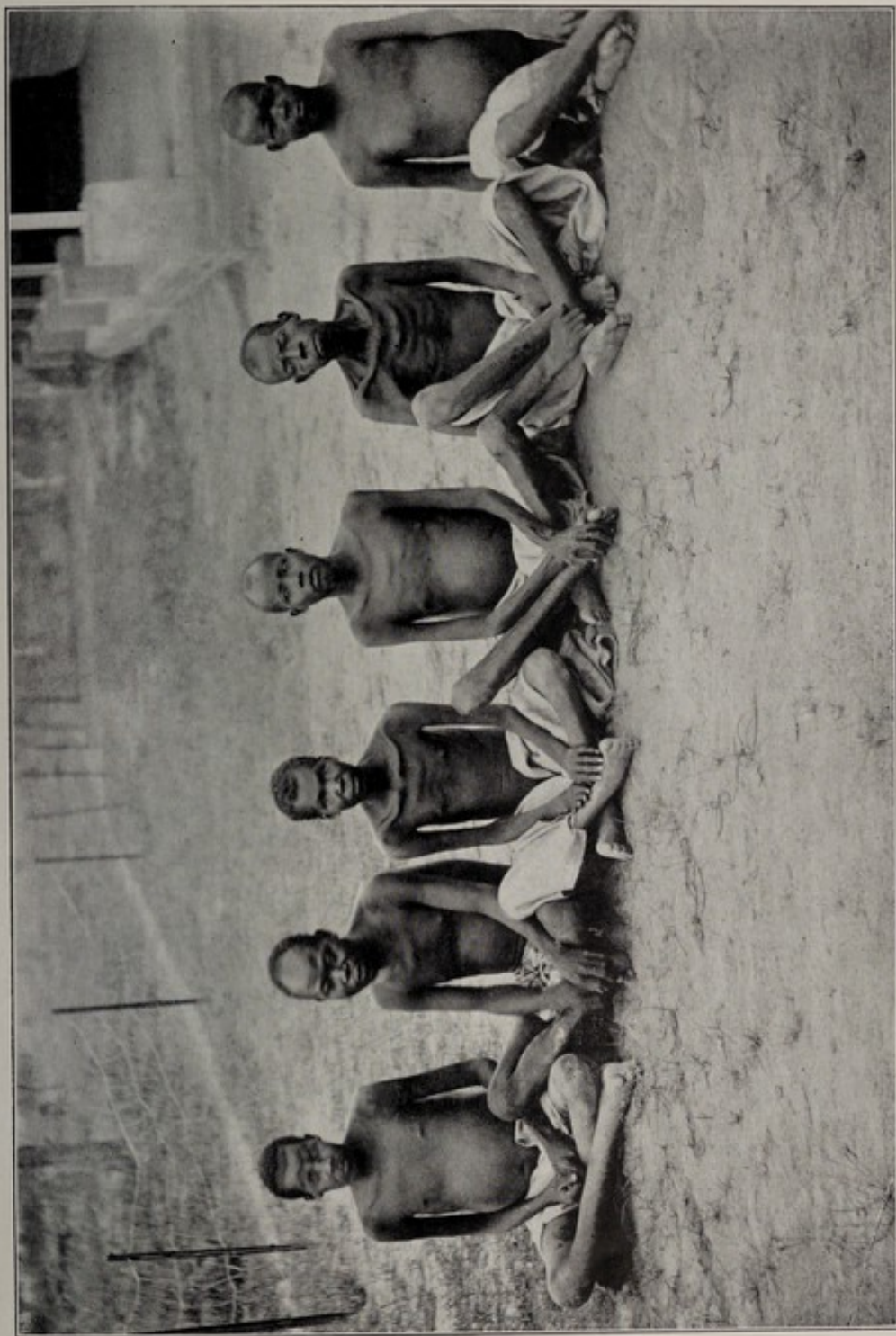


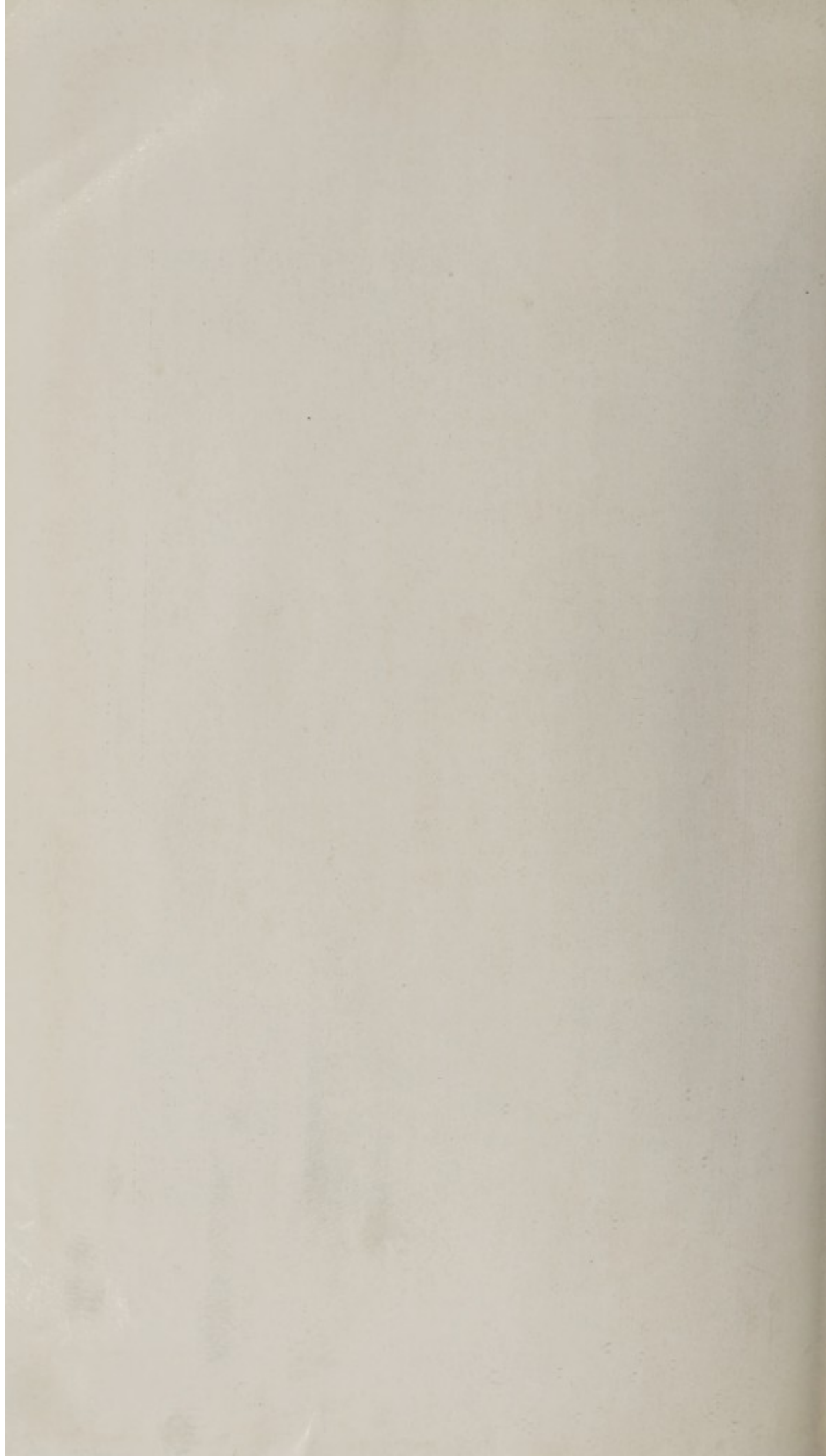
Fig 4.

GOUNDOU.





CASES OF BERIBERI IN KANO NATIVE ADMINISTRATION PRISON.



(2) *Ankylostomiasis*.—Sixteen of the cases had Ankylostomes.

(3) *Diarrhœa and dysentery*.—There was a marked increase in the number of these cases during June and July.

(4) *Fatigue*.—I should say that the prisoners usually do a hard day's work.

(5) *Food*.—Previous to May the usual prison diet per man per day was:—

Guinea corn	...	...	...	1½ lb.
Ground nut oil	...	...	...	½ oz.
Meat	...	...	...	2 oz.
A little salt and pepper.				

Owing to the scarcity of food during May and June, polished rice was used as a substitute for half the guinea corn ration.

The rice issue ceased on June 17th, and the original diet was reverted to.

The diet would seem to be adequate, or at least would not be expected to cause Beri-beri, but the guinea corn was not ground or cooked as well as it might have been, and possibly the quantities were not always strictly accurate.

B. *Symptomatology*.

(1) Oedema of the ankles, dorsum of feet and skins first attracted notice. Puffiness under the eyes and ascites developed later. Some cases had irregular patches of œdema on the limbs and body, and others resembled acute nephritis.

Fluid also appeared in the pericardial and pleural cavities.

(2) There was difficulty in walking, sensation of heaviness in the lower limbs, and a few patients complained of cramps.

There was marked tenderness on pressure over the calf muscles, and two cases developed foot-drop.

(3) Knee jerks were sluggish or absent in the later stages, partial anæsthesia over the œdematous areas, and in the upper limbs marked loss of power of grip. Wasting of muscles was partially obscured by the œdema, but the fluid rapidly disappeared in some of the cases, revealing a shrunken, emaciated condition and wasted muscles.

(4) Palpitation and dyspnœa were present in all cases. Heart sounds were irregular and almost inaudible, and murmurs and dilation were frequent.

(5) The blood showed a secondary anæmia, with a few malarial parasites.

(6) The urine was diminished and albumen absent.

(7) The ages varied from about thirty to forty-five years.

(8) The fatal cases developed diarrhœa five or six days before death.

C. After the occurrence of the first few cases the number of prisoners was reduced by about 200.

August 13th.—Five days after the occurrence of the first case, ground nuts were added to the prison diet. In September, instead of getting 1½ lb. of guinea corn each, 1 lb. of guinea corn and ½ lb. of millet in the form of Kunu was given.

In October beans were added.

D. *Treatment*.

All were given Oil of Chenopodium for the Ankylostomes. Iron, Arsenic, Malt and Cod Liver Oil were given. Digitalis was tried in a few cases where the heart condition seemed to indicate it, but without much effect.

(2) *Diet*.—In addition to the ordinary prison diet of guinea corn, millet, beans, ground nut oil, ground nuts and meat—the Beri-beri cases got fresh milk and eggs.

So far no more cases have occurred since November 1st, 1927.

ACRIFLAVINE IN GONORRHOEA.

J. P. NAUDI, M.D., B.SC.

At the beginning of May this year I started treating cases of gonorrhœa with intravenous injections of acriflavine. In no case was local treatment by irrigation instituted concomitantly with the intravenous injections.

My first case was given 5 cc. of a 2% Sol. of acriflavine on alternate days; the patient received nineteen injections but the urethral discharge was just as profuse after the last injection as it was before treatment was commenced. On admission to hospital he was also suffering from gonorrhœal orchitis and this resolved after the eighth injection without any local treatment. The result on the whole was not very encouraging and after a period of disillusionment I decided to increase the dosage in my subsequent cases and finally I found that I could give 10 cc. of a 2% sol, daily, with no untoward effects in fully developed adult Africans.

In all thirty-seven cases were treated and they received a total of 2,749 cc. the number of injections amounting to 328. The results on the whole were very satisfactory: twenty-five were cured five improved, and seven showed no improvement or treatment was abandoned for various reasons. The cost of acriflavine used in treating these cases amounted to £5 10s.

The urethral discharge was examined microscopically before treatment and the cases fell into three categories: the first group showed abundant gonococci both intra and extra-cellular, few urethral cells, and scanty staphylococci; the second group showed few gonococci, abundant urethral cells and an increase of staphylococci; these two groups formed about 85% of the cases; the third group showed no gonococci or just a few, an abundance of urethral cells, and enormous numbers of staphylococci. In this last category the condition was more of a super-imposed staphylococcic than of a gonorrhœal urethritis.

The following are the three groups expressed in a concise and schematic form:—

	Gonococci.	Urethral Cells.	Staphylococci.
Group I 	+ + +	+	±
Group II 	+	+ +	+
Group III 	±	+ + +	+ + +

I cannot say whether acriflavine treatment was more effective in one group of cases than in the others.

The patients seemed to tolerate the drug very well: after a few injections they all showed a slight yellowish discoloration of the ocular conjunctiva and a good percentage complained of mild dyspepsia or constipation. Nearly all noted a burning sensation of the throat immediately after the injection. In only one case did I have symptoms of intoxication. A bullous dermatitis developed after the eighth injection; the bullæ were on the dorsal surface of both hands and lower dorsal surface of both forearms, regions constantly exposed to the action of the sun-rays. The patient, a European, was having his injections daily at 10 a.m. and I did not take the precaution of requesting him to use a jacket during the day, and to remain under cover away from the sun-light during treatment. Acriflavine is very heliotropic and the skin

of Europeans during treatment is very photo-sensitive. Consequently I think it is advisable for Europeans under treatment with acriflavine to avoid the sun-light, to wear jackets during the day, and to receive their injections after 4 p.m. these precautions are obviously not necessary for Africans as their cutaneous pigment hinders the sun-rays from reaching the acriflavine circulating in the capillary blood vessels of the skin.

CONCLUSIONS.

1. Acriflavine intravenous injections alone are capable of stopping the urethral discharge after a variable number of daily injections.

2. Dosage recommended is 10 cc. of a 2% watery solution and the patient should receive at least three to four injections after the discharge has stopped.

3. Europeans should have special precautions as regards dosage, time of injection, wearing of clothes and exposure to sunlight.

4. Though this method does not supersede local treatment by irrigation, etc., I think it is the method of choice for such complications as orchitis, arthritis, rheumatism, and posterior urethritis.

5. There is no need to inject the drug slowly or to neutralise it by aspiration of blood into the barrel of the syringe as recommended by some authors. Endophlebitis never occurs even after rapid injection and the time of actual injection need not take more than ten seconds.

PARTICULARS OF THIRTY-SEVEN CASES OF GONORRHOEA TREATED BY ACRIFLAVINE INTRAVENOUS INJECTIONS.

Serial No.	No. of Injections.	Amount in c.cs.	Period in Days.	Result.
1	19	118	43	Nil.
2	6	35	11	Cured.
3	6	45	6	do.
4	18	165	25	Improved.
5	9	75	20	Cured.
6	15	135	29	Improved.
7	6	45	6	Nil.
8	10	85	22	Cured.
9	6	45	6	do.
10	6	45	6	do.
11	6	45	6	do.
12	6	45	6	do.
13	10	85	22	Improved.
14	6	45	6	do.
15	6	45	6	Cured.
16	10	85	22	do.
17	6	45	6	do.
18	9	75	21	do.
19	6	45	6	do.
20	6	45	6	Nil.
21	17	155	34	Cured.
22	6	45	6	do.
23	6	45	6	do.
24	9	75	20	Improved.
25	16	145	30	Cured.
26	6	45	6	Nil.
27	11	110	24	Cured.
28	6	60	6	do.
29	8	80	8	do.
30	6	60	6	do.
31	8	83	8	Nil.
32	4	35	4	Nil.
33	13	130	13	Cured.
34	9	72	9	do.
35	8	80	8	do.
36	14	86	14	Nil.
37	9	90	9	Cured.

REMARKS:—"Cured" means no urethral discharge after suspension of treatment.

Case 1.—Complicated by orchitis which resolved after eight injections.

Case 7.—Treatment unavoidably interrupted.

Case 20.—Treatment unavoidably interrupted.

Case 26.—Treatment interrupted owing to the small calibre of veins.

Case 31.—Bullous dermatitis developed after eighth injection. Treatment abandoned.

Case 32.—Treatment stopped owing to small calibre of veins.

Case 33.—Case complicated by gon. rheumatism. Pain and swelling disappeared after five injections.

Case 36.—Case relapsed after discharge had completely disappeared. Relapse due to alcoholic excesses.

ANNUAL REPORT OF THE PORT HEALTH OFFICER, LAGOS.

Through-out the year 1927 the work of the Port Health Officer in Lagos has continued but slightly more than in 1926. Through the actual construction of the new dock building at Lagos and the completion of the new dock building at Lagos, the Port Health Officer has been able to carry out his duties more easily than in 1926. The new dock building at Lagos is considerably larger than that at Lagos, and the new dock building at Lagos is having the building work done as a separate building, which will allow of a more complete inspection being carried out when necessary. The new dock building at Lagos is expected to be completed by the end of 1928, and will be in a state of readiness for the work which will be carried out in the rapid advance of the port of Lagos.

At the end of the year 1927 the work of the Port Health Officer consisted of

- The Port Health Officer
- Two European Sanitary Inspectors
- One European Sanitary Inspector
- One Native Sanitary Inspector
- Four Native Sanitary Inspectors
- Eight Native Sanitary Inspectors
- One Veterinary Officer

APPENDIX H.

ANNUAL REPORT OF THE PORT HEALTH OFFICER, LAGOS, 1927,

BY

G. B. WALKER, M.B., CH.B.,
Port Health Officer.

APPENDIX H

ANNUAL REPORT OF THE PORT HEALTH OFFICER,
LAGOS, 1927.

BY
G. B. WALKER, M. A., C. M. A.,
Port Health Officer.

ANNUAL REPORT OF THE PORT HEALTH OFFICER, LAGOS.

Throughout the year 1927 the routine of the Port Health work in Lagos has differed but slightly from that adopted in former years. Though the actual construction of the new disinfecting station at Apapa was completed towards the middle of the year, the building is not yet ready for occupation, as electric light and other installations have still to be provided. All control of sea-going passengers has therefore as previously been carried out from the Lagos station. The new building is considerably larger than that at Customs Wharf and differs from the latter in having the fumigation chamber as a separate building, which will allow of cyanide fumigation being carried out when desired without danger or inconvenience to people in the vicinity. It is expected that the new station will be available for use early in 1928, so that one will be in a state of preparedness for the changes which are certain to follow the rapid advance of development at Apapa.

STAFF.

At the end of the year under consideration the Port Health Staff consisted of:—

- The Port Health Officer.
- Two European Sanitary Inspectors.
- One European Rodent Inspector.
- One Native Sanitary Inspector.
- Five Native Sub-Inspectors of Sanitation.
- Eight Native Rat-Catchers.
- One Vaccinator.
- Two Female Attendants (one part-time).
- One Caretaker (Quarantine Station).
- Two gangs Labourers (usual strength twenty).

It will be noted that no apprentice mechanic is now employed to run the Clayton Machine, this work being carried out quite satisfactorily by one of the labourers under supervision. The Caretaker is the only permanent employee at the Quarantine Station extra labour, cook, nurses, etc., being engaged temporarily when required.

INFECTIOUS DISEASE IN OUTSIDE PORTS.

Infectious Disease was notified as having occurred in the following places:—

Plague.—*Las Palmas*—12th January, 1927; 14th February, 1927; 14th October, 1927; 20th October, 1927; and 2nd December, 1927.

Teneriffe—12th January, 1927.

Azores—11th January, 1927.

Cape Verde Islands.

La Laguna—17th June, 1927.

Benguela—23rd December, 1927.

Yellow Fever.—Cases of this disease have been fairly numerous in neighbouring countries during the year. A list of countries affected and the number of cases is given hereunder. The largest epidemic occurred in Senegal, and fairly large outbreaks were also reported from the Gold Coast. In the case of both countries the outbreaks called for special preventive measures in Lagos. All vessels entering this harbour from those places were detained at the quarantine anchorage where a thorough medical inspection was carried out, and any vessels arriving in this port within the yellow fever quarantine period were required to carry out all loading and discharging of cargo at the said anchorage until the period expired. No cases of this disease were imported into Lagos.

Areas affected.

Dahomey	...	...	3 cases.		
Gambia	...	...	2	„	
Gold Coast	...	...	110	„	
Ivory Coast	...	...	3	„	
Liberia	...	...	5	„	
Senegal	...	...	182 cases :—	Dakar	80
				Goree	4
				Rufisque	5
				St. Louis	2
				Other Districts	91
Togoland	...	...	12 cases.		

(One cannot guarantee the accuracy of the figures shown in the case of Senegal, as reports up to the end of the year have not yet been received).

Smallpox.—Accra ... 10 cases notified, 9th March, 1927.

Tarkwa ... 1 case notified 27th September, 1927.

GENERAL MEASURES TO PREVENT IMPORTATION OF INFECTIOUS DISEASE.

All vessels arriving in Lagos were boarded, Bills of Health scrutinised, answers to questions in the Quarantine Schedule verified, all sick persons examined, and all Deck Passengers,—and, where considered necessary, members of the crew and saloon passengers,—were inspected. Notices under Regulation No. 14 of the Regulations made under the Quarantine Ordinance, 1926, were served on all matters and the provisions set out therein *re* rat-guards, etc., were rigidly enforced. All unprotected deck passengers were vaccinated against smallpox. A thorough inspection of all vessels from plague-infected ports was carried out, and the rat-catching gang operated on all such shipping, all rats caught being forwarded to Ereko Dispensary for bacteriological examination. The manifests of all such ships were scrutinised and all cargo capable of carrying rats was discharged under supervision.

INFECTIOUS DISEASE IN LAGOS.

Throughout the year 155 cases of Plague were notified as having occurred in the town of Lagos. No cases occurred in harbour craft or in the vicinity of any of the wharves.

From 1st January until 13th February all deck passengers leaving the port were subjected to isolation and observation at the Quarantine Station for a period of five days prior to embarkation, all baggage being fumigated at that station. All African Saloon passengers were kept under surveillance for a similar period. During the remaining months of the year no isolation was enforced but all Africans were required to report at the Customs Disinfecting Station on the day of sailing, when medical examination, vaccination against smallpox, disinfestation of clothing and persons, and fumigation of baggage were carried out as routine measures.

Further preventive measures adopted included the fumigation of harbour craft, regular trapping of rodents on foreshore and shipping, and the supervision of canoe traffic. This latter measure was carried out by members of the Plague Staff, whose duties included the inspection of passengers, crew and cargo, with a view to preventing transportation of sick persons, dead bodies and rat-infested cargo by canoe. The rat-catching gang trapped 7,550 rodents during the year, 847 on shipping

and 6,703 on the foreshore, and, of these, two caught in the neighbourhood of Ijora Wharf were found to be plague-infected. As in the previous year, rat traps were issued to the masters of local craft, branch boats, colliers, etc., and 223 rats were caught on these vessels. 206 rats were recovered after fumigation of vessels in the harbour. Thus the total rodents killed in the port area amounted to 7,979, of which only two were found on examination to be infected.

YELLOW FEVER.

Four cases of yellow fever were reported to the Lagos Port Health Office during 1927, only three of which actually occurred in the town itself. No case occurred in the harbour area, a point of interest and satisfaction when one remembers that in past outbreaks of this disease numerous cases of infection have occurred in harbour craft and in houses adjacent to the wharves and foreshore.

Throughout the year careful inspection of all native passengers travelling to and from Lagos has been carried out in the hope of detecting possible chronic cases and carriers of this disease in the African population. From time to time suspects showing some degree of pyrexia associated with albuminuria and icterus have been selected for further investigation by members of the Rockefeller Yellow Fever Commission. In quite a number of such cases blood has been withdrawn and injected into Rhesus monkeys at the Yaba Rockefeller Laboratories, but so far none of the subjects investigated have shown any sign of infectivity.

Systematic inspection of harbour craft, wharves, dockyards and foreshore has been carried out as in recent years with the object of restricting mosquito breeding as much as possible. One European and three African Sanitary Inspectors are constantly engaged on this work, the former being responsible for regular survey of the harbour craft, the latter carrying out inspection of foreshore, canoes, etc. Seventy cases of breeding in lighters and other craft were revealed during the year, *Aedes Argenteus* being the type most frequently discovered. Prosecutions have been carried in all cases in privately-owned craft, and whenever breeding was found in Government Vessels the Marine or Harbour Works Departments were notified in order that departmental action might be taken. Towards the latter part of the year considerable improvement in the state of Marine Department craft has been noticeable following an increase in the severity of punishment meted out to persons guilty of neglect leading to mosquito breeding in bilges, etc. One must remark upon the gratifying improvement in the condition of Company-owned craft which has been demonstrated during the year, resulting from helpful cooperation on the part of the firms concerned. As in former years oil has been issued from this office to other departments for anti-mosquito purposes. It is hoped that before the onset of the next rainy season an adequate supply of sprays will be obtained by the Marine Department for use on their vessels. The acquisition of sprays will not only increase the efficiency of oiling, but, owing to the prevention of waste which must follow the adoption of this method of application, will undoubtedly lead to a very marked reduction in the quantity of oil used.

SMALLPOX.

In the first half of the year thirty-two cases of smallpox were reported in Apapa and Lagos, but active measures taken by the Town Health Authorities effectively prevented any serious outbreak of the disease. The routine vaccination carried out in former years upon all unprotected deck passengers was continued during 1927.

BILLS OF HEALTH.

It may be noted here that commencing on 25th January of the past year a new form of Bill of Health (specimen copy attached to this report) has been issued at this port to all ocean-going vessels. The old form gave very little information about the state of health in the port, no details as to number of cases of infectious disease being noted thereon. In the new bill full and detailed information is furnished as to the number of cases of infectious disease for the year and for the week preceding the date of issue. The form also gives information *re* the number of rodents examined and found infected and details of precautions taken by vessels during their stay in the harbour are also shown.

INFECTIOUS DISEASE ON BOARD VESSELS ARRIVING IN LAGOS.

Two instances of epidemic disease on board vessels arriving in this harbour are deemed worthy of record, and details are supplied here below.

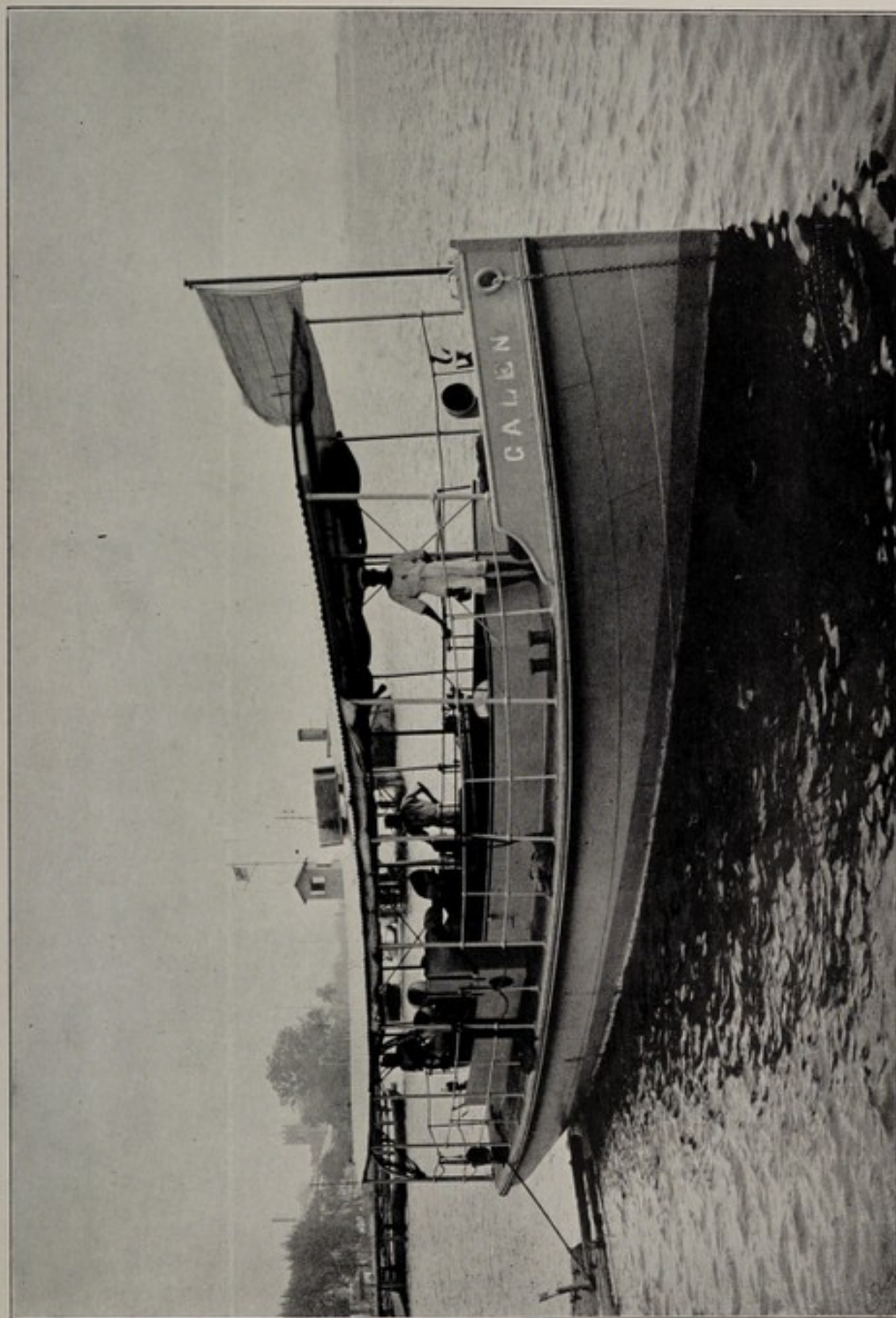
S.S. Capafric:

The above vessel, of gross tonnage 4,120 belonging to the Weir-Venture Steamship Line came to Lagos from Duala for fumigation on account of infection with bubonic plague, five cases of which disease had occurred during the fortnight preceding her arrival. This vessel arrived at Lagos on 30th August, 1927, and was conveyed to the Quarantine Anchorage where she remained throughout her stay in the port, strict isolation being maintained from first to last.

Enquiry elicited the information that the first case had occurred in a European steward, the other cases being Krooboyes. The first case occurred on 18th August, 1927: the final case was found on the morning before arrival. It seemed obvious that the infection was centred round the storeroom, as the labourers were housed in its vicinity and the only other member of the crew who had occasion to visit the store was the affected steward. This assumption was further justified by the discovery of a number of decomposed and mummified rats in bales of fodder lying in the storeroom (presumably victims of plague).

On arrival there were no infected persons on board, all having either been buried at sea or removed to hospital at Duala the vessel's last previous port of call. Inspection of all members of the crew was carried out daily and strict isolation of the vessel was maintained, police guards being posted on board. The crew, who had all been given an injection of 20 ccs. anti-plague serum at Duala by the French Authorities, were given a further protective dose of 1 cc. plague vaccine. On the day of arrival rat traps were set and the fore-castle, saloon and all cabins, were sprayed with kerosene. The entire ship was fumigated with Clayton gas on the day following, the motor fumigating barge "Galen" being engaged on this operation for about 7½ hours. A concentration of 3% gas was reached in all parts of the vessel and was maintained for five hours in the sleeping compartments and left overnight in the holds. On inspection after fumigation thirty-two dead rats were recovered, but this number cannot be held to represent the total "kill" because thorough search of the holds and 'tween-decks was dangerous and impossible owing to the delapidated and broken-down condition of most of the ladders and decks. On the next morning the storeroom was thoroughly cleaned out, all bales of fodder and other rubbish being destroyed by burning, after which this compartment was again fumigated with sulphur. The main decks were sprayed with carbolacene and scrubbed down.

Observation with isolation was continued for a period of ten days, after which the vessel cleared for Point-Noir. It is understood that no further case of plague has since occurred on the ship.



CLAYTON FUMIGATION BARGE.



H.M.S. Lowestoft:

The *H.M.S. Lowestoft* was boarded on the evening of 16th December when she arrived in Lagos Roads with twenty-one cases of Influenza on board. All affected persons had been isolated on board, and except for one case which developed a fatal broncho-pneumonia, the disease ran quite a mild course without serious complication.

The warship anchored in the Pool and remained there throughout her visit to Lagos. All shore leave was disallowed until 21st December, on and after which date restricted leave was commenced subject to the examination by the ship's surgeon of all liberty men prior to their proceeding ashore. No cases developed after the ship's arrival.

SULPHUR FUMIGATION.

The new self-propelled fumigation barge "Galen" arrived in Lagos on January 10th. Supplied by the Clayton Fumigation Company, this barge is thoroughly equipped in every way and is an extremely valuable addition to the sanitary armature of the port. She has a displacement of sixty-one tons and is propelled by two 30 H.P. Kelvin Engines with a speed of 10 knots. A third Kelvin Oil Engine of 7 to 8 h.p. is installed for driving the blower of the Clayton Machine. Sleeping accommodation is provided for the native crew, four bunks being fitted, and ample provision for stores has been made. The fumigating machine is a Clayton Type "B" Model capable of transmitting 250,000 cubic feet of gas per hour.

Unfortunately it has been found that in this climate the ordinary wrought iron armoured flexible hose supplied very soon corrodes, due to the action of the sulphur oxides associated with excessive atmospheric humidity. For the first five months or so all went well, eleven steamships and a number of lighters being fumigated during that period with excellent results, but thereafter the pipes began to show loss of flexibility and very soon more than half were rendered unfit for use. A specimen of corroded pipe was submitted to the Government Analyst who reported that the scale consisted principally of ordinary iron rust and magnetic oxide of iron. The question was raised as to the possibility of steam having access to the interior of the pipes, as the presence of steam would account for the extreme rapidity of the corrosion; but the only sources of moisture are the atmosphere and the sulphur. It may be mentioned that treatment of the pipes with lime solution as advised by the makers has been regularly carried out since the machine was first brought into action. At the suggestion of the Analyst experiments are being carried out with various grades of canvas hose treated with a variety of bituminous preparations in order to discover if possible some suitable less expensive material for the construction of gas pipes. The Clayton Installation Company are very kindly supplying several lengths of tinlined copper hose which will be fitted along with several new wrought iron pipes in order to compare their suitability for use under existing climatic conditions.

It may be added that the results of fumigation with the new barge have been absolutely satisfactory.

CYANIDE GAS.

Further experimental work in fumigation with Zyklon B gave every satisfaction, and in future it has been arranged to import quarterly supplies of this fumigant. The method, though danger is extreme and great caution essential, is extremely simple and easy to carry out. It entails considerably less labour and working time than any other method of fumigation employed in this country, and appears to be quite

as efficient as any other mode of cyanide application. It will be possible to give more details and data of this modern HCN method in the next annual report.

Whilst on leave during 1927, Mr. S. Harvey, European Sanitary Inspector, attached to the Lagos Port Health Staff, underwent a course of instruction in Cyanide Fumigation of vessels with the Port of London Sanitary Authority and the Orient Steamship Company. Zyklon B was the fumigant of choice and Mr. Harvey acquired considerable experience in the fumigation of vessels, large and small, by this method.

STEAM DISINFESTATION.

As in the past, Leleans Sack Disinfectors were employed for the disinfection of passengers' clothing and gave the usual satisfaction, the clothing of 14,776 deck passengers being dealt with by this method.

The following articles were dealt with in the Thresh Disinfector :—

Blankets.	Pillows.	Mattresses.	Curtains.	Cane Chairs.
437	572	281	26	4

PORT HEALTH RETURN FOR THE YEAR ENDING 31st DECEMBER, 1927.

OCEAN-GOING SHIPPING.

No. of Vessels entering the Port	...	...	...	...	711
No. of Vessels leaving the Port	...	...	...	...	712
No. of passengers examined	...	...	...	...	27,014
No. of passengers vaccinated	...	...	...	...	17,006
No. of passengers inoculated	...	...	...	...	—
No. of passengers under observation	...	...	...	...	765
No. of passengers under surveillance	...	...	...	...	84
No. of ships' crew vaccinated	...	...	...	...	—
No. of ship's crew inoculated against plague	...	...	...	...	85
No. of ships' crew under observation	...	...	...	...	85
No. of passengers disinfested	...	...	...	...	14,776
No. of kits fumigated	...	...	...	...	14,776
No. of ships fumigated	...	...	...	...	14

CRAFT, LAGOS HARBOUR.

No. of lighters fumigated	...	...	...	...	29
No. of craft permanently stationed in Lagos	...	...	...	...	189
No. of inspections carried out	...	...	...	...	5,225
No. of craft dirty	...	...	...	...	393
No. of craft with mosquito larvæ	...	...	...	...	70
No. of canoes inspected	...	...	...	...	23,368
No. of canoe passengers inspected	...	...	...	...	177,873
No. of canoes dirty	...	...	...	...	3,601
Canoes destroyed or removed	...	...	...	...	112

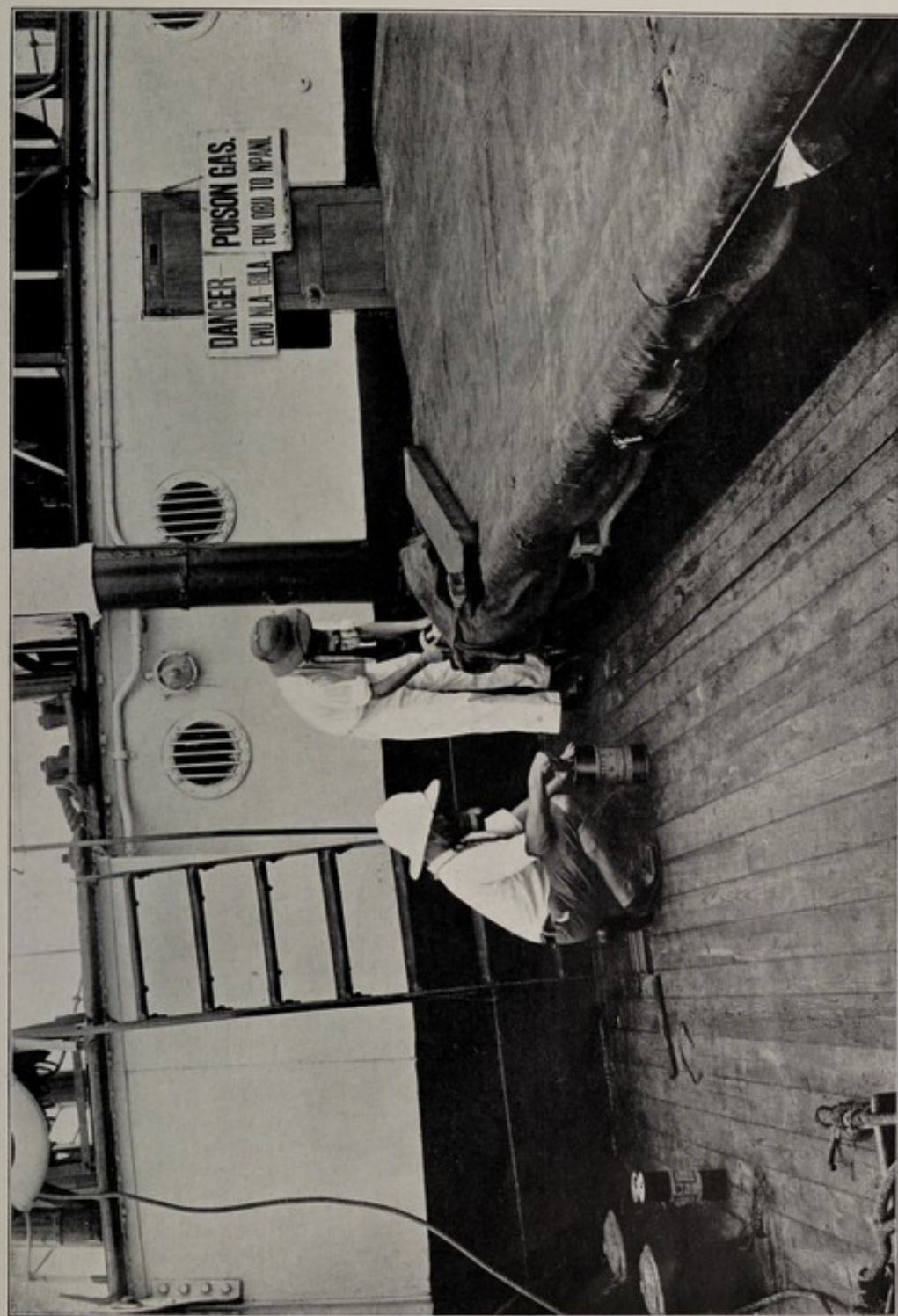
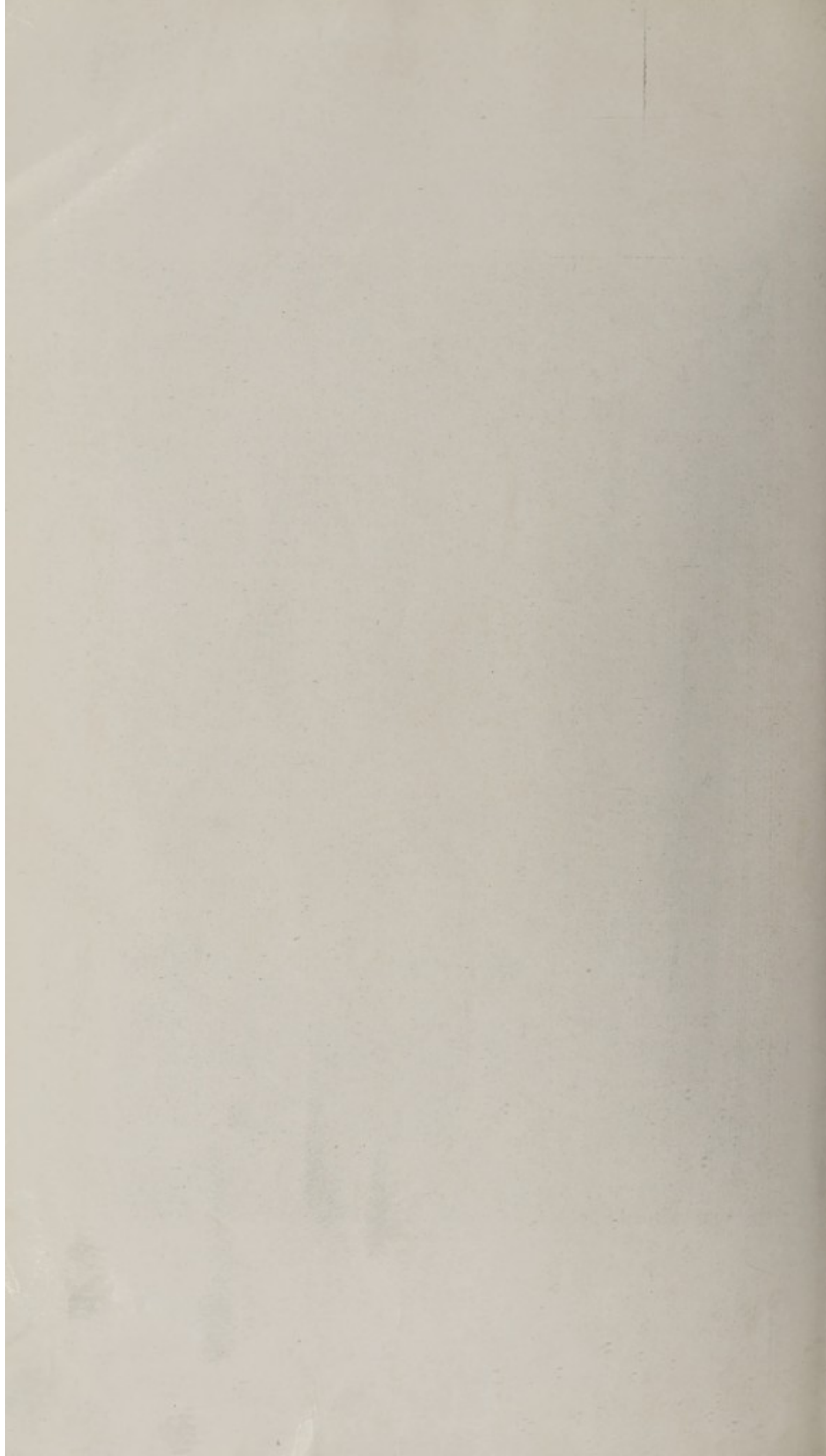


Fig 1.—FUMIGATION WITH ZYKLON B.



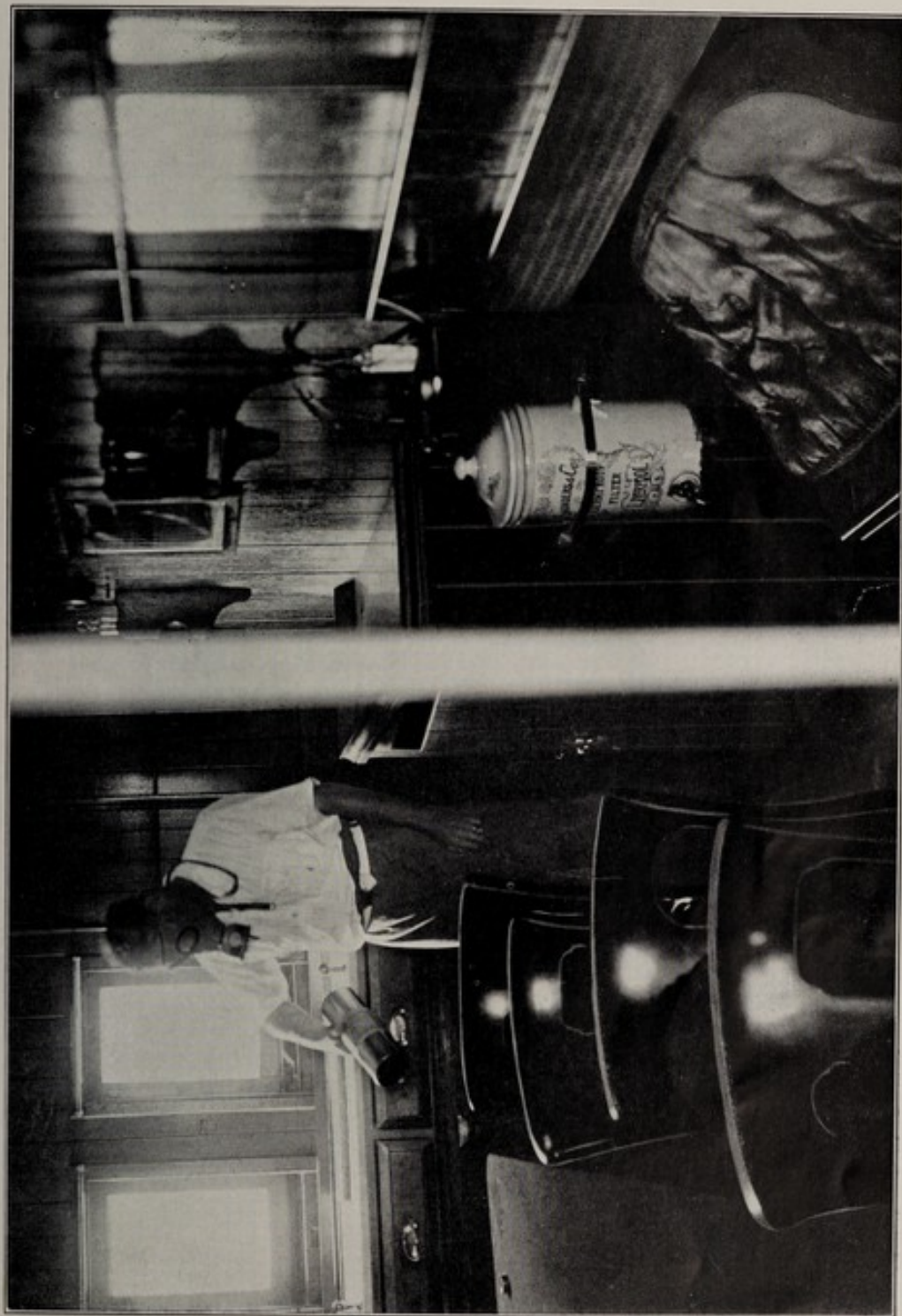
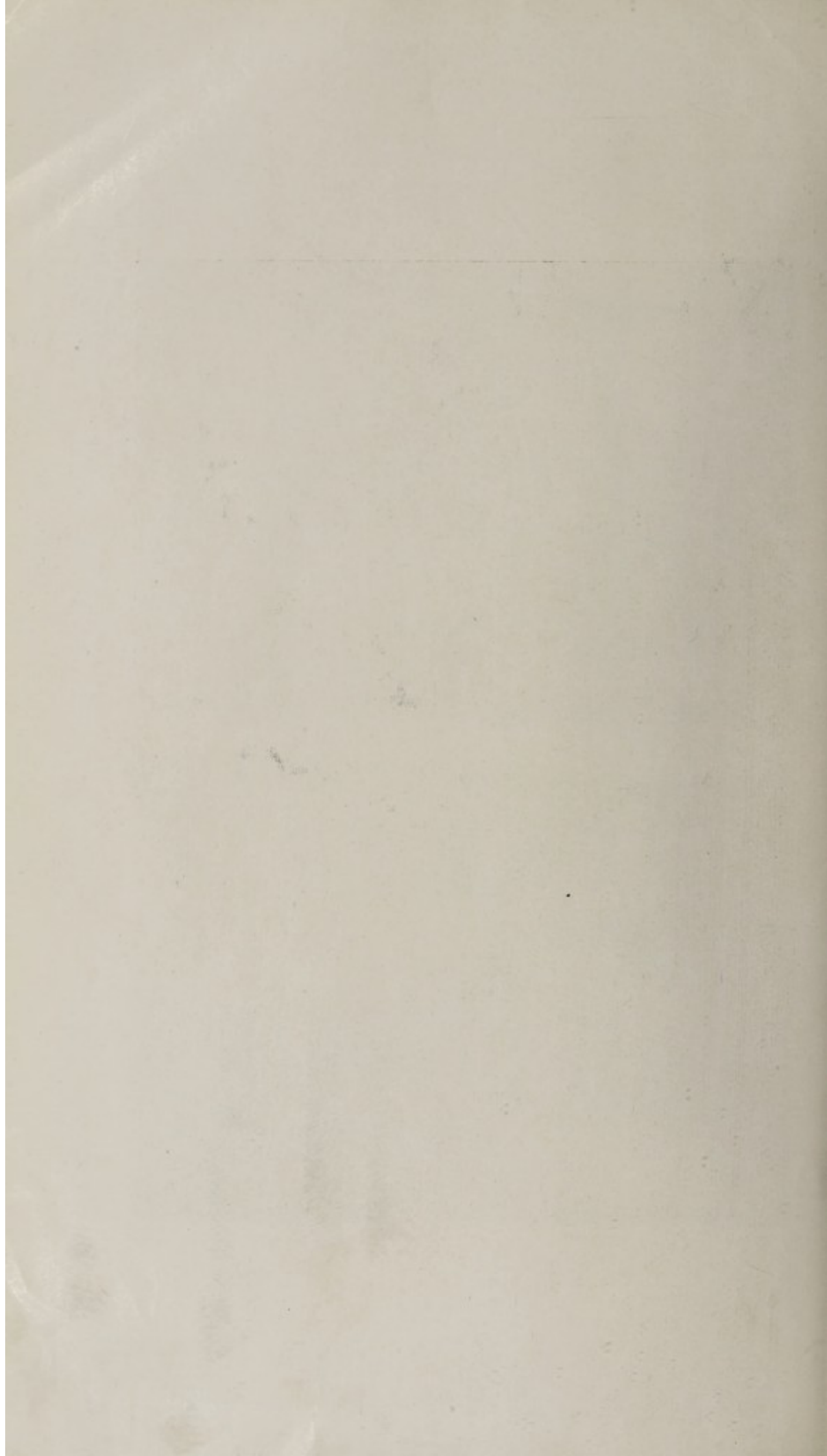


Fig 2.—FUMIGATION WITH ZYKLON B.



SANITATION FORESHORE.

	Inspected.	Oiled.	Dirty.	Larvæ.
Tanks	345	6	43	3
Barrels	2,945	—	253	10
Catch pits	220	3	12	6
Drains	1,628	10	261	13
Compounds	840	—	64	13

ABATEMENT NOTICES, ETC.

No. of written notices	85
No. complied with	79
Total prosecutions	40
Total convictions	33
Total Fines	£13 5s. 0d.

RODENTS.

Trapped by Rodent Inspector on ships	847
Trapped by Rodent Inspector on Foreshore	6,703
Trapped by crews on colliers, etc.	223
Recovered after fumigation	206

G. B. WALKER,
Port Health Officer.

SPECIMEN FORM OF BILL OF HEALTH.

Issued at the Port of
 Name of ship.....
 Name of Master.....
 Where, and date when ship last disinfected or deratted.....

Past History of Ship.

First port of present voyage.....
 Date of leaving first port.....
 Ports called at on voyage.....

Infectious disease on board during voyage to date:—

Plague.....	Cases;.....	Deaths.
Cholera.....	do.	do.
Smallpox.....	do.	do.
Yellow fever.....	do.	do.
Typhus.....	do.	do.

Number and causes of deaths from other causes.....

BY

G. TAYLOR, M.R.C.S., L.R.C.P.,

REPORT ON PHARMACY SCHOOL, LAGOS.

More students have entered Pharmacy during 1927 than ever before. Persons have come to realise that the fascination of Pharmacy is balanced by a consideration of its possibilities as a career, that there are openings for individual enterprise, and that qualified persons are readily absorbed as dispensers by Government, Medical Practitioners, etc.

Since the introduction of Entrance Examinations, more highly educated students of good character have been appointed as paid Government Dispensers-in-training and others admitted to the school as unpaid students.

2. The Staff has consisted of the Superintendent, Pharmacy School and Chief Dispenser who have been assisted during Dispensing, Practical Chemistry, and Pharmacognosy by three demonstrators selected from the senior students. No demonstrator has been appointed for any particular subject unless he has passed a competitive examination with distinction, unless his conduct has been exemplary, and unless he has shown diligent attendance and proficiency. Honoraria have not been granted to demonstrators but as they enjoy certain privileges and are exempted from the more humdrum tasks of dusting and washing bottles, the appointments are cherished by all and give encouragement to specialise in one or more subjects and, it is anticipated, will later provide the school with competent native teachers.

3. During the month of April, 1927, the school was transferred from the ground floor of E ward to the building adjoining the out-patients' department of the African Hospital. The new premises contain four rooms, the largest of which has a floor space of 24' x 18' and has been converted into a dispensary and main lecture room and contains two large dispensing counters, poison lockers, shelves for stock, seats for students, etc. The remaining three rooms are smaller; of these one has been converted into a Pharmacognosy museum and a lecture room for one class, another into an office, and the smallest into a cloak room for students. The lecture rooms, although too small, are a great improvement on the single room formerly used as a school because it is now possible to separate the classes as required for lectures. Students have attended for Practical Chemistry and Physics at King's College, the laboratories of which are fully equipped and well stocked; being also well ventilated and spacious, students have worked under ideal conditions.

4. Thirty-nine pharmaceutical students have been registered and have attended daily except Sundays at the school during the whole or part of 1927.

Twenty-six have been subsisted by Government, three by the Native Administration of Ibadan, and one by the Native Administration of Zaria.

Ten registered students were admitted as candidates to the examinations held under the Drugs and Poisons Ordinance. Nine were successful at the first attempt. Two passed with distinction.

Special evening lecture have been given twice weekly by the Superintendent on Pharmacy and Inorganic Chemistry to thirty-one qualified and unqualified private students employed by Government, local Medical practitioners and Pharmacists.

5. Registered Pharmaceutical students have received a systematic course of instruction and training on each of the following subjects :

Official and General Pharmacy, Dispensing, Prescription, Reading, Pharmacognosy, Inorganic and Pharmaceutical Chemistry, Botany, Physics, Forensic Pharmacy, and Elementary Pharmacology and Therapeutics.

A. *Official and General Pharmacy*.—Six lectures have been given each week on Official Pharmacy dealing with the chemicals, galenical preparations, and crude drugs of vegetable and animal origin mentioned in the British Pharmacopœia, 1914. To demonstrate official characters, specimens have been handed round and many of the official tests carried out. The following have received due consideration. The sources of official drugs and their important incompatibles; the solubilities of chemicals; the processes involved in the preparation of official galenicals together with the principles upon which these processes are based; the proportions of active ingredients contained in the official preparations of Aconite, Antimony, Arsenic, Belladonna, Calabar Bean, Cantharidin, Chloral Hydrate, Chloroform, Caustic Potash, Colchicum, Digitalis, Ergot, Iodine, Iodoform, Ipecacuanha, Lead, Mercury, Nux Vomica, Opium, Phenol, Phosphorus, Scammony, Strophanthus, Squill, and all alkaloids and salts of alkaloids; the Metric and Imperial Systems of weights and measures; the calculation of percentages and other quantities occurring in prescriptions. Students have been allowed one hour a week for the recognition of official drugs.

In General Pharmacy two hours have been devoted each week, to the general processes made use of in preparing drugs for administration. Such simple operations as dessication, decantation, infusion, etc., have been performed by students and the various solvents of the Pharmacopœia and the method of diluting rectified spirit in order to make an alcohol of lower percentage dealt with in the lectures.

B. *Dispensing*.—Students have devoted nearly half their time of training to this important subject and have gained much practical experience in preparing the simple galenical preparations of the Pharmacopœia in dispensing mixtures, powders, pills, emulsions, ointments, applications, suppositories, etc., in accordance with autograph prescriptions and once a week in dispensing stock for local Government dispensaries but they would profit more by experience in retail pharmacies. Unfortunately there are few pharmacies in the country. The majority of qualified persons appear to be content with employment as dispensers by Government or private medical practitioners.

Examinations in dispensing have been held each week, the marks assessed being recorded in order that the teachers may note what progress is being made by each student. At the conclusion of the practical work behind the dispensing counter, students have written full reports in their note books, on the chemical and physical changes, incompatibility of ingredients, *modi operandi*, etc.

C. *Prescription Reading*.—One lecture a week has been given on medical Latin Grammar and the construction of the prescription. At the conclusion of each lecture, students have been asked to read without abbreviation autograph Latin prescriptions describe the grammatical construction, translate them into English and render a literal as well as appropriate translation of the directions for use. In addition, students have been trained to promptly detect errors and discover unusual doses occurring in prescriptions.

D. *Pharmacognosy*.—Lectures have been given twice weekly on the crude drugs of vegetable and animal origin mentioned in the British Pharmacopœia; their botanical, zoological and geographical sources; the Natural Orders to which they belong; methods of formation, collection, and preparation; chemical and physical characters; active constituents, and their official preparations. Specimens have been handed round for examination during lectures and one hour a week allowed for recognition.

E. Inorganic and Pharmaceutical Chemistry.—The Junior Class has completed the course of lectures on General Theoretical Chemistry and has received lectures on many of the metals and non-metals. The Senior Class has nearly completed the entire course of lectures on Inorganic Chemistry.

The practical work conducted at King's College included experiments connected with the methods of preparing the more important inorganic substances, chemical tests for the important non-metallic elements and their compounds, as well as the important metals and their salts. Unknown solutions containing not more than two basic and two inorganic acid radicles have been given for analysis. Students have written full analytical reports in their laboratory note-books showing the experiments, observations, inferences, and equations. The Senior Class has completed the full course on practical inorganic Chemistry; the Junior Class has completed the course for the preliminary examination of chemical substances and group 3 of the chart for the analysis of metals.

Pharmaceutical Chemistry was included as a subject of the curriculum towards the latter part of 1926. Lectures were given to the Senior Class on the general principles of Organic Chemistry but had to be discontinued when the Superintendent proceeded to England in February, 1927. On his return, the subject was taken up again and lectures have since been given twice a week on the ultimate analysis of organic compounds.

The Senior Class has completed the course on the qualitative analysis of organic radicles and the alkaloids; quinine, strychnine and morphine.

F. Botany.—During the greater part of 1927, this subject was taught in conjunction with pharmacognosy and the general morphology and physiology of medicinal plants only considered but as botany has been included as a special subject of the syllabus drawn up by the Board of Medical Examiners, special lectures were given twice a week, beginning in November, on the four chief groups of the plant kingdom, viz., Thallophyta, Bryophyta, Pteridophyta, and Spermatophyta; on unicellular and multicellular plants; the thallus, shoot and root, plant members, the vegetable cell and changes affecting the cell-wall and cell-contents during the growth of the cell.

G. Physics.—The subject of heat has formed the main theme of lectures. The following have received attention. Sources and nature of heat; temperature; thermometry; expansion of solids, liquids, and gases; specific heat and calorimetry; change of state fusion and solidification, vaporisation and condensation; hygrometry; transmission of heat—conduction, convection, and radiation.

H. Elementary Pharmacology and Therapeutics.—As Government dispensers should possess at least an elementary acquaintance with the actions of drugs and the art of alleviating or curing disease, these subjects have received attention during the Pharmacy lectures and specimen prescriptions given to illustrate facts.

I. Forensic Pharmacy.—Students about to enter for qualifying examinations have received lectures in connection with legal matters affecting pharmacists. Special reference has been given to the Second Schedule, Part A—of The Poisons and Pharmacy Ordinance and the proper entries to be made in the Disposal of Poisons Book as set out in the Form H of the said Ordinance.

6. Examinations under the Drugs and Poisons Ordinance were held in January and October, the School vacations being held at the same time in order that the dispensary and lecture room might be available for conducting the oral and practical examinations.

The Superintendent of the School was on both occasions appointed a member of the Board of Examiners.

Weekly School Examinations have been held and the results recorded.

7. The Superintendent of the School was in December appointed a Member of the Board of Medical Examiners established by His Excellency the Governor under Section 4 of the Poisons and Pharmacy Ordinance, 1927.

The rules made by the Board affecting the examination of candidates for certificates and diplomas and the curriculum and training connected therewith were prepared by the Deputy Director of the Medical and Sanitary Service and the Superintendent of the Pharmacy School. In determining the scope of these rules and the standard required for the curriculum, consideration has been given to—

- (a) The danger of incompetent dispensers.
- (b) The need in this country of an approved course of study and training at a recognised institution by persons entering Pharmacy.
- (c) The preliminary standard of education essential for the course.
- (d) Registration of Pharmaceutical Students.
- (e) The intelligence of the average students.
- (f) His faculties for Pharmacy and its allied subjects.
- (g) The amount of work which could be reasonably accomplished during the periods of study required by the Ordinance.
- (h) The value to the country of qualified dispensers and Chemists and Druggists.

8. The Superintendent was absent on leave and attended the course of instruction at the London School of Hygiene and Tropical Medicine from 14th February, 1927 to 28th September, 1927, during which period he was relieved by Chief Dispenser, Mr. Nicol.

GORDON TAYLOR,
Superintendent,
School of Pharmacy.



