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NIGERIA

ANNUAL
MEDICAL AND SANITARY
REPORT

FOR THE YEAR

1928.



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NIGERIA

ANNUAL

MEDICAL AND SANITARY
REPORT

FOR THE

YEAR 1928.

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ANNUAL

MEDICAL AND SANITARY

REPORT

FOR THE

YEAR 1928

No. D/DMS.

DIRECTOR, MEDICAL & SANITARY SERVICE,

LAGOS, NIGERIA,

1929.

ANNUAL MEDICAL AND SANITARY REPORT, 1928.

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 1928, together with the Returns, etc., appended thereto.

I have the honour to be,

Sir,

Your obedient Servant,

G. J. PIRIE,

*Acting Director of Medical and Sanitary
Service, Nigeria.*

THE HONOURABLE

THE CHIEF SECRETARY TO THE GOVERNMENT,

LAGOS.

Director, Bureau of Sanitary Service
Bureau, Nigeria
1930

ANNUAL MEDICAL AND SANITARY REPORT 1930

I have the honor 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 1930,
together with the Reports on special subjects.

I have the honor to be,
Sir,
Your obedient servant,

G. J. PHILLIPS
Medical Director, Nigeria and Sanitary
Service, Nigeria

Chief Secretary to the Government
Lagos

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Annual Medical and Sanitary Report on Nigeria for the Year ending 31st December, 1928.

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 (four appointed, one vacant).
- 1 Alienist Medical Officer.
- 1 Research Medical Officer.
- 1 Superintendent of the Dispensers' Training School.
- 95 Medical Officers (seventeen vacancies).
- 3 Lady Medical Officers.
- 2 Government Dentists.

CLERICAL.

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

NURSING.

- 2 Matrons.
- 9 Senior Nursing Sisters.
- 36 Nursing Sisters.

TSETSE INVESTIGATION.

- 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 appointed).

SPECIAL PLAGUE STAFF.

- 2 Majors, R.A.M.C.
- 2 Captains, R.A.M.C.
- 4 R.A.M.C. Non-Commissioned Officers.
- 38 Rodent Inspectors.



(b) AFRICAN STAFF.

MEDICAL.

- 6 Medical Officers (five vacancies).
- 3 Junior Medical Officers (Temporary Appointments).
- 1 Assistant Accountant.
- 1 Chief Clerk.
- 4 Assistant Chief Clerks.
- 12 First Class Clerks.
- 35 Second Class Clerks and Probationers.
- 2 Chief Dispensers.
- 7 Senior Dispensers.
- 20 First Class Dispensers.
- 70 Second Class Dispensers.
- 25 Dispensers-in-Training.
- 1 Chief Storekeeper.
- 2 Assistant Chief Storekeepers.
- 3 First Class Storekeepers.
- 5 Second Class Storekeepers.
- 3 Senior Wardens.
- 8 Wardens.
- 2 Assistant Wardens.
- 10 Senior Nurses (provision for six only.)
- 24 Charge Nurses.
- 58 First Class Nurses.
- 120 Second Class Nurses.
- 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 (eight provided).
- 1 Charge Attendant, Lunatic Asylum.
- 25 Attendants, Lunatic Asylum.
- 10 Attendants, Leper Asylum.

SANITATION.

- 2 Chief Sanitary Inspectors (unfilled).
- 5 Senior Sanitary Inspectors.
- 10 First Class Sanitary Inspectors (six appointed).
- 46 Second Class Sanitary Inspectors (twenty-seven appointed).
- 33 Third Class Sanitary Inspectors (twenty-four appointed).
- 64 Vaccinators (sixty-three appointed).
- 1 Registrar of Vital Statistics.
- 2 Deputy Registrars of Vital Statistics.
- 1 Assistant Chief Clerk.
- 3 First Class Clerks.
- 15 Second Class Clerks and Probationers.
- 2 Second Class Dispensers.
- 1 Charge Nurse.
- 4 First Class Nurses (two appointed).
- 10 Second Class Nurses (two appointed).

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

ORDINANCES.

Serial No	Date.	Short Title and Application.	
3/1928	8.3.1928	Ordinance to amend the Building Lines Regulation Ordinance.	
20/1928	8.3.1928	Ordinance to amend the Lagos Township Ordinance.	
28/1928	6.12.1928	Ordinance further to amend the Lagos Township Ordinance.	
44/1928	13.12.1928	Ordinance to amend the Township Ordinance.	
45/1928	19.12.1928	Ordinance to make provision for re-planning Improvement and Development of Lagos.	

SUBSIDIARY LEGISLATION.

Serial No.	Date.	Ordinance made under.	Provision.
		ORDERS-IN-COUNCIL, 1928.	
5/1928	6.2.1928	The Public Health Ordinance (Chap. 56).	Ordering the application of the Public Health Ordinance and Rules 1-7, 10-25 of Rules No. 2/1917 to the whole of Abeokuta Province.
9/1928	5.3.1928	The Public Health Ordinance (Chap. 56).	Ordering the application of the whole of the said Ordinance and Rules 1-25 (a), 27 (a), 31-33, 37-39, 41-50 and 67-82 of Rules No. 2/1917 made under the said Ordinance to the Urban District of Abeokuta.
27/1928	20.8.1928	The Building Lines Regulation Ordinance (Chap. 108).	Ordering the application of Building Lines Regulation section 4 to all roads maintained by Government or by Local Authorities.
29/1928	15.10.1928	Dangerous Drugs Ordinance, 1927.	Ordering application of section 13 (a) of the Dangerous Drugs Ordinance, to benzol-morphine, dihydro-oxycodine, dihydrocodine and their respective salts.
33/1928	29.10.1928	The Public Health Ordinance (Chap. 56).	Ordering sections 44, 45 and 46 of the Ordinance to be in force in the area having a radius of two miles within a circle with the station flag-staff at Benin as centre.

SUBSIDIARY LEGISLATION—*continued.*

Serial No.	Date.	Ordinance made under.	Provision.
		ORDERS-IN-COUNCIL, 1928— <i>continued.</i>	
4/1928	13.2.1928	The Poisons and Pharmacy Ordinance, 1927.	Amending Regulation 21 of the Poisons and Pharmacy Ordinance, 1927 and inserting fees to be paid before other fees prescribed.
21/1928	17.7.1928	The Lagos Township Ordinance (Chap. 59).	Providing that Regulation 1 of Regulation 1/1920 referred to as principal Regulations be repeated and this be submitted thereof.
		RULES, 1928.	
1/1928	11.4.1928	The Townships Ordinance (Chap. 57).	Ordering that no person shall keep pigs (a) anywhere within the waterside section of the township that is to say west of the Oguta Road (b) in the Inland Town save except within compounds faced so as to prevent straying.
2/1928	4.7.1928	The Townships Ordinance (Chap. 57).	Ordering section 41 of the Ordinance to township of Sapele regarding the fees to be paid by butchers and occasional users of Public Slaughter House.
3/1928	4.7.1928	The Markets Ordinance (Chap. 58).	Ordering amendment to Rule 3 of Rules No. 4/1926 made by the Governor for the market in the township of Aba.
4/1928	8.12.1928	The Public Health Ordinance (Chap. 56).	Ordering that no person shall keep sheep or goats within the township of Jos.

C.—FINANCIAL.

Revenue	...	...	...	...	£10,800
Expenditure	...	...	...	...	£437,944

The total Medical and Sanitary Expenditure for the year 1928 of £437,944 is about a sixteenth of the Estimated General Expenditure for 1928/29 £7,435,271.

II.—PUBLIC HEALTH.

A.—GENERAL REMARKS.

The attendances at the Government Hospitals and Dispensaries throughout Nigeria show a very remarkable increase on those of previous years. This is noticeable not only in the Southern Provinces but in the Northern Provinces and Mandated area of the Cameroons, the people are now availing themselves of modern treatment especially in regard to surgery, leprosy, and yaws and travel great distances for the latter treatment. The increase in the Northern Provinces is further attributed to the recent appointments of Travelling Medical Officers in the Kano, Zaria and Bornu Divisions.

The following table shows the comparison with previous years :—

	1926.	1927.	1928.
(a)			
European In-patients	1,272	1,315	1,553
Non-European In-patients	24,757	26,896	29,173
European Out-patients	6,635	6,456	8,629
Non-European Out-patients	228,966	272,483	354,191
Major Operations	1,418	3,227	5,441
Minor Operations	3,221	4,853	4,186
(b) Northern Provinces.			
African In-patients	8,915	10,461	10,904
African Out-patients	47,121	71,816	87,476
(c) Southern Provinces and Cameroons.			
African Out-patients	181,845	255,964	266,615
African In-patients	15,842	16,435	18,269

This increase is also in part due to the opening of several new hospitals and out-patient departments during the year and the re-opening of stations that have been closed during the war period and subsequent years from shortage of both European and African staff. This shortage is still acute. As pointed out in my report for 1927, the European establishment has never yet been up to pre-war standard and the increased work is a tribute to the keenness and the loyalty of the Medical Officers and Nursing Sisters as well as the African subordinate staff. Very great difficulty has been experienced in providing Medical Officers for patrols and for the military camps of exercise and it is unfortunate at a time when expansion is rapidly taking place that recruitment should fail to supply an adequate number of officers. In the Mandated Territories of the Cameroons, hospitals and Medical Officers are required and steps are being taken to provide the necessary African staff. This shortage extends to the African Medical Officers as well, there being only one Medical Officer at present on the staff, but it is hoped that in 1929 two of the Junior Medical Officers appointed in 1927 will be taken on to the establishment but more are still needed.

The work of the three Travelling Medical Officers has proved satisfactory, with the result that medical treatment on modern lines has been extended to the population of the outlying districts in the Northern Provinces.

During the year under review, fourteen new appointments were made to the European Medical Staff but despite this fact there are still twenty-two vacancies due to retirements on pension and promotion to the administrative ranks.

The European Hospital and Sisters quarters at Kaduna and Jos were completed and occupied during the year, while the African Hospitals at Aba, Benin, with the extensions to the existing hospitals at Calabar, Kaduna and Jos were also completed.

The work in the new African Hospital at Lagos is steadily progressing but it will be some time before it is really finished and occupied. The other hospitals begun in 1928 will shortly be completed and ready for occupation.

With reference to the training of the African subordinate staff, much good work has been done at the various large hospitals and in the Southern Provinces it was possible to obtain pupils with a higher standard of education than was formerly obtained but in the Northern Provinces this difficulty still exists. The establishment of Scholarships with the aim of giving a post primary course of instruction at the Katsina College in the north and at King's College at Lagos, will it is hoped in time produce the standard aimed at, my report in 1927 fully dealt with this important subject but until the Training Colleges are built and established at Lagos, and Zaria, progress will be slow. The Pharmacy School at Lagos under the able supervision of Dr. G. Taylor has done extraordinary good work as will be seen from the Annual Report on the School embodied in the appendix to this report, and there is at present very keen competition amongst scholars from the various schools for entrance and training as dispensers, chemists and druggists.

The development of the X-ray Department at Lagos has been very rapid and facilities now exist for the curative side of electro-therapeutics and light treatment. X-ray Departments at Kaduna and Port Harcourt will be opened towards the end of 1929 when the buildings are completed the necessary money for equipment, etc., being available. A report of the work done at Lagos is incorporated in the appendix.

(i) GENERAL DISEASES.

During the year under review, there has been a very marked increase in the number of patients seen at the hospitals and dispensaries; in consequence a nearer approach to the actual incidence of disease is attained, and with the increased facilities for the study of pathology, a definite diagnosis in cases of malignant growth as well as other diseases is now available.

The number of cases of cancer recorded in this year among Africans is 192 with thirty-five deaths, as compared with 215 in 1927 and 115 in 1926.

Acute rheumatism or rheumatic fever is not met with to any extent in this Colony and the majority of cases are classified under chronic rheumatism. This year shows a very marked increase in the number attended as compared with the two previous years.

1926.	1927.	1928.
6,067	11,714	17,194

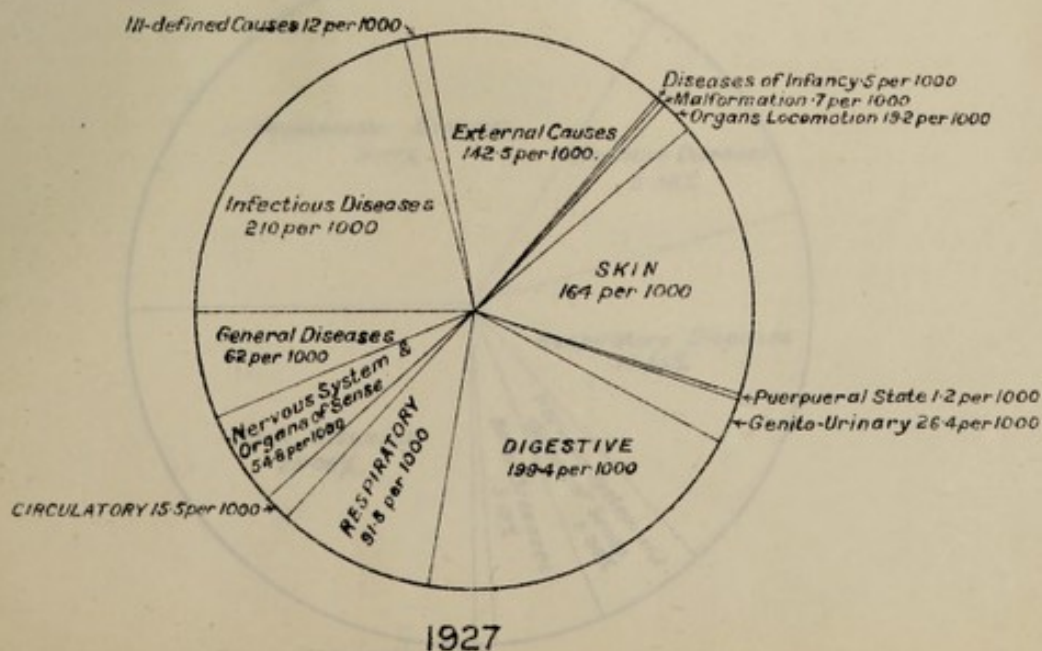
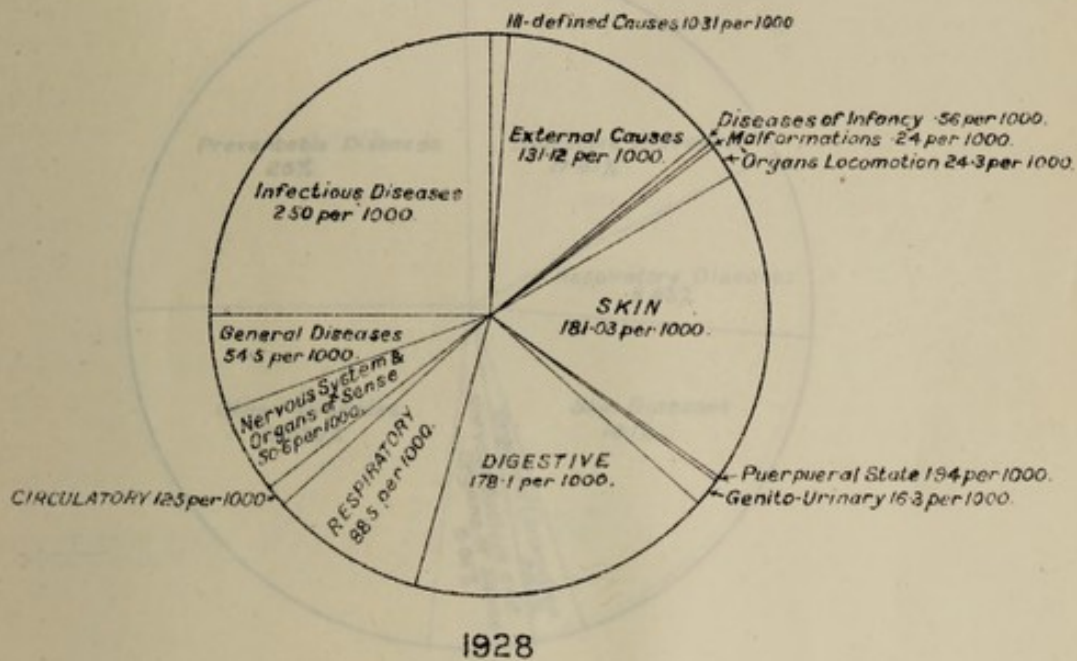
Incidence 27.8 per 1,000; 39.1 per 1,000; 43.7 per 1,000.

Four cases of beri-beri were recorded in 1928 with one death as compared with the forty-two cases shown in 1927, these four cases were Kroo boys who are rice eaters. Nineteen cases are recorded under epidemic dropsy but in my opinion these are probably due to diet deficiencies.

Neurasthenia shows a higher percentage among Europeans than in Africans and is a very common cause of invaliding. Neuritis and hysteria being far more prevalent in the African. The following table shows the comparison:—

	1926.	1927.	1928.
<i>Europeans.</i> —Hysteria	1	14	9
Neuritis	92	70	152
Neurasthenia	116	121	100
<i>Africans.</i> —Hysteria	36	57	267
Neuritis	660	1,334	1,378
Neurasthenia	676	273	323

GENERAL COMPARATIVE DIAGRAMS
OF
DISEASE GROUPS
TREATED IN GOVERNMENT INSTITUTIONS.
1927 & 1928

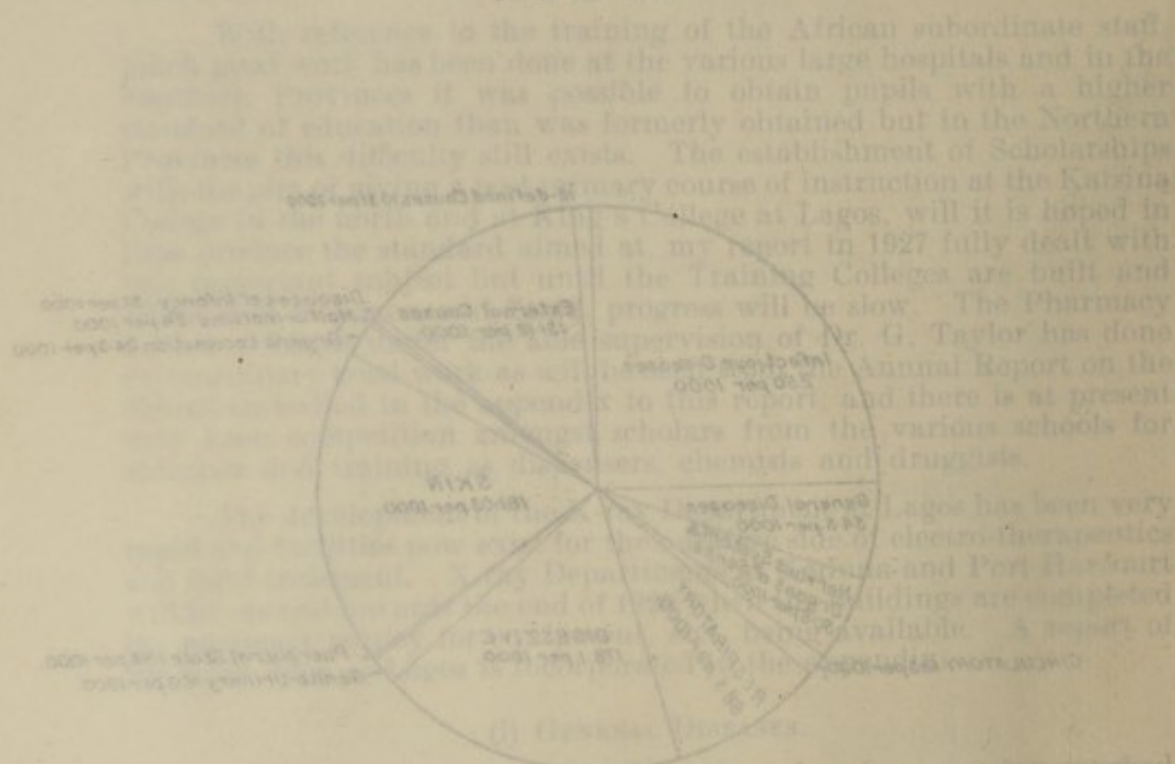


COMPARATIVE DIAGRAMS

OF

DISEASE GROUPS
TREATED IN GOVERNMENT INSTITUTIONS

1927 & 1928



1928

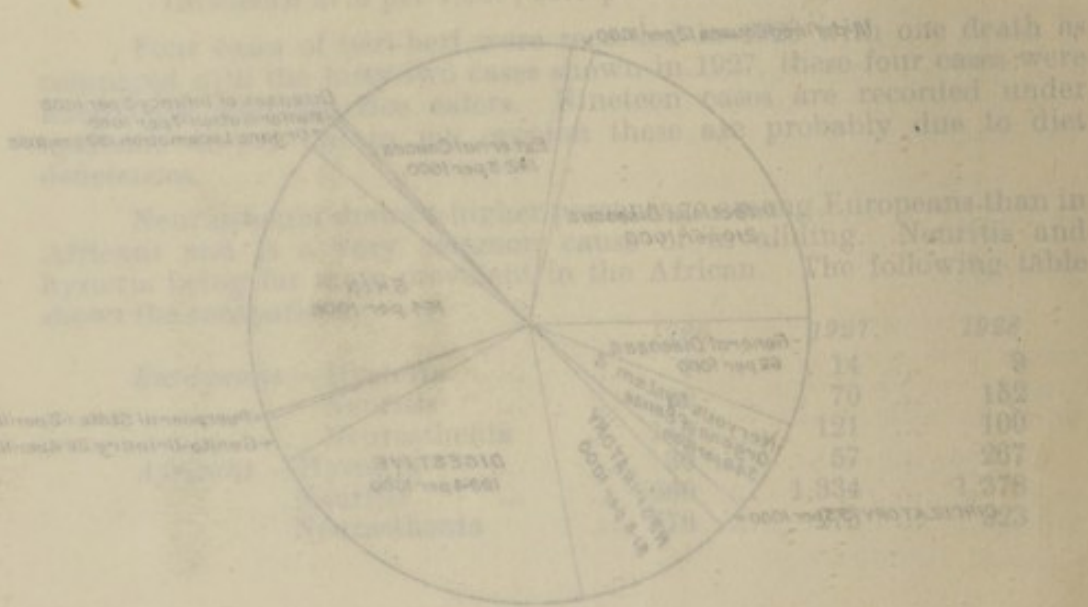
There has been a very marked increase in the number of cases of disease treated in government institutions in 1928 compared with 1927. The increase is particularly marked in the case of General Diseases, which have increased from 34.5 per 1000 in 1927 to 43.7 per 1000 in 1928. This increase is due to a number of factors, including the improved medical services available in government institutions and the increased number of cases of disease reported to the authorities.

The increase in the number of cases of disease treated in government institutions in 1928 is also reflected in the comparative diagrams for 1927 and 1928. The diagrams show that the total number of cases treated in government institutions has increased from 11,714 in 1927 to 17,194 in 1928.

The increase in the number of cases of disease treated in government institutions in 1928 is also reflected in the comparative diagrams for 1927 and 1928. The diagrams show that the total number of cases treated in government institutions has increased from 11,714 in 1927 to 17,194 in 1928.

1927 1928

11,714 17,194



1927

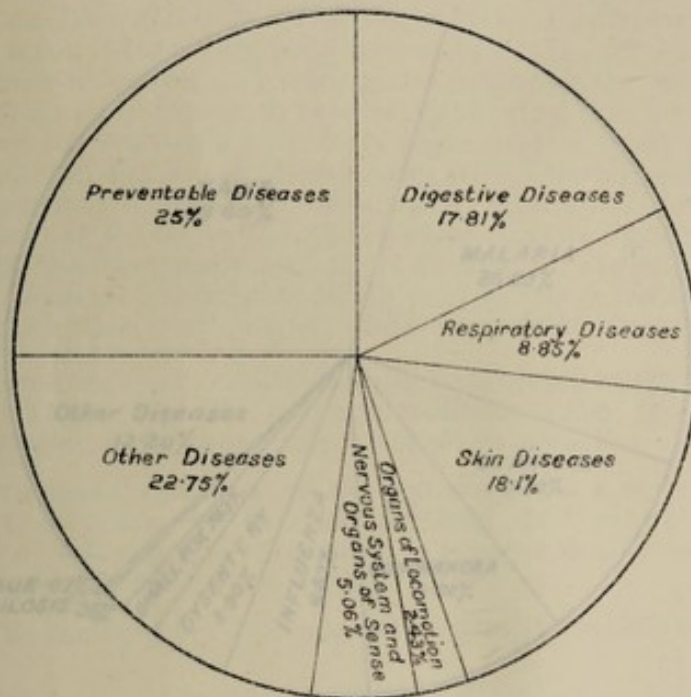
GENERAL SYSTEMIC AND PREVENTABLE

TREATED IN GOVERNMENT INSTITUTIONS.

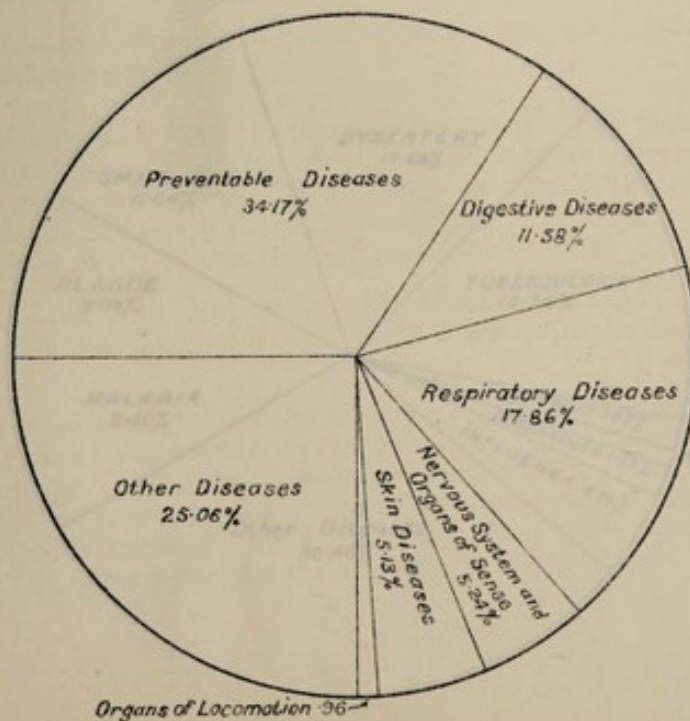
TREATED IN GOVERNMENT INSTITUTIONS.

Total Cases 393446

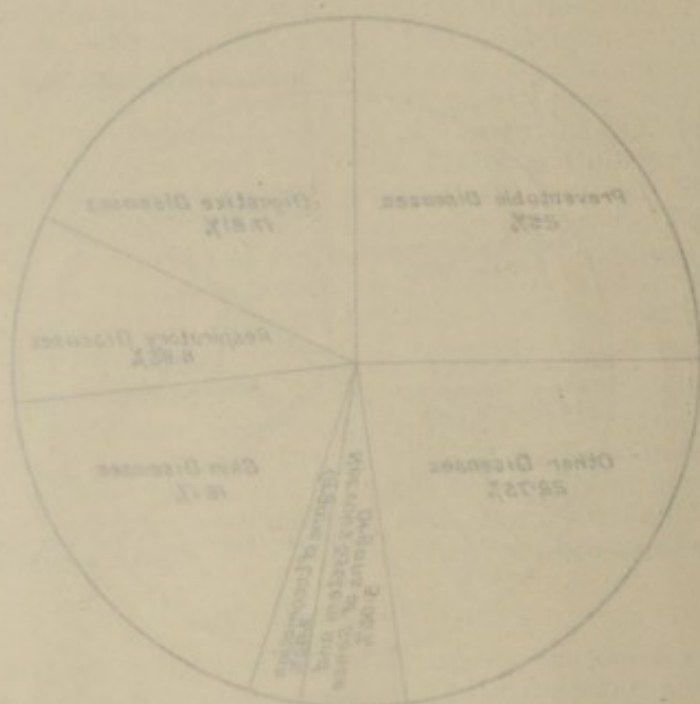
1928.



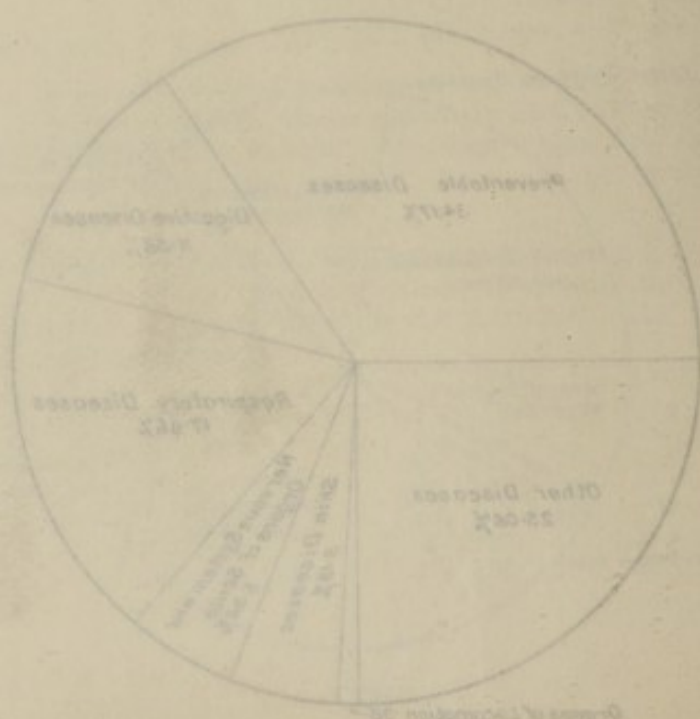
Total Deaths 1987



GENERAL SYSTEMIC AND PREVENTABLE
DISEASES
TREATED IN GOVERNMENT INSTITUTIONS
Total Cases 393,448
1928

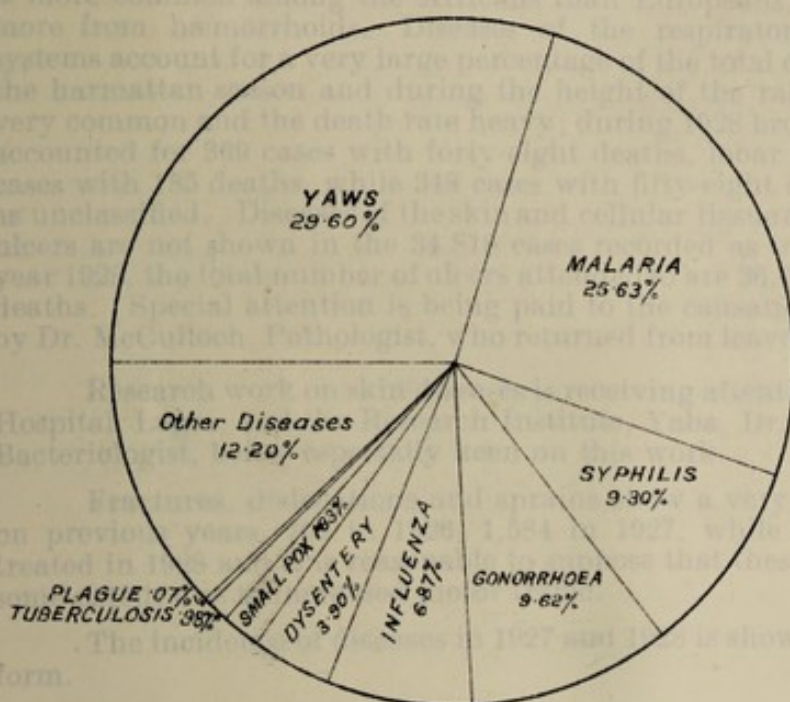


Total Deaths 1927

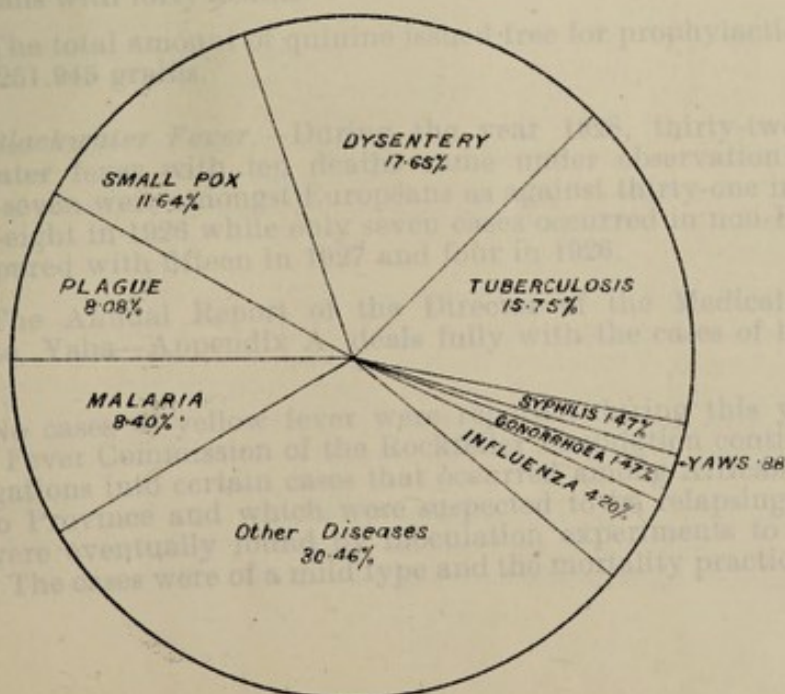


TREATED IN GOVERNMENT INSTITUTIONS.

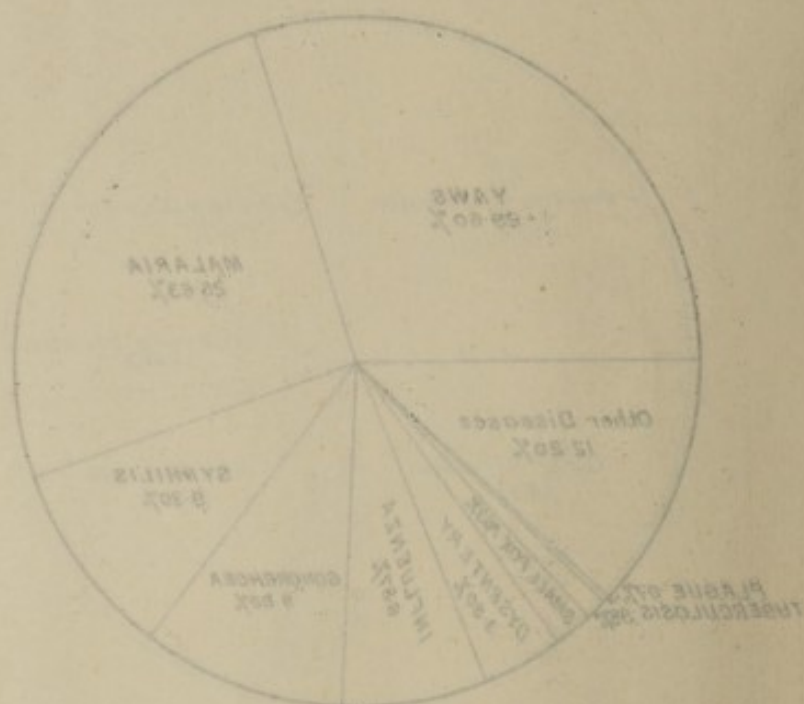
1928



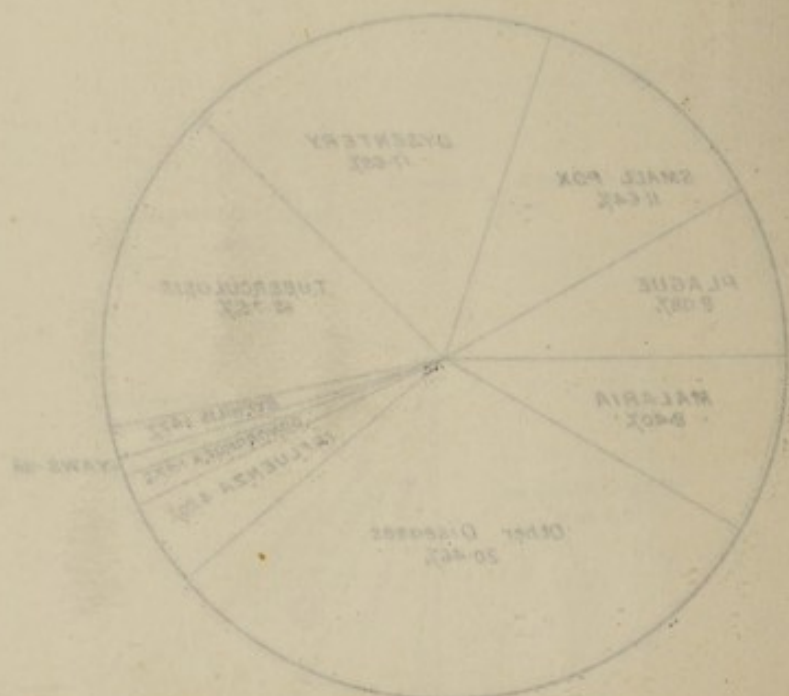
Total Deaths 679.



INFECTIVE DISEASES
TREATED IN GOVERNMENT INSTITUTIONS
Total Incidence 98383
1938



Total Deaths 679



There is undoubtedly a decided increase among Africans of other forms of mental alienation due, in the opinion of the alienist to the rapid changes in education, mode of life, etc., the result of advancing civilisation. General paralysis of the insane is comparatively rare only forty-five cases with six deaths being recorded in 1928.

In diseases of the circulatory system, valvular disease of the heart is more common among the Africans than Europeans, the latter suffer more from hæmorrhoids. Diseases of the respiratory and digestive systems account for a very large percentage of the total cases treated. In the harmattan season and during the height of the rains pneumonia is very common and the death rate heavy; during 1928 broncho-pneumonia accounted for 369 cases with forty-eight deaths, lobar pneumonia 1,558 cases with 185 deaths, while 348 cases with fifty-eight deaths are shown as unclassified. Diseases of the skin and cellular tissue are very common, ulcers are not shown in the 34,818 cases recorded as treated during the year 1928, the total number of ulcers attended to are 36,037 with fifty-four deaths. Special attention is being paid to the causation of these ulcers by Dr. McCulloch, Pathologist, who returned from leave in April, 1929.

Research work on skin diseases is receiving attention at the African Hospital, Lagos, and the Research Institute, Yaba, Dr. Smith, Assistant Bacteriologist, being especially keen on this work.

Fractures, dislocations and sprains show a very marked increase on previous years, 709 in 1926, 1,584 in 1927, while 2,366 cases were treated in 1928 and it is reasonable to suppose that these accidents are to some extent due to increased motor traffic.

The incidence of diseases in 1927 and 1928 is shown in diagramatic form.

(ii) COMMUNICABLE DISEASES.

(a) *Mosquito or Insect Borne.*

Malaria as usual was one of the most important to be dealt with and is responsible for a large proportion of illness and invaliding among Europeans. The total number of cases treated in Europeans during the year was 1,369 with eleven deaths, of this number blackwater fever represents twenty-seven cases with eight deaths. Among non-Europeans 23,853 cases were treated an increase of 10,678 on 1927; the total number of deaths being forty-six, of which two were due to blackwater fever. The aestivo-autumnal form is the most common and accounted for 1,298 cases among Europeans with three deaths and 22,044 among non-Europeans with forty deaths.

The total amount of quinine issued free for prophylactic purposes were 3,251.945 grains.

Blackwater Fever.—During the year 1928, thirty-two cases of blackwater fever with ten deaths came under observation of which twenty-seven were amongst Europeans as against thirty-one in 1927 and twenty-eight in 1926 while only seven cases occurred in non-Europeans, as compared with fifteen in 1927 and four in 1926.

The Annual Report of the Director of the Medical Research Institute, Yaba—Appendix A, deals fully with the cases of blackwater fever.

No cases of yellow fever were reported during this year. The Yellow Fever Commission of the Rockefeller Foundation continued their investigations into certain cases that occurred among Africans at Ife in the Oyo Province and which were suspected to be relapsing fever but these were eventually found by inoculation experiments to be yellow fever. The cases were of a mild type and the mortality practically nil.

Trypanosomiasis.—There were 2,273 cases of this disease reported during the year. Of this number four were Europeans. The European cases occurred in the Tiko area of the British Mandated Territory of the Cameroons, they were employees of the German Plantations. A Tsetse Investigation Officer has been detailed to proceed there and make a report of the occurrence of this disease in that area. In addition to the cases quoted above 723 were also treated by the Sleeping Sickness Officers on tour, making a total of 3,012 cases of the disease seen and treated in the Northern Provinces in addition to the four Europeans from the Cameroons. A full report of the work done during the year in investigation control and treatment will be found in the report of the Tsetse Investigator (Appendix B).

Relapsing Fever.—Small outbreaks of this disease occurred from time to time in both the Northern and Southern Provinces, chiefly in the Ondo area in the latter. The total number of cases reported being 265 with nineteen deaths; all the outbreaks were mild in type, no cases occurred amongst Europeans.

Cerebro-Spinal Meningitis.—Twenty cases of this disease were under treatment in the Government Hospitals with ten deaths, as against sixty-three with twenty-nine deaths in 1927 and 142 with ninety-three deaths in 1926. It is probable that the actual number of cases that occurred were greater but there was no epidemic manifestation of the disease.

Filariasis in its various forms is very common in Nigeria and is usually seen in the hospitals in the various forms of elephantiasis, guinea worm and *F. loa*; it is also very common in the Cameroons.

Dengue Fever.—Twenty-three cases of this disease were diagnosed and treated in the various hospitals of this number, eighteen were Europeans; it is prevalent in the Northern Provinces.

(b) *Infectious Diseases.*

Plague.—A full report on plague in Lagos and on the mainland will be found in Appendix F attached to this report. The number of rodents dissected and examined is brought out in the report of the Medical Research Institute, Appendix A attached. In Lagos 519 cases occurred during the year with 509 deaths, a case mortality of ninety-eight per cent.; of this number sixty-seven cases were actually treated in the Infectious Diseases Hospital, the remaining cases being found on post-mortem of dead bodies brought in; this shows an increase on the number of cases that occurred in 1927, viz., 155 with a case mortality of 97.4 per cent. As usual in other years, October showed the highest number of cases and there is no doubt that the meteorological conditions have a very marked effect on the occurrence of the disease.

Influenza.—This disease appeared in several mild out-breaks throughout the year, 6,194 cases with twenty-eight deaths occurred among non-Europeans while 562 cases were reported amongst Europeans with no deaths.

Enteric Group.—Little is known of the prevalence of the diseases of this group in Nigeria. During the year thirty cases were under treatment, nineteen in Europeans with no deaths and eleven with six deaths in Africans. This is an increase on number on the two previous years, twenty-eight cases in 1927—eleven Europeans and seventeen Africans and twenty-two cases in 1926—ten Europeans and twelve Africans.

Dysentery.—The following table shows the cases of this disease treated during the past three years among Europeans and Africans in the Colony; as will be seen there is a gradual increase in the total number

treated in each year; of the 962 cases shown as undefined in this year a considerable proportion would really be found to be amoebic in origin.

		EUROPEAN.			AFRICAN.		
		1926.	1927.	1928.	1926.	1927.	1928.
Amoebic	Cases ...	95	122	125	2,254	2,614	2,465
	Deaths	—	—	—	102	120	76
Bacillary	Cases ...	6	3	12	39	240	255
	Deaths	—	—	—	4	21	22
Undefined	Cases ...	7	5	21	704	348	962
	Deaths	—	—	—	20	18	22
Liver Abscess	Cases ...	1	13	10	55	102	65
	Deaths	—	1	—	5	6	4
Total Cases ...		109	143	168	3,052	3,304	3,747
Total Deaths ...		—	1	—	131	165	124

Smallpox.—Smallpox has been as usual prevalent in the Northern Provinces, where its heaviest incidence was in July, but the epidemic had been in evidence from April of this year. The Benue, Bauchi, Sokoto and Plateau Provinces showed the heaviest incidence; this is undoubtedly due to the fact that compulsory vaccination is not universally applicable in these provinces as it is in the Southern Provinces of Nigeria and it is very probable that only a proportion of the cases occurring in the north came to light as notification is not as efficiently carried out as in the south. The cases reported as treated in the Infectious Diseases Hospital were 1,785 with seventy-nine deaths, of this number one was a European who recovered. During the year 2,861 cases with 569 deaths were reported to the Senior Sanitary Officer, Northern Provinces, this gives a case mortality of 22.2%. In the Southern Provinces 978 cases with 290 deaths were reported.

The total number of vaccinations performed during the year 1928 were as follows:—Northern Provinces, 121,074 with 81.4% successful; Southern Provinces, 309,588 with a sixty-five *per cent.* successful. In the Southern Provinces the people freely avail themselves of vaccination well knowing its value.

Venereal Diseases.—These diseases are very common throughout the colonies, particularly so in the Northern Provinces; gonorrhoea is the most prevalent but syphilis is also widespread, cases being only seen in the advanced stages as the African does not appreciate the seriousness of either disease.

Yaws.—This disease is extremely prevalent throughout Nigeria, during the year 29,079 cases have been treated with only six deaths as compared with 16,952 cases in 1927 with twenty-three deaths. The people appreciate the modern treatment with N.A.B. and other preparation of organic, arsenic and come forward in ever-increasing numbers. The Bismuth preparations have been found to give excellent results and will be more largely used on account of their cheapness.

Leprosy.—With the formation of the Nigerian branch of the British Leprosy Relief Association, this disease will now be treated more efficiently than in former years as the people are appreciating the modern methods of treatment and are coming forward voluntarily for attention. A short report by the Secretary of the Nigerian branch is attached—Appendix K, which shows the progress made and the centres at which the disease is being treated; at present 2,975 lepers are receiving treatment as compared with 2,046 in 1927 of whom 616 were in-patients.

Tuberculosis.—Reliable information of the incidence of this disease among Africans is not yet obtainable as the people do not seek treatment for this disease until it is far advanced. The pulmonary form is the most common. During the year twelve cases were reported among Europeans with one death as compared with thirteen cases and one death in 1927. Among non-Europeans 930 cases occurred with 106 deaths as compared with 806—seventeen deaths in 1927 and 785 cases with 124 deaths in 1926.

(c) *Helminthic Diseases.*

Ankylostomiasis is undoubtedly very common in Nigeria but the disturbance to health caused by the infection is insufficient to make the patient seek treatment and it is usually the advanced cases in poorly nourished individuals that are seen in hospital.

Routine examinations made in the various hospitals and prisons show its presence. In the Colliery at Enugu, the incidence of the parasite amongst the miners was large but mass treatment is being carried out at regular intervals among them and prophylactic measures adopted in the workings of the mine. Similar measures are adopted among the labourers in the plantations in the Cameroons.

Ascaris is the commonest of all the intestinal parasites and it is practically universal throughout Nigeria.

Schistosomiasis.—This disease, in both forms, is prevalent in Nigeria but its incidence at present is not fully known. In 1927, 303 cases of the disease were reported with one death while in this year three cases occurred amongst Europeans and 203 cases with two deaths among Africans.

Cestoda.—This parasite is chiefly reported from the Northern Provinces, 4,542 cases being under treatment of whom six were Europeans, one death was attributable to this cause.

B.—VITAL STATISTICS.

(1) *General African Population.*

The estimated population for Nigeria including the Mandated area of the Cameroons is 18,804,834. Under present conditions, as registration is only compulsory in Lagos and Ebute Metta, it is impossible to give even approximately, figures of the births and deaths or any indication of the infant mortality rates.

The general health of Nigeria during this year was on the whole good, although there is an increase in the number under treatment.

The following table gives the summary of Vital Statistics for the Lagos and Ebute-Metta areas :—

SUMMARY OF VITAL STATISTICS FOR LAGOS AND EBUTE METTA
FOR THE YEAR 1928.

	1928.		
	Lagos.	Ebute Metta.	Total.
Estimated Population (Lagos and Ebute Metta)	—	—	118,500
Total Births	2,710	620	3,330
Birth Rate per 1,000 population	—	—	28·1
Total Deaths	2,006	433	2,439
Death Rate per 1,000 population	—	—	20·5
Deaths—Causation of—Certified by Medical Practitioners—number	1,950	272	2,222
Deaths—Causation of—Certified by Medical Practitioners—per cent.	97·2	62·8	91·1
Deaths—Infants under one year	363	97	460
Infantile Mortality per 1,000 births	133·9	156·5	138·1
Deaths under one year Certified by Medical Practitioners—number	309	62	371
Deaths under one year Certified by Medical Practitioners—per cent.	15·4	63·9	15·2
Deaths—Children under five years	503	138	641
Percentage of deaths of Children under five years to total deaths	25·07	31·8	26·2
Total Stillbirths	88	33	121
Stillbirths—proportion per cent. of the total Births (normal and stillbirths)	2·8	5·0	3·5
Deaths uncertified by Medical Practitioners—number	56	161	217
Deaths uncertified by Medical Practitioners—per cent.	2·7	37·1	8·8

The registration of births and deaths in Lagos has been in operation since the 1st August, 1867.

This year, 1928, shows an increase in the total population on that of 1927, while there is a decline in the birth rate and rate of infant mortality. The latter shows a decided fall and is undoubtedly due in part to the establishment of the Child Welfare Clinic at the Massey Street Maternity Section under a Lady Medical Officer. The following table shows the various figures :—

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
1928	3,330	28·1	2,439	20·5	138·1

(2) General European Population.

While it is impossible to give accurate figures as to the total European population of Nigeria, the figures shown in the following table compiled from the returns received from the Secretariat and Police are approximately correct and show a steady increase in population.

	Totals.
1926.	
Remaining on 31/12/25	4,833
Deaths during 1926	42
1927.	
Remaining on 31/12/27	5,493
Deaths during 1927	40
1928.	
Remaining on 31/12/28	5,699
Deaths during 1928	38

During the year under review the total number of Europeans—official and unofficial attended to in the various hospitals are as follows:—inpatients, 1,553 and 81,113 outpatients, with thirty-eight deaths as compared with thirty-three deaths in 1927, an increase which may be taken to be due to the increased European population.

EUROPEAN UNOFFICIALS.

The number of invalidings of European unofficials recorded in the Government Returns for the year 1928 is seventy-two.

The causes of invaliding are:—malaria, 9; anæmia, 4; blackwater fever, 4; neurasthenia, 11; debility, 1; appendicitis, 2; insanity, 1; ischio rectal abscess, 2; dysentery, 3; alcoholism, 1; cardiac diseases, 3; duodenal ulcer, 1; hernia strangulated, 1; renal tuberculosis, 1; accidents of pregnancy, 2; ulcer, 1; abscess, 2; cyst (ear), 1; typhoid fever, 2; paratyphoid (*a*), 1; paratyphoid (*b*), 1; pulmonary tuberculosis, 3; melancholia, 1; myocarditis, 1; gastritis, 1; hepatic abscess, 1; acute prostatitis, 1; abortion, 1; injury, 1; injury eye, 1; asthenia, 2; nephritis, 1; bronchitis, 1; fracture skull, 1; diabetes, 1; neuritis, 1.

The number of deaths among European non-officials is twenty-four.

The causes of deaths are:—blackwater fever, 5; asthenia, 1; heart failure, 2; carcinoma, 1; burns by fire, 1; cerebral tumour, 1; appendicitis, 2; unknown, 1; nephritis, 1; malaria, 1; septicæmia, 1; strangulated hernia, 1; injuries, 1; valvular disease of heart, 1; myocarditis, 1; influenza, 1; pulmonary tuberculosis, 1; lobar pneumonia, 1.

As statistics regarding the unofficial European population are incomplete, it is not possible to prepare a table showing the sick, invaliding and death rate.

(3) European Officials.

The invalidings among European officials for 1928 shows an increase of fifty on the figures of 1927, *viz.*, 200 as compared with 150 in 1927 and 100 in 1926 which cannot be attributed to any increase of the total number resident as there is a decrease of 196 as compared with the number resident in 1927. The number of deaths is the same as that for 1927, *viz.*, fourteen.

EUROPEAN OFFICIALS.

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 Officials.
New Regulations	24	16	18	57	68	...	183	2,087
Old Regulations	2	7	8	...	...	...	17	393
Totals ...	26	23	26	57	68	...	200	2,480

TABLE SHOWING SICK, INVALIDING AND DEATH RATES OF EUROPEAN OFFICIALS FOR 1926, 1927 AND 1928.

	1926.	1927.	1928.
(1) Total number resident ...	2,526	3,049	2,853
(2) Average number resident ...	1,776	1,752	1,990
Total number on sick list ...	1,587	1,509	1,744
Total number of days on sick list ...	15,187	14,884	18,241
Average daily sick ...	42.43	40.78	49.9
Percentage of daily sick to average number resident ...	2.38	2.33	2.4
Average number of days on sick list to each patient ...	9.76	9.86	10.4
Average sick time to each resident ...	8.72	8.50	6.6
Total number invalided ...	100	150	200
Percentage of invalided to number resident ...	3.96	4.92	7.01
Percentage of invalided to average number resident ...	5.63	8.56	10.05
Total deaths ...	15	14	14
Percentage of deaths to number resident ...	.59	.46	.49
Percentage of deaths to average number resident ...	.84	.80	.70

(1). Includes all European Officials who resided in Nigeria for any part of the year.

(2). *i.e.* Total number of "men-days" divided by 366.

SUMMARY OF THE CAUSES OF INVALIDINGS AND DEATHS OF
EUROPEAN OFFICIALS IN 1928.

Disease.	Invalidings.	Deaths.
Enteric Group—Paratyphoid A ...	1	—
Malaria ...	26	2
Blackwater Fever ...	4	2
Dysentery Amœbic ...	5	—
Elephantiasis ...	1	—
Tuberculosis ...	5	—
Syphilis ...	1	—
Gonorrhœa ...	1	—
Mediastinal Neoplasm ...	1	—
Cancer ...	1	—
Rheumatism ...	3	—
Purpura Hæmorrhagica ...	—	1
Anæmia ...	10	—
Alcoholism ...	1	—
Encephalitis ...	—	1
Anterior Poliomyelitis ...	1	—
Thrombosis ...	1	—
Confusional Insanity ...	1	—
Other Mental Alienation ...	2	—
Neuritis ...	1	—
Neurasthenia ...	24	—
Asthenopia ...	1	—
Other Eye Affections ...	4	—
Perforation Membrane Tympanum ...	1	—
Otitis Media ...	1	—
V.D.H. Aortic ...	2	—
Myocarditis ...	2	—
Bronchitis ...	1	—
Pneumonia ...	2	3
Asthma ...	1	—
Pharyngitis ...	1	—
Pyorrhœa ...	1	—
Gastric Ulcer ...	7	—
Gastritis ...	10	—
Enteritis ...	2	—
Colitis ...	1	—
Appendicitis ...	3	—
Hernia ...	1	—
Hepatitis ...	2	—
Enteroptosis ...	1	—
Jaundice ...	3	—
Cholecystitis ...	1	—
Other Diseases Kidney ...	3	—
Cystitis ...	1	—
Abscess Prostate ...	1	—
Boil ...	3	—
Abscess ...	1	—
Arthritis ...	4	—
Suicide by fire-arms ...	—	2
Accidental Poisoning ...	1	1
Wounds by fall ...	2	—
Dog bite ...	4	—
Murder by Cutting Instruments ...	—	1
Fracture ...	3	1
Debility ...	29	—
Insomnia ...	9	—
Asthenia ...	1	—
Total ...	200	14

(4) African Officials.

The general health of the African officials as indicated by the invalidings and deaths was a decided improvement on that of the previous year. During 1928, there were fifty-eight invalided as compared with sixty-three in 1927 while the deaths recorded in 1928 were only twenty-eight as against forty in the previous year.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES OF
AFRICAN OFFICIALS FOR 1926, 1927 AND 1928.

	1926.	1927.	1928.
Total number resident	3,457	3,425	3,590
Average number resident	3,169	3,418	3,582
Total number on sick list	2,993	3,006	2,757
Total number of days on sick list	18,389	18,033	20,651
Average daily sick	50·3	49·4	56·5
Percentage of daily sick to average number resident	1·5	·23	1·5
Average number of days on sick list to each patient	6·1	5	7
Average sick time to each resident	5·3	5	5
Total number invalided... ..	52	63	58
Percentage of invalided to number resident	1·5	1·8	1·6
Percentage of invalided to average number resident	1·6	1·8	1·6
Total deaths	28	40	28
Percentage of deaths to number resident	·80	1·1	·77
Percentage of deaths to average number resident	·88	1·1	·77

SUMMARY OF CAUSES OF INVALIDINGS AND DEATHS OF
AFRICAN OFFICIALS 1928.

Disease.	Invalidings.	Deaths.
Neurasthenia	2	—
Cataract	2	—
Nephritis	1	—
Bronchitis	—	1
Cardiac Disease	6	1
Blackwater Fever	—	1
Anæmia	1	—
Colitis	—	1
Optic Neuritis	3	—
Poisoning—Snake Bite	—	1
Senility	5	—
Smallpox	—	1
Arterio-Sclerosis... ..	1	—
Ulceration of Cæcum	—	1
Ataxia	1	—
Tuberculosis Pulmonary	4	3
Tuberculosis Generalised	1	—
Pneumonia	—	8
Mental Lethargy	1	—
Pyelo Nephritis	—	2
Chronic Arthritis	4	—
Unsound Mind	1	—
Gangrene	—	2
Delusions of Persecution	1	—
Typhoid	—	1
Defective Eyesight	3	—
Myocardial Degeneration	4	1
Dysentery	—	1
Telegraphist's Cramp	1	—
Syphilis with severe double Iritis	1	—
Septic Inflammation of Throat	—	1
Pott's disease	1	—
Hernia Strangulated	—	1
Paraplegia	1	—
Hemiplegia	1	—
Cirrhosis of Liver	1	—
Gonorrhoeal Rheumatism	1	—
Enlarged Testicles	1	—
Glaucoma	1	—
Ulceration of Cornea of left eye	1	—
Chronic Ulceration and Oedema of left foot	1	—
Endocarditis	1	1
Auricular fibrillation and dropsy	1	—
Loss of Memory	1	—
Influenza followed by Pneumonia	1	—
Debility	2	—
Total	58	28

(5) Soldiers—Nigeria.

The following figures show the health of the rank and file of the West African Frontier Force for 1928 :—

Average daily strength	...	...	...	...	3,201
Total number on sick list	...	...	...	...	4,086
Total number of days on sick list	...	...	...	...	25,167
Average daily sick	...	...	...	...	11.19
Total number of deaths	...	...	...	...	35
Death rate per thousand	...	...	...	...	8.5

The total number invalided was fifty.

(6) Police Force.

The following figures show the health of the rank and file of the Police Force in Nigeria for 1928 :—

			<i>Northern.</i>	<i>Southern.</i>
Average daily strength	...	...	1,191	2,499
Total number on sick list	...	...	402	3,431
Total number of days on sick list	...	...	4,177	12,754
Average daily sick	...	...	1.1	9.4
Total number of deaths	...	...	21	23
Death rate per thousand	...	...	17.6	9.2

The number invalided in the Northern Provinces during the year was twenty-two.

The number invalided in the Southern Provinces was forty-one.

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 methods to prevent the breeding of mosquitoes have been carried out in all stations during the year.

The Medical Officer of Health, Lagos, in his annual report states that the results obtained from the examination of school children during 1928 would tend to indicate that approximately thirty-three *per cent.* of the total population under ten years of age have suffered recently from malaria.

In Lagos the number of deaths recorded as due to malaria during 1928 shows a marked reduction from previous years.

The recorded deaths are during the last four years as follows :—

1925	...	...	...	...	139
1926	...	...	...	...	130
1927	...	...	...	...	131
1928	...	...	...	...	73

In the Northern Provinces the number of cases of malaria reported during 1928 was as follows :—

European	...	...	...	66
Non-European	...	...	...	793

In Lagos special work was carried out to try to reduce mosquito breeding and the following swamps were dealt with during the year :

(a) *Obalende*.—This swamp is the main source of anopheline mosquitoes in Ikoyi. It is overgrown with weeds and bush and is semi-liquid to a depth of about three feet. As an experiment about three acres were dealt with by localising the water in ditches and reclaiming the intervening area with sand carried from the surrounding high ground. Breeding in the trenches thus formed is easily and economically controlled by oiling whereas formerly any attempts to treat the swamp in this manner were well-nigh futile. With a view to absorbing ground water by transpiration and keeping the reclaimed area dry, opepe and consarina trees were planted.

It will be necessary to experience another rainy season to prove the success or failure of the above experiment. Photographs showing the work done at Obalende are reproduced at the end of the report.

(b) *Onikan*.—Extension of the previous system of drains was carried out with the result that mosquitoes were found breeding on two occasions only during the year.

(c) *Ikoyi*.—The three Okepa swamps were kept in good condition and no further breeding has occurred. Owing to the extended building programme on the edge of the inland lagoon it was found necessary to dig drains along the foreshore and several low-lying areas were reclaimed with satisfactory results.

In addition to clearing bush and draining swamps, oiling with light fuel oil was adopted in many places where draining was not possible, and in Lagos, Paris Green has been tried in an endeavour to further prevent mosquito breeding.

(b) *Trypanosomiasis*.—Special work in the investigation of and treatment of trypanosomiasis is being carried out by the Tsetse-Fly Investigator and his staff at Sherifuri in the Bauchi Province.

Most of the cases of trypanosomiasis reported have occurred in the Northern Provinces, 2,628 cases having been reported during 1928 with twenty-six deaths. One death was recorded from the African Hospital, Lagos, which occurred in an old case admitted in 1927.

(c) *Yellow Fever*.—With the exception of an outbreak at Ife no cases of this disease were reported during the year. In April, 1928, an epidemic was reported at Ife which was at one time suspected to be one of relapsing fever.

Members of the Rockefeller Yellow Fever Commission investigated the disease and as the result of inoculation experiments they eventually proved it to be yellow fever. By the time, however, that it was proved to be yellow fever, the epidemic had ended.

The epidemic appeared to be mild and the mortality was low. In addition to the routine anti-mosquito work carried out in Lagos and elsewhere, a very strict supervision of all craft in Lagos harbour and lagoon was kept under the direction of the Port Health Officer.

The report of the Port Health Officer, Lagos, is attached as an appendix.

During the year outbreaks of yellow fever were reported from the following places outside Nigeria:—Gold Coast, Gambia, Belgian-Congo, Dahomey, Dakar, and the Ivory Coast.

"*Kukuruku Disease*".—An epidemic disease associated with febrile disturbance, jaundice, mild nausea and vomiting, and in the majority of cases a mild albuminuria, appeared in the Kukuruku Division of Benin Province during the latter half of the year and was thoroughly investigated by members of the Rockefeller Yellow Fever Commission. In all 121 cases were seen of a total of 275 reported. The case mortality rate was 6.25.



A. ANOPHELINE BREEDING SECTION OF OBALENDE SWAMP.

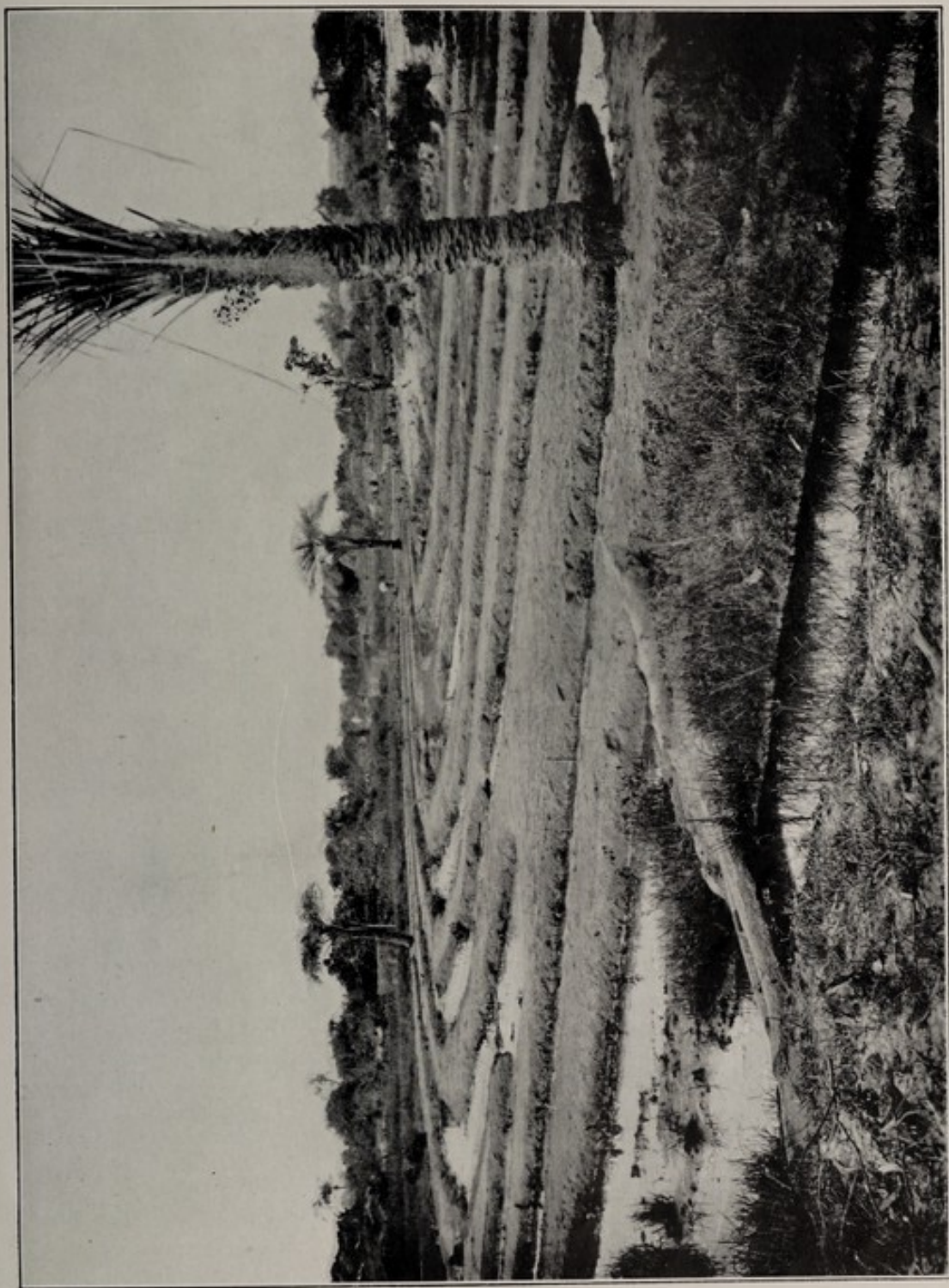
July, 1928.





B. OBALENDE SWAMP—PRELIMINARY CLEARING.





C. OBALENDE SWAMP—UNDER CONTROL—November, 1928.



The disease resembled yellow fever in some respects but numerous differential points presented themselves including the relative mildness of the albuminuria, the absence of faget's pulse, of "black tongue", and of hæmorrhages and black vomit.

At autopsy further points of differentiation became evident chief amongst which were the presence of deep blue-green bile staining and the absence of hæmorrhages, of mid-zonal necrosis, and of marked fatty degeneration in the liver. All attempts to transmit the disease to animals and to cultivate the causal virus on media were unsuccessful, and protection tests in monkeys (*Rhesus macacus*) against yellow fever carried out with the blood of convalescents were almost uniformly negative. Enteric fever, Weil's disease and relapsing fever were also considered and eliminated as possible causes.

The symptomatology was similar in many ways to that of catarrhal jaundice, which, however, is apparently not a clear-cut disease pathologically. In the cases under review catarrhal inflammation of the biliary channels was absent, but if such catarrhal manifestations are held to be unnecessary for a case to fall into this group of diseases, in which there may be hepatic destruction in addition to biliary stasis, then "Kukuruku disease" may be regarded as an infectious and epidemic form.

(d) *Filariasis* is prevalent among Africans in Nigeria. Although only two cases were reported during the year, filariasis is fairly common in the Northern Provinces and the Senior Sanitary Officer, Northern Provinces, states that Makurdi reports positive results in forty-eight *per cent.* of the blood tested while Ankpa and Lokoja report the disease as being common.

(2) EPIDEMIC DISEASES.

(a) *Plague*.—The report of the Senior Sanitary Officer in charge of Plague in Nigeria for 1928 is attached as an appendix.

In spite of Sir Edward Thornton's recommendations having been vigorously carried out throughout the year plague persisted in epidemic form in Lagos. 519 cases of plague occurred in 1928 as compared with 155 in 1927. The whole of Lagos has been dealt with by the Senior Sanitary Officer in charge of Plague and his staff, deratting and rat-proofing measures having been assiduously carried out.

On the mainland six cases of plague occurred in the Abeokuta District during the first three months of the year but the disease did not assume an epidemic form. Deratting and the other usual anti-plague measures were carried out in the larger outlying towns in the Ijebu-Ode Province and also in the towns of Abeokuta and Ibadan. The total number of cases of plague occurring on the mainland during 1928 was fifteen as compared with 242 in 1927.

(b) *Smallpox, including Vaccination*.—Smallpox is endemic throughout Nigeria, especially in the Northern Provinces. In the Northern Provinces during 1928, its heaviest reported incidence was in July but actually the epidemic had been in existence from April onwards.

The Benue, Plateau, Bauchi and Sokoto Provinces suffered the heaviest incidence.

During the year, 2,861 cases with 569 deaths (a case mortality of 22.2%) were reported to the Senior Sanitary Officer, Northern Provinces, which figures include one non-fatal case in an European reported from Kano. Although these figures cannot represent the true state of affairs yet the incidence of smallpox was lower in 1928 than in 1927 as during the latter year there were 3,901 cases with 910 deaths giving a case mortality of 23.3%.

In the Southern Provinces smallpox was not so prevalent as in the Northern Provinces. In 1928 there were 978 cases reported with 290 deaths (a case mortality of 29.6%). As a prophylactic measure against smallpox, vaccination was carried out throughout the whole country, lanolated lymph prepared by the Lister Institute being used.

The heavier incidence of this disease in Northern Provinces as compared to Southern is undoubtedly due to the fact that compulsory vaccination is only universally applicable in Southern Nigeria. It is further probable that only a portion of cases occurring in the north came to light, for notification is not there so efficiently carried out as in the Southern Provinces. This factor might also be held to explain the higher case mortality reported in the south where more efficient control and supervision can be effected with the resultant lessened likelihood and possibility of deaths being concealed.

SOUTHERN PROVINCES.

		1926.		1927.		1928.
Total vaccinated	...	330,209	...	296,988	...	309,588
Number inspected	...	273,792	...	235,172	...	276,664
Number successful	...	216,610	...	185,218	...	200,363
Percentage successful of those inspected	...	75.4%	...	78.7%	...	65.00%

NORTHERN PROVINCES.

		1926.		1927.		1928.
Total vaccinated	...	39,367	...	107,146	...	121,074
Number inspected	...	25,281	...	62,271	...	78,004
Percentage successful of those inspected	...	79.5%	...	78.7%	...	81.4%

(c) *Cholera*.—No cases of this disease have been reported in Nigeria.

(d) *Dysentery* is an endemic disease prevalent in both the Northern and Southern Provinces and both amoebic and bacillary types occur.

The Senior Sanitary Officer, Northern Provinces, in his annual report states that the disease is widespread throughout the whole of the Northern Provinces although it must be noticed that Kano furnishes most of the reported cases. Weekly returns total 227 cases with thirty-four deaths from dysentery, these figures including eighteen Europeans sixteen of which were reported from Kano. In Lagos, 133 cases of dysentery were notified with eighty-five deaths, the maximum incidence being during the rainy season between May and October.

During the year under consideration there was a total number of 452 cases of dysentery with 120 deaths.

(e) *Enteric*.—During the year nine cases of enteric fever were notified with two deaths. Of these three occurred in the Northern Provinces—one each at Kano, Jos and Kaduna—and six were in the Southern Provinces, five being in Lagos and one in Ijebu-Ode.

(f) Tuberculosis is fairly common in West African races but being a non-notifiable disease very few cases were reported. Only seventy-eight cases with one death were reported to the Senior Sanitary Officer, Northern Provinces, while in Lagos 201 deaths were recorded during the year.

Owing to the absence of compulsory registration of deaths in the Northern Provinces the death rate in that part of Nigeria is made to appear absurdly low.

The following table gives the incidence of the disease during the past eight years in Lagos :—

	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.
Pulmonary	48	57	74	85	69	72	102	107	163
Other Forms	8	8	4	6	23	10	23	53	38
Total	56	65	78	91	92	82	125	160	201
Percentage Total of certified deaths ...	5.5	6.1	6.5	8.4	4.9	6.6	5.7	8.7	8.9

It will be observed that there has been a progressive increase in the incidence of the disease, but this may well be due to the extension of medical facilities and consequent increase in numbers of cases diagnosed and notified.

(g) *Relapsing Fever*.—No serious outbreak of this disease occurred during the year.

161 cases with seventeen deaths were reported from the Northern Provinces of which 158 cases occurred in the Bornu Province prior to the final termination of an outbreak which commenced there during the latter months of 1927.

No cases were reported in the Southern Provinces. Usual methods for cure and prevention of spread of the disease were carried out comprising destruction of lice and bugs, isolation of cases, treatment with N.A.B. *et cetera*.

(h) *Cerebro-Spinal Fever*.—There was no serious outbreak of this disease during the year, only six cases with four deaths having been reported from the Northern Provinces and five cases with no deaths from the Southern Provinces.

(3) HELMINTHIC DISEASES.

(a) *Ankylostomiasis*.—This disease is prevalent throughout the country, particularly in the Northern Provinces. One of the chief sources of infection is the use of the bush as a latrine, the soil around which soon becomes contaminated and infective.

(b) *Taeniasis* is common in the Northern Provinces, 628 cases having been reported from Bauchi and 414 from Kano.

(c) The Medical Officer of Health, Lagos, reports that ascaris infection is very common in Africans, about eighty *per cent.* being affected.

(d) *Schistosomiasis*.—The Senior Sanitary Officer, Northern Provinces, states that sixty cases were reported during the year of which fifty-six were in Kano.

(e) *Guinea-Worm* is common in certain parts of the Northern Provinces although only 411 cases were reported.

II.—GENERAL MEASURES OF SANITATION.

Sewage Disposal.—The methods adopted in Nigeria generally are the pail and the salga or pit latrine.

The pail latrine is used in Europeans' quarters, clerks' quarters, Prisons, Hospitals and most schools; the salga is made use of by the indigenous population.

The contents of the pails are disposed of—

- (a) by burial in shallow trenches or deep pits;
- (b) by incineration;
- (c) by emptying into the lagoon as in the Ebute Metta District of Lagos.

The Medical Officer of Health, Lagos, in his annual report for 1928 states that the dejection jetty at Ebute Metta is not satisfactory and it is proposed to build a faecal incinerator similar to the one in use at Ikoyi.

Scavenging and Refuse Disposal.—In townships all combustible material is disposed of by burning in simple types of incinerators, and all tins, bottles, etc., are buried in pits. In Lagos a modern forced draught destructor has been erected by Messrs. Heenan and Froude at Epetedo and has helped considerably to diminish the nuisance formerly caused at Oke Suna by the dumping of partially decomposed refuse.

The clinker obtained from the destructor is used for reclamation purposes. It is soft and powdery and of little use for other purposes, this being due to the enormous vegetable and dust content of the refuse collected.

Drainage.—Other than the normal percolation which occurs in a porous soil there is no subsoil drainage.

Surface drainage in townships by earth drains is the usual form of drainage and these are unsatisfactory in that they require constant supervision and repair.

In some of the larger townships the principal drains have been strengthened with cement.

Water Supplies.—These are mainly river and well supplies. Pipe-borne supplies at present exist at Lagos, Abeokuta, Kaduna, Makurdi, Kafanchan (Railway), Zaria (Railway), Offa (Railway), Minna and Lokoja.

Only the supplies at Lagos and Lokoja are potable ones, the rest being untreated river water pumped into tanks and supplied to the houses by gravitation.

Progress has been made with the building of the waterworks at Kaduna which when completed will provide the headquarters of the Northern Provinces with a potable water treated by filtration and chlorination.

Commencement has now been made with the Kano supply.

All European stations without a proper potable supply were supplied with "condenser water" for drinking purposes. The Lagos Water Supply is pipe-borne and weekly examination of the water proved it to be on the whole of a satisfactory quality.

The closing of the wells in Lagos is proceeding slowly.

During the year eight wells were filled in in Lagos and twenty-seven in Ebute Metta.

Offensive Trades.—At present these are restricted to the hide and skin industry which is carried out on a large scale in Kano and Zaria and on a small scale in Jos.

Tanneries are the only offensive trades carried on in Lagos.

Clearing of Bush and Undergrowth.—This is carried out in Government stations in a routine manner by labour paid from Sanitary funds. Money is also provided from Townships funds for this work and, when available, prison labour is utilised for clearing bush.

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 the Medical Officer of Health or Medical Officer. In small stations the Sanitary Inspector is responsible to the local District Officer.

In many Native Administration towns in the Northern Provinces sanitary inspections are not permissible but the Senior Sanitary Officer, Northern Provinces, states that it has been noted that in some cases Hausa people have asked Sanitary Inspectors to go into their compounds and give advice. At the larger stations European Sanitary Inspectors are posted. During the year 383,601 houses and compounds were inspected in Lagos with a larvæ index of 0.9.

During the year the Deputy Director of Sanitary Service or his Deputy visited many places in the Northern and Southern Provinces.

III.—SCHOOL HYGIENE.

In Lagos a regular inspection was made of all school premises and various defects pointed out.

The general health of children was good. Several visits were made by the Medical Officer of Health, Lagos, accompanied by Dr. Smith of Yaba to investigate skin conditions. A large proportion of the children were found to be suffering from various types of ring-worm the commonest variety being *tinea flava*.

The examination of children for malaria was continued throughout the year.

In the Northern Provinces the schools were inspected when possible by the Senior Sanitary Officer who states that they are generally of local construction and commodious, though in many cases the lighting is defective.

IV.—LABOUR CONDITIONS.

Labour in Nigeria is employed chiefly by Government, trading and mining companies.

In the Northern Provinces agriculture by private enterprise is the commonest form of employment. The Senior Sanitary Officer, Northern Provinces, in his annual report states that "conditions in the farming hamlets are primitive, in the mining camps far from good and in the Railway camps the standard of sanitation is not high".

Recently one of the tin mining groups have commenced to employ their own Medical Officer.

V.—HOUSING AND TOWN PLANNING.

A Lagos Town Planning Ordinance—No. 45 of 1928—was passed in 1928 which gives a special Executive Development Board power to develop and improve Lagos. Under this Ordinance provision has been made in the Town Planning Scheme for the erection of proper markets throughout the township and also for markets at Yaba and Apapa.

In the Northern Provinces there has been a gradual improvement in the housing of Europeans.

Many areas have new layouts and in these good permanent buildings are being and have been erected. These layouts are in accordance with modern practice and provide separate areas for European residential purposes, business cum residential areas, native town, industrial areas, etc.

VI.—FOOD IN RELATION TO HEALTH AND DISEASE.

In those places where Sanitary Officers are stationed food stuffs are inspected daily.

This is most efficiently carried out in places where there are European Sanitary Inspectors as in the big centres like Kano, Zaria, Lagos, etc.

(a) *Dairies* as such are non-existent in either Northern or Southern Provinces, with the exception of one at Buea in the Cameroons Province.

In the north the Fulanis are the chief milk vendors and fresh milk, sold mostly to Europeans, is heavily contaminated and subject to adulteration, and requires boiling before use.

(b) *Markets* are inspected daily. They exist in most African towns or villages and vary from simple grass or bamboo shelters to more permanent structures with a cement floor and galvanised iron roof.

In Lagos provision has been made for the erection of proper markets throughout the township.

A number of market stalls of a simple design made of iron with a cement floor are in course of erection at Yaba.

(c) The number of bakehouses registered during the year in Lagos was sixty-two but even with registration their sanitary condition is in many instances very poor.

In the Northern Provinces bread is baked anywhere, Jos being the only place where any sanitary measures in baking are adopted.

(d) *Slaughter-Houses*.—Cattle are inspected and examined both before and after slaughtering to prevent the sale of meat unfit for human consumption.

Slaughtering has been and is still being carried out on concrete slabs but enclosed abattoirs have been erected in some places.

(e) During the year four mineral water factories were registered in Lagos. Arrangements have been made for a regular bacteriological examination of their products. The methods of manufacture are on the whole satisfactory.

(f) *Deficiency Diseases*.—The Medical Officer of Health, Lagos, in his report states two cases of wet beri-beri were recorded during the year in Lagos. Both cases were diagnosed at post-mortem examination.

The first case occurred in July in a prisoner confined in Lagos gaol and the second at the Infectious Diseases Hospital. In the case of the prisoner the diet was found to be adequate and no other prisoner showed any signs of the disease. In the second case no information was available, as the man had been a patient at the hospital for two days only. In the Northern Provinces food supplies have been good and plentiful and no famine has arisen.

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

Hygiene is taught in all Government and other schools. Whenever possible simple lectures were given by Medical Officers, Medical Officers of Health and European Sanitary Inspectors on elementary hygiene to the police and at various schools.

INFANT, CHILD AND MATERNAL WELFARE.

Lagos and Abeokuta are the only places in which any serious effort has been made to deal with this important work. In Lagos this branch of hygiene is carried out, under the supervision and control of the Medical Officer of Health, Lagos, by a Woman Medical Officer and Health Visitors employed by the Lagos Town Council.

There are nine Health Visitors—One Senior and eight Junior—All Africans.

The Woman Medical Officer was appointed on 1st April, 1928. The Health Visitors were appointed at varying dates from November, 1925 to December 1st, 1928.

In addition to the work in their respective districts each Health Visitor assists in rotation at the Infant Welfare Clinics held at Massey Street Dispensary both in the clinical work and in the keeping of records.

Infant Welfare Clinics were started on 30th April, 1928, and are held three times weekly at Massey Street Dispensary. Children up to two years of age attend the clinics but the majority are under one year old.

Minor ailments only are treated at the clinic, the more serious complaints being referred to the African Hospital or to the Dispensary.

Leaflets of instruction, especially on the subject of feeding, printed in Yoruba are distributed to mothers. The total number of attendances at the Clinics since their institution was 2,317.

An Ante-Natal Clinic is held in conjunction with and simultaneously with the Infant Welfare Clinic. The birth rate has declined steadily, together with the infantile mortality rate. Both have now reached their lowest point since 1910.

The birth rate for Lagos and Ebute Metta combined for 1928, was 28.1.

Infantile mortality rate for 1928 was as follows:—

Lagos	...	...	...	...	134.1
Ebute Metta	...	...	...	...	156.4

The infantile mortality rate of Lagos has always been lower than that of Ebute Metta but both rates are comparatively high.

The maximum infant mortality follows the rainfall closely and occurs between June and August. *See* Charts 1 and 2. The more important causes of infantile mortality were bronchopneumonea and other allied pulmonary complaints, gastrointestinal disorders, malaria, tetanus and congenital syphilis.

C.—TRAINING OF SANITARY PERSONNEL.

Sanitary Inspectors-in-Training are given a three years' course of training. The ordinary class tuition which is undertaken by the Assistant Medical Officer of Health at Lagos under the direction of the Medical Officer of Health extends over two years.

In their third year the students get practical instruction in house inspections, refuse disposal, water supply, anti-mosquito, drainage, etc.

During the year there were twenty-four Sanitary Inspectors-in-Training in the class of whom twelve were being trained for the Sanitary Department.

Three short revision courses were held during the year for the special benefit of Government Sanitary Inspectors transferred to Lagos from the Provinces to attend these courses before attempting promotion examinations.

The following is the syllabus of work :—

1. Elementary meteorology and mensuration.
2. Elementary parasitology and entomology.
3. Simple lectures on the most important communicable diseases including preventive measures, quarantine, isolation, etc.
4. Disinfectants and disinfection.
5. Disposal of refuse, nightsoil, drainage.
6. Water, air, ventilation and housing.
7. Meat, food and general inspection.
8. Rat destruction and anti-mosquito measures.
9. Vaccination technique.
10. Elementary vital statistics and local legislation affecting public health.

In the Northern Provinces the training of sanitary personnel is now carried on at Kano, Zaria, Kaduna and Jos. The learners accompany the European Sanitary Inspectors on their rounds and they also receive short lectures in the elements of hygiene.

During the year eleven learners were sent from various emirates.

D.—RECOMMENDATIONS FOR FUTURE WORK.

1. Introducing water supplies into other large towns when the new water supplies for Kano, Kaduna and Jos have been installed.
2. Fostering among native communities more modern ideas of preventive medicine through curative medicine by extending the scheme of travelling Medical Officers.

G. C. M. DAVIES,

Acting Deputy Director of Sanitary Service.

7th March, 1929.

IV.—PORT HEALTH WORK AND ADMINISTRATION.

The principal ports in Nigeria are Lagos, Forcados, Burutu, Sapele, Bonny, Port Harcourt, Degema, Opobo, Calabar and Victoria in the Cameroons.

At the Port of Lagos, the Sanitary Authority is a whole time Medical Officer of Health with a subordinate staff. The new Port Office and Disinfecting Station at Apapa have not yet been put into operation as the main passenger departure wharf is still in Lagos. The Port of Lagos is now fully equipped for dealing with the fumigation of vessels, both sulphur and cyanide processes being employed. A Medical Officer of Health is stationed at Port Harcourt and in addition to his sanitary duties is in charge of the port work. The Disinfecting Station as well as the Quarantine Station have been completed and are in use.

The Port Health Officers of Lagos and Port Harcourt are provided with special launches for port work. The Medical Officers stationed at the smaller ports act as the sanitary authority of the port in addition to their medical duties. At Bonny the Customs Officer undertakes the duties of the port sanitary authority as far as possible.

The Report of the Port Health Officer of Lagos is attached to the Appendix—Appendix I.

V.—MATERNITY AND CHILD WELFARE.

The Establishment of the Clinic for Child Welfare and Maternity work at Massey Street, Lagos, has fully justified itself and the results are very gratifying as the people have lost their shyness and bring their infants for treatment and advice. The Maternity Section is well attended by expectant mothers coming for attention, examinations and advice. During the year under review, 9,282 cases were treated with a record of only thirty-four deaths, the total attendances being 26,864 which shows that the confidence of the women is being gained; of the above number 418 were cases of expectant mothers, an increase of 244 on that of 1927. A decided increase is also shown in the number of normal labour cases admitted and treated, namely: ninety-five in 1928 against thirty-three in 1927. Only three cases of abnormal labour were seen and attended to. The Maternity Clinic is in charge of a Lady Medical Officer with a fully qualified European Nursing Sister, as well as two African Midwives who received their training in England and hold the C.M.B. Certificate.

Seven selected and educated girls are now undergoing training at this Clinic. They will be useful in working among their own people when qualified.

In addition to the Government Lady Medical Officer, the Town Council of Lagos employ a fully qualified West Indian Lady Medical Officer, who holds a Welfare Clinic at the Massey Street Dispensary three times a week; these clinics are also well attended and appreciated by the people.

At Abeokuta, a centre for Child Welfare and Health Visitors is in operation at the Imo Dispensary with a small ward of four beds for emergency cases, under the Lady Medical Officer who also is in charge of the Maternity Section of the Sacred Heart Hospital.

The Native Administration is also contemplating the establishment of another welfare centre, the Alake being especially interested in this work among his people.

It is expected that it will be opened and in working order in 1929. The Government section of the Sacred Heart Hospital has done very good work, difficult and abnormal labours still form the majority of admissions. It was unfortunate that the good work of the Lady Medical

Officer was interrupted through ill-health but the Medical Officer, Abeokuta, with the European Nursing Sister in charge has been carrying on the work in addition to his other duties. Three pupils at this hospital are now ready for their final examination as midwives which it is hoped will be held early in 1929.

The General Return of Diseases shows that an increasing number of diseases peculiar to women are being treated at the various Government institution and the confidence of the people has been gained. School children are being attended at the Government dispensaries free of charge while the various schools in the districts are visited by the Medical Officer when on tour in his district. The Government subsidise a fulltime Health Visitor recommended by the Church Missionary Society who is employed in visiting the schools and giving lectures and antenatal advice to the women in these areas. Maternity and child welfare is also carried out at all the larger mission centres in both the Southern and Northern Provinces chiefly at Ogbomosho, Ilesha, Iyi-Enu, Uburu, Itu, Itinan and Umuahia in the south while extremely good work is being done by the Dutch Reformed Church Mission at Mkar in the Northern Provinces.

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINICS.

Reference has already been made to the increase in hospital accommodation under general remarks but there is still lack of inpatient accommodation to meet the needs of the people. This deficiency is met to some extent by the hospitals being established by the various Native Administrations and Missions.

New hospitals are in progress of erection at Lagos and Oshogbo, while those at Ibadan, Benin and Ijebu Ode and Aba are now completed fully equipped and in occupation. In the mandated area of the Cameroons, the hospitals at Bamenda, Kumba and Mamfe were completed and are doing good work. In the Northern Provinces, the new European and African Hospitals at Jos were completed and occupied and were proving a great success. The new hospitals at Kano should be ready for occupation early in 1929.

New hospitals are also being erected at Lafia Beri-Beri and Kafanchan as well as at Makurdi for the Benue Bridge Construction parties.

The following tables show the increase in cases attended at Government Institutes in both the Southern and Northern Provinces.

SOUTHERN PROVINCES AND CAMEROONS.

		1926.	1927.	1928.
European In-patients	...	952	950	1,052
" Out-patients	...	4,091	4,494	5,783
African In-patients	...	15,842	16,435	18,269
" Out-patients	...	181,845	255,964	266,615

NORTHERN PROVINCES.

		1926.	1927.	1928.
European In-patients	...	315	365	501
" Out-patients	...	1,550	1,962	2,746
African In-patients	...	8,915	10,461	10,904
" Out-patients	...	47,121	71,816	87,476

The figures quoted in the table under Southern Provinces include those of the mandated area of the Cameroons and it is interesting to note that in 1928 3,287 inpatients, 47,839 outpatients were treated in the Government Institutions in that area. The total deaths recorded was 194, and 1,014 surgical operations were performed during the year.

The principal diseases treated among Europeans during the year were malaria, dysentery, gastro-intestinal disorders; while among Africans, malaria, respiratory and gastro-intestinal diseases and diseases due to external causes were most prevalent.

There has been a marked increase in the number of cases of leprosy treated. This is due to the good results of modern treatment. The growing belief of the people that they may be cured of a disease which they looked upon as incurable, is now causing them to come more readily for early treatment. Similarly in the case of yaws, the effective and immediate results due to treatment with the arsenical and bismuth preparations is causing a very large increase in the number of attendances.

Modern facilities for the treatment of venereal diseases are provided at all the larger hospitals and other stations.

Medical requirements for railway construction were provided during the year in the Northern Provinces on the Kano-Nguru and Kano-Gusau, Zaria-Kaduna Namoda sections.

The European Construction Hospital at Zaria admitted seventy-eight patients during the year, twenty-three being African construction officials, forty-six officials of other Government departments with nine non-official Europeans. The Construction African Hospital at Funtua was closed down on the 31st December; the few patients being removed to Gusau. An African Hospital was opened at Taura 54½ miles on the Kano-Nguru section.

The general health of the Europeans on Construction was fairly good, three deaths occurred during the year, *viz.*, one from cerebral malaria on the Ifo-Idogo march, one due to murder by a native on the Gusau-Namoda section and one at Kano due to gunshot wound.

Forty-six European Construction Officials were treated during the year, twenty-three being treated at Zaria and twenty-three at Kaduna and Kano European Hospitals, the total number of inpatients days being 669. Twenty-eight were treated as outpatients with a total of 148 days on the sick list. Five Construction Officers were invalided during the year.

The general health of the African staff has been very good, there were no epidemics of any kind and the death rate was low, *viz.*, twenty-six, as compared with fifty-eight in 1927. The main diseases treated at the Railway Construction Hospitals and Dressing Stations were as follows:—

Disease.						Male.	Female.	Total.
Malaria	...	...	...	...	...	718	142	860
Dysentery	...	...	...	...	...	190	49	239
Syphilis	...	...	...	...	...	154	26	180
Other Venereal Diseases	...	...	...	...	...	643	20	663
Rheumatism	...	...	...	...	...	849	96	945
Eye Affections	...	...	...	...	...	287	61	348
Respiratory	...	...	...	...	...	1,027	106	1,193
Affections of the Digestive System	...	...	...	...	...	2,202	334	2,536
Intestinal Parasites	...	...	...	...	...	489	69	558
Ulcers	...	...	...	...	...	3,387	102	3,489
External Injuries and wounds	...	...	...	...	...	2,687	170	2,857
Total	...	...	...	...	...	12,633	1,235	13,868

The Government Dentist, Mr. Pearson, was on leave during the period June to November of the year under review. A second Dentist was appointed to the staff and assumed duty in Nigeria on the 26th September and was posted to the Northern Provinces for duty; this appointment will considerably facilitate the work in this province. Both dentists are very fully occupied and there has been a considerable increase in the work done as compared with previous years.

The following tables show details of work done in the Northern Provinces from the date of arrival of the Dentist to the end of the year and in Southern Provinces during the year:—

DETAILS OF DENTAL WORK, NORTHERN PROVINCES, FROM 28TH
SEPTEMBER, 1928 TO 31ST DECEMBER, 1928.

	Fillings.	Extrac- tions.	Dressings.	Sealings.	Root treatments.	Crowns.	Part Dentures.
European Officials ...	91	34	21	20	4	1	—
Officials' Wives ...	14	2	8	1	—	—	—
Non-Official Europeans	45	6	6	9	2	—	—
African Officials and Wives	3	32	—	4	—	—	1
Non-Official Africans	—	8	—	—	—	—	—
Total	153	82	35	34	6	1	1

SOUTHERN PROVINCES.

The number of patients who presented themselves for dental treatment were as follows:—

European officials	350
Native officials	135
Wives and children	30
Conservation work, synthetic fillings ...	121
Amalgams	295
Copper amalgams	15
Gutta percha (temporary fillings) ...	300
Gutta percha (permanent fillings) ...	15
Sealings	290
General suppurative cervical perio- dontitis	163
Extractions	260
Dentures and repairs	90

SURGICAL OPERATIONS, 1928.

	Total.	Cured.	Relieved.	Unrelieved.	Died.
A. GENERAL.					
Amputations	167	139	18	...	10
Aneurism ... ..	...	...	...	...	...
Appendectomy	31	26	...	...	5
Arthrectomy	17	12	3	...	2
Empyema	8	6	1	...	1
Fractures Plated, etc. ...	37	29	6	1	1
Coloplicopexy ... ..	...	...	...	...	...
Herniotomy	752	689	13	6	44
Hepatic Abscess (Drainage, etc.)	4	2	...	...	2
Laparotomy	35	8	6	5	16
Elephantiasis (Limb) ...	15	15	...	...	...
Perforated Gastric Ulcer (Suture) ... ..	...	...	...	...	...
Perforated Duodenal Ulcer (Suture) ... ..	...	...	...	...	...
Hæmorrhoids (Radical Cure)...	49	41	8	...	...
Acute Pancreatitis (Colos- tomy) ... ..	...	...	...	...	...
Colotomy	1	1	...	...	...
Ligature Popliteal Artery ...	...	...	...	...	...
Excision, Benign Tumours and Cysts	359	352	2	...	5
Excision, Malignant Tumours	49	14	18	6	11
Excision Glands	19	18	...	...	1
Excision Breast	8	8	...	...	...
Nephrotomy	2	1	1	...	...
Enterectomy	2	1	1	...	...
Sequestrotomy	98	71	21	1	5
Osteotomy	3	1	2	...	...
Thyroidectomy	15	14	1	...	...
Trephining	3	1	...	...	2
Splenectomy	3	2	...	...	1
Other operations	1,502	1,370	90	15	27
B. EYES.					
Cataract	8	8	...	...	...
Enucleation	3	3	...	...	...
Other operations	39	28	10	1	...
C. EAR.					
Mastoid Schwartz operation	7	7	...	...	...
Other operations ... ..	...	...	...	...	...
D. GENITO URINARY, MALE.					
External Urethrotomy ...	61	48	9	...	4
Dilation of Stricture ...	325	100	222	3	...
Elephantiasis of Scrotum ...	157	147	3	...	7
Hydrocele (Radical Cure) ...	565	534	28	1	2
Varicocele	4	4	...	...	...
Circumcision	645	645	...	...	...
Cystotomy	13	10	1	...	2
Orchidectomy	10	9	1	...	...
Other operations	131	34	96	...	1
GENITO URINARY, FEMALE.					
Abdominal Hysterectomy ...	4	4	...	...	...
Elephantiasis	13	11	2	...	...
Ovariectomy	11	10	...	...	1
Salpingectomy	5	4	...	...	1
Hysterectomy	1	1	...	...	...
Hysteropexy	11	11	...	...	...
Fibroids (Removal)	1	...	1	...	...
Perineoplasty	2	2	...	...	...
Endometritis (Curettage) ...	119	84	35	...	...
Colporrhaphy	8	8	...	...	...
Other operations	40	22	15	2	1
E. OBSTETRICAL.					
Forceps Extraction	48	32	7	...	9
Podalic Version ... ..	...	...	...	...	...
Craniotomy ... ..	...	...	...	...	...
Ectopic Gestation	4	3	...	1	...
Cæsarian Section ... ..	...	...	...	...	...
Other operations	27	24	2	...	1
F. MINOR SURGICAL OPERATIONS.					
Abscesses General	13	13	...	...	...
Injuries, etc.	2,573	2,472	89	3	9
Not including Intravenous In- jections	1,600	1,501	76	11	12
Totals	9,627	8,600	788	56	183

NATIVE ADMINISTRATION PRISONS—NORTHERN PROVINCES.

During the year 1928, the average daily number in the Northern Prisons was 2,743.8 with 188 recorded deaths. These figures do not give reliable statistics as these prisons are only visited at intervals by a Government Medical Officer. There was no epidemic or undue mortality reported.

ASYLUMS—MENTAL ALIENATION CASES.

The principal asylum for mental alienation cases is Yaba Asylum near Lagos. A small asylum with accommodation for twenty patients is also maintained at Calabar, which is invariably full, vacancies only occurring on the rare occasions of the discharge of a patient or death. In addition there are special blocks in the prisons in Lagos and Onitsha for the accommodation of all criminal lunatics. The total number of cases of mental alienation recorded during the year was 363, of whom twelve were Europeans.

There were 157 cases under treatment at Yaba Asylum, ten deaths occurred during the year; twenty-two were treated at Calabar with four deaths. The general health in both these institutions has been very good.

Dr. Home the Alienist, made an extensive tour throughout Nigeria and made a personal examination of all patients detained in the hospitals, prisons and asylums and also made a study of the prevalence of insanity in twenty-five centres of population in different areas of the colony. Insanity occurs throughout Nigeria and no race or tribe or class is exempt. More cases are usually reported from the civilised communities. The greater stress of modern life has little effect on the mental condition of a people whose civilisation has developed slowly but it will bear hardly on the minds of backward tribes subjected to rapid civilising influences. For this reason an increase in the incidence of insanity may be anticipated in the Southern Provinces of Nigeria. Dr. Home estimates the proportion of insane in Nigeria at present to be at least twenty per 100,000 of population. The sex ratio of reported cases in Nigeria of males to females is three to one. The predisposing cause in the most number of cases is unstable mental heredity with the superstition of juju as a very likely exciting cause. In addition in Nigeria the physical causes are trauma toxaemia and the infections. Mania in its various forms accounts for the largest number of cases, amentia is also common and accounts for the majority of the criminal lunatics, melancholia as well as the psychoses of the schifoid group, *viz.* dementia praecox, D. paranoides paranoia are not common.

Psychoses associated with organic brain disease are remarkably rare although syphilitic infection is very common. Very few cases of general paralysis of the insane are encountered and its rarity is very striking. The establishment of a large Mental Hospital to deal with insanity is being considered and plans are in process of being made. It is hoped that in a year or two a properly equipped modern hospital will deal with these cases.

VIII.—METEOROLOGY.

The rainfall, during 1928 was considerably less than that of the previous year.

In the Northern Provinces, the highest fall recorded was at Lokoja, *viz.*, 62.10 inches but this was 11.5 inches less than in 1927; all fifteen stations show a decrease except Kano where the rainfall was 4.9 inches in excess of that of 1927.

In the Southern Provinces, Calabar recorded the highest rainfall, *viz.*, 141.83 inches, 48.41 inches below that of 1927; there was an increase recorded at Lagos, Ibadan and Enugu.

A summary of the records at twenty representative stations is given in Table III of the report. Further meteorological data from out-stations will be found in the Annual Report of the Survey Department.

IX.—SCIENTIFIC.

The Annual Report from the Director of Medical Research Institute, the Tsetse Investigators, the Pathologists of Lagos, Kaduna and Calabar, the Officer in charge of Anti-Plague Measures, the Radiologist, the Port Health Officer, Lagos, the Superintendent of the Pharmacy School, the Secretary of the Nigerian Branch of British Leprosy Relief Association appear as appendices.

G. J. PIRIE,

*Acting Director of Medical and
Sanitary Service.*

COMPARATIVE MONTHLY RAINFALL—LAGOS, 1918-1928.

Month.	YEAR.											
	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	
January	Nil.	0.12	0.37	0.31	0.59	0.89	1.94	1.50	Nil.	2.49	1.77	
February	3.66	2.74	0.11	0.02	0.81	1.22	1.12	0.40	3.01	2.35	2.22	
March	7.86	5.98	3.78	3.42	1.50	2.60	5.28	6.61	2.74	2.78	8.20	
April	4.15	3.96	5.71	4.81	7.42	6.43	7.55	7.00	12.76	3.37	6.96	
May	7.85	8.58	8.91	21.55	8.13	13.55	3.45	12.16	13.69	8.19	15.23	
June	18.13	8.31	14.97	15.34	26.36	25.08	5.53	20.40	13.06	7.08	21.05	
July	1.03	0.86	9.55	16.86	2.75	10.44	2.48	15.22	10.07	8.57	2.53	
August	1.32	0.20	1.36	3.53	5.73	0.12	0.10	1.28	0.26	0.25	2.05	
September	3.71	2.74	0.45	7.94	11.32	3.15	4.10	5.98	11.05	3.04	5.00	
October	4.11	8.96	5.06	3.74	15.40	5.36	15.62	2.98	3.79	13.33	12.67	
November	2.05	4.66	2.79	3.35	3.51	2.72	0.83	2.87	5.47	2.38	.54	
December	0.02	1.28	0.04	2.35	0.85	Nil.	1.92	Nil.	0.07	1.17	.13	
Total	53.89	48.39	53.10	83.22	84.37	71.56	49.92	76.40	75.97	55.00	79.05	

(a).—STAFF OF THE DEPARTMENT.

Title.	Name.	On Leave.		REMARKS.
		From.	To.	
Director of the Medical and Sanitary Service	David Alexander, C.M.G.	5-10-28	31-12-28	
Deputy Director of the Medical and Sanitary Service	T. B. Adam ..	1-6-28	13-10-28	Retired, 14-10-28. Promoted Deputy Director of Medical and Sanitary Service on 14-10-28.
Do. do.	H. T. Palmer ...	16-11-28	31-12-28	
Assistant Director of the Medical and Sanitary Service	T. M. Russel Leonard	13-1-28	23-5-28	Promoted Assistant Director of Medical and Sanitary Service on 14-10-28.
Assistant Director of Medical Service	J. M. W. Pollard	10-2-28	23-4-28	Retired, 24-4-28.
Do. do.	T. L. Craig ...	4-5-28	20-10-28	
Do. do.	M. W. Fraser ...	23-10-28	31-12-28	
Do. do.	S. Goodbrand ...	10-12-28	31-12-28	
Do. do.	J. Y. Wood ...	—	—	Transferred from Sierra Leone.
Do. do.	L. W. Davies, O.B.E.	1-1-28	6-3-28	Promoted A.D.M.S. on 16-10-28.
Specialist	E. E. Maples ...	28-8-28	14-11-28	Retired on pension, 15-11-28.
Do.	H. H. Stewart ...	1-1-28	29-2-28	
Do.	E. C. Braithwaite	1-1-28	1-2-28	
Do.	Frank Ross ...	27-1-28	18-9-28	
Alienist	B. F. Home ...	26-10-28	31-12-28	
Senior Medical Officer	C. W. O'keeffe ...	20-1-28	4-5-28	
Do. do.	G. F. Forde ...	18-5-28	7-11-28	
Do. do.	L. H. Booth ...	30-11-28	31-12-28	
Do. do.	A. J. M. Crichton	18-5-28	21-11-28	
Do. do.	J. W. Thomson	1-1-28	23-5-28	
Do. do.	J. S. Pearson ...	1-1-28	8-6-28	Invalidated.
Do. do.	H. R. M. Ferguson	—	—	
Do. do.	R. H. Nolan ...	19-10-28	31-12-28	
Do. do.	K. K. Grieve ...	1-6-28	4-12-28	
Do. do.	W. E. Glover ...	1-1-28	31-5-28	
Do. do.	J. Lindsay ...	10-12-28	31-12-28	
Do. do.	C. G. Grey ...	1-1-28	6-1-28	
Pathologist	G. G. Butler, M.B.E.	—	—	Transferred to Gold Coast, 24-8-28.
Do.	H. Morrison ...	2-11-28	31-12-28	
Do.	G. W. St. Clair Ramsay	15-6-28	31-12-28	
Do.	W. E. McCulloch	7-4-28	31-12-28	
Research Medical Officer	R. F. Burnie ...	—	—	
Superintendent Dispenser	G. Taylor ...	—	—	
Training School	S. L. G. D. Mac-laine ...	24-8-28	16-11-28	Retired on 17-11-28.
Medical Officer	John Lindsay ...	10-12-28	31-12-28	
Do. do.	G. H. Gallagher	23-3-28	—	Promoted S.M.O., 24-4-28 and transferred to Sierra Leone.
Do. do.	W. A. Nicholson	10-8-28	12-12-28	Retired on 13-12-28.
Do. do.	J. P. B. Snell ...	31-7-28	30-11-28	Retired on 1.12.28.
Do. do.	R. H. Brierley ...	20-1-28	27-6-28	
Do. do.	B. J. Courtney ...	1-1-28	23-5-28	

Title.				Name.	On leave.		REMARKS.
					From.	To.	
Medical Officer	...	...	...	W. I. Martyn-Clark	1-1-28	20-6-28	Promoted S.M.O. on 8-6-28 and transferred to Gold Coast.
Do.	do.	...	...	B. A. F. Dilke	18-5-28	1-8-28	Retired on pension, 2-8-28.
Do.	do.	...	...	W. G. Cobb, D.S.O.	1-1-28	25-4-28	
Do.	do.	...	...	C. Kelsall	5-10-28	31-12-28	
Do.	do.	...	...	E. B. L. Anderson	—	—	
Do.	do.	...	...	B. W. F. Wood	5-10-28	31-12-28	
Do.	do.	...	...	H. North	—	—	
Do.	do.	...	...	W. E. Digby	10-12-28	31-12-28	
Do.	do.	...	...	J. W. B. Hanington	—	—	
Do.	do.	...	...	R. H. Miller	21-12-28	31-12-28	Died, 18-3-28.
Do.	do.	...	...	E. Gibson, M.C.	1-1-28	10-5-28	
Do.	do.	...	...	C. Mackey	29-6-28	4-12-28	
Do.	do.	...	...	J. T. Watt	8-6-28	18-12-28	
Do.	do.	...	...	J. R. C. Stephens	1-1-28	18-1-28	
Do.	do.	...	...	G. E. Craig	—	—	Transferred from Gambia.
Do.	do.	...	...	M. Morrison	—	—	
Do.	do.	...	...	W. J. McClintock	—	—	
Do.	do.	...	...	J. B. Steven	5-12-28	31-12-28	
Do.	do.	...	...	G. D. K. Waldron, M.C.	1-1-28	15-2-28	
Do.	do.	...	...	N. A. Dyce-Sharp	1-1-28	29-2-28	
Do.	do.	...	...	D. G. F. Moore	6-7-28	31-12-28	
Do.	do.	...	...	C. J. H. Sharp	7-4-28	7-11-28	
Do.	do.	...	...	E. W. Adcock	19-10-28	31-12-28	
Do.	do.	...	...	R. P. Crawford	—	—	
Do.	do.	...	...	H. B. Lee, D.S.O., M.C.	1-1-28	25-7-28	
Do.	do.	...	...	E. G. A. Don	28-8-28	31-12-28	
Do.	do.	...	...	P. J. Caffrey	23-3-28	7-11-28	
Do.	do.	...	...	F. McGrath	15-6-28	31-12-28	
Do.	do.	...	...	J. P. Naudi	6-7-28	18-12-28	
Do.	do.	...	...	E. J. Crawford	30-11-28	31-12-28	
Do.	do.	...	...	C. E. Sharp	—	—	
Do.	do.	...	...	W. Nelson	—	—	
Do.	do.	...	...	C. Wilson	—	—	
Do.	do.	...	...	J. R. H. Pasqual	—	—	
Do.	do.	...	...	F. H. King	1-1-28	10-5-28	
Do.	do.	...	...	H. C. E. Chantler	19-10-28	31-12-28	
Do.	do.	...	...	P. H. Rawson	—	—	
Do.	do.	...	...	H. B. Boucher	1-1-28	10-5-28	
Do.	do.	...	...	T. James	—	—	
Do.	do.	...	...	N. S. Williams	1-1-28	11-1-28	
Do.	do.	...	...	G. Clark	1-1-28	23-5-28	
Do.	do.	...	...	D. M. Mackay	8-1-28	12-9-28	
Do.	do.	...	...	T. Cullen	23-3-28	12-9-28	
Do.	do.	...	...	G. Sanders	27-1-28	20-6-28	
Do.	do.	...	...	E. H. L. Le Clezio	13-4-28	24-9-28	
Do.	do.	...	...	J. C. Paisley	16-3-28	22-8-28	
Do.	do.	...	...	I. G. MacGregor	16-3-28	22-8-28	
Do.	do.	...	...	C. S. J. Kearney	5-5-28	13-11-28	
Do.	do.	...	...	J. S. Oliphant	27-9-28	31-12-28	
Do.	do.	...	...	T. O'Carroll	25-9-28	31-12-28	
Do.	do.	...	...	T. B. McAleer	11-5-28	10-10-28	
Do.	do.	...	...	J. S. Robinson	7-9-28	31-12-28	
Do.	do.	...	...	G. Simpson	21-9-28	31-12-28	
Do.	do.	...	...	W. S. Ormiston	16-11-28	31-12-28	
Do.	do.	...	...	A. J. Murray	—	—	
Do.	do.	...	...	J. D. Horsburgh	—	—	
Do.	do.	...	...	G. G. Brander	—	—	
Do.	do.	...	...	L. H. Thomas	—	—	
Do.	do.	...	...	R. K. Phillips	—	—	
Do.	do.	...	...	A. E. F. L. Forbes	10-2-28	23-5-28	
Do.	do.	...	...	F. L. G. Selby	—	—	
Do.	do.	...	...	B. G. T. Elmes	—	—	
Do.	do.	...	...	G. V. Fiddian	—	—	

Title.	Name.	On leave.		REMARKS.
		From.	To.	
Medical Officer	R. N. Hall			
Do. do.	E. I. Bieber	1-1-28	1-2-28	
Do. do.	F. Kane	—	—	New Appointment.
Do. do.	C. W. Hope-Gill			do.
Do. do.	G. Shearer			do.
Do. do.	D. W. McLaren			do.
Do. do.	H. M. Soar			do.
Do. do.	C. W. Mackey			do.
Do. do.	H. C. Weir			do.
Do. do.	A. H. Bean			do.
Do. do.	T. H. I. Potts			do.
Do. do.	A. C. Lovett-Campbell			do.
Do. do.	D. C. G. Halon			do.
Do. do.	G. Winter			do.
Do. do.	W. H. Emslie			do.
Lady Medical Officer	H. S. Keer	21-12-28	31-12-28	
Do. do.	B. E. Ebdon	9-3-28	17-10-28	
Do. do.	G. Lowe	—	—	Appointed, 14-7-28.
Medical Officer	K. Faderin	1-9-28	30-11-28	Retired on 1-12-28.
Do.	I. G. Cummings	—	—	Invalided, 1-3-28.
Do.	A. B. W. Smart	24-8-28	24-12-28	
Junior Medical Officer (African)	S. L. A. Manuwa	—	—	Non-pensionable.
Do. do.	R. G. A. Savage			do.
Do. do.	L. E. R. Henshaw			do.
Dentist	C. N. Pearson	1-6-28	10-10-28	
Do.	C. D. Cunningham	—	—	Not pensionable.
TSETSE INVESTIGATION.				
Tsetse Investigator (Specialist)	W. B. Johnson	24-10-28	31-12-28	
Do. Do.	Ll. Lloyd	20-4-28	12-9-28	
Assistant Do.	P. H. Rawson, M.C.			
Do. do.	H. M. O. Lester	1-1-28	31-5-28	
Entomologist	A. W. Taylor	19-10-28	31-12-28	
MEDICAL RESEARCH.				
Director of Medical Research Institute	A. Connal	1-1-28	29-2-28	
Assistant Bacteriologist	E. C. Smith	16-11-28	31-12-28	
Do. do.	J. A. Young	1-1-28	18-9-28	
SANITARY.				
Deputy Director of Sanitary Service	G. J. Pirie	23-3-28	25-9-28	
Assistant Director of Sanitary Service	W. Allan			
Senior Sanitary Officer	G. C. M. Davies, M.C.	18-5-28	4-12-28	
Do. do.	J. A. A. Duncan			
Do. do.	G. B. Walker			
Do. do.	J. Cauchi			
Do. do.	G. R. Waller	16-2-27	3-9-28	
Medical Officer of Health	J. MacDonald	21-9-28	31-12-28	
Do. do.	N. S. Turnbull			
Do. do.	J. G. S. Turner	27-7-28	31-12-28	
Do. do.	W. C. Smith			
Do. do.	A. Robertson	21-9-28	31-12-28	
Do. do.	H. P. Fowler	24-2-28	1-8-28	
SPECIAL PLAGUE STAFF.				
Senior Sanitary Officer	Major W. J. E. Bell, D.S.O.	15-6-28	21-11-28	Seconded from R.A.-M.C.
Do. do.	Major R. E. Price, D.S.O., R.A.M.C.			do.

Title.	Name.	On leave.		REMARKS.
		From.	To.	
NURSING STAFF.				
Matron	L. M. Single ...			
Senior Nursing Sister	F. A. King ...			
Do. do. ...	E. O'Hara ...	1-1-28	18-9-28	
Do. do. ...	L. Mernagh ...	1-1-28	1-2-28	
Do. do. ...	W. Norwood ...	1-1-28	29-2-28	
Do. do. ...	B. Hulme ...	1-1-28	29-2-28	
Do. do. ...	E. N. Price ...	1-1-28	11-1-28	
Do. do. ...	M. Slaney ...	24-2-28	1-8-28	
Do. do. ...	M. MacDonald ...	20-1-28	4-7-28	
Do. do. ...	A. E. Blakemore	3-8-28	31-12-28	
Nursing Sister ...	E. M. Scammell	19-10-28	31-12-28	
Do. ...	E. Cordiner ...	21-9-28	31-12-28	
Do. ...	M. A. L. Gummow	11-5-28	10-10-28	
Do. ...	Ethel Williams ...	27-1-28	—	Resigned, 4-5-28.
Do. ...	V. M. Gillespie	13-1-28	20-6-28	
Do. ...	I. W. Dron ...	6-7-28	31-12-28	
Do. ...	Freder Roche ...	10-8-28	18-12-28	
Do. ...	C. W. Caulfield ...			
Do. ...	Ellen Patchell ...			
Do. ...	J. M. Garvey ...			
Do. ...	E. Walker ...	19-10-28	31-12-28	
Do. ...	L. S. Buist ...			
Do. ...	W. C. Evans ...	1-1-28	7-3-28	
Do. ...	R. Baldock ...	1-1-28	8-2-28	
Do. ...	B. Skerritt ...	1-1-28	24-5-28	
Do. ...	A. V. Butcher ...	1-1-28	5-4-28	Resigned, 6-4-28.
Do. ...	E. Taylor-Smith	13-1-28	23-5-28	
Do. ...	K. E. Jones ...	17-2-28	4-7-28	
Do. ...	M. A. A. Swynerton.	—	—	Transferred from Gold Coast.
Do. ...	A. F. McTavish	23-3-28	1-8-28	
Do. ...	K. W. Storrier ...	10-12-28	31-12-28	
Do. ...	H. K. Donaldson	10-8-28	31-12-28	
Do. ...	M. Lancaster ...	25-12-28	31-12-28	
Do. ...	C. A. Maude ...	13-7-28	7-11-28	
Do. ...	M. Earl ...			
Do. ...	M. G. Duke ...			
Do. ...	K. L. Cowan ...			
Do. ...	M. Butler ...	21-12-28	31-12-28	
Do. ...	V. S. McAndrew			
Do. ...	M. P. Steele ...			
Do. ...	N. M. C. Horrocks	—	—	New Appointment.
Do. ...	J. J. Innes ...			do.
Do. ...	M. E. Saunders ...			do.

(b) PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF.

Assistant Accountant ...	W. J. Bocking ...	24-2-28	1-8-28
Office Assistant ...	C. G. Hearn ...		
Chief Dispenser and Store-keeper ...	E. G. Stoneham		
Do. do. ...	G. H. Green ...	10-2-28	1-8-28
Do. do. ...	E. M. Cragg ...	1-1-28	10-5-28

RESEARCH.

Technical Assistant ...	E. F. Hines ...		
Do. do. ...	F. W. Randoll		

SANITARY.

Sanitary Inspector, Grade I.	N. W. J. Turnbull		
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Title.	Name.	On leave.		REMARKS.
		From.	To.	
AFRICAN.				
Chief Clerk	J. C. Foresythe	1-5-28	31-7-28	Retired on Pension, 13-3-28.
Chief Dispenser	J. J. Nicol ...	8-10-28	28-10-28	
Do.	T. J. O. Watson ...	15-12-28	31-12-28	
Chief Storekeeper	J. T. C. Robbin	—	—	
Do. do.	S. J. Coker ...	1-6-28	12-8-28	
Assistant Chief Storekeeper	W. D. Green ...	1-1-28	2-2-28	
Do. do. —	B. E. Bassey ...			
Senior Dispenser	T. A. O. L. Asolo.	3-9-28	2-12-28	
Do.	J. A. Bara-Hart ...			
Do.	A. G. da Silva ..			
Do.	I. N. O. Anthony ...			
Do.	F. E. I. Leigh ...			
Do.	O. S. Thomas ...			
Do.	D. O. Johnson ...			
Assistant Chief Clerk ...	T. R. Mullen ...	4-1-28	6-4-28	
Do. do.	S. P. Y. Akofur ...	21-9-28	20-10-28	
Do. do.	P. A. Welsing ...	—	—	
Do. do.	A. J. Salvador ...			
Do. do.	B. Majekodunmi ...			
SANITARY.				
Registrar of Vital Statistics	E. J. Martins ...	5-6-28	4-9-28	Retired on Pension, 26-4-28.
Assistant Chief Clerk ...	E. B. Beckley ...			
Senior Sanitary Inspectors	E. E. Henshaw	6-3-28	3-4-28	

(c).—PRINCIPAL APPOINTMENTS, PROMOTIONS AND CHANGES
DURING THE YEAR, 1928.

The following European Officers retired on pension :—

Drs. T. B. Adam, E. E. Maples, J. M. W. Pollard, C. W. O'Keeffe, J. S. Pearson, T. A. Dowse, B. A. Fetherston-Dilke, L. H. Booth, S. L. G. D. MacClaine, W. A. Nicolson, J. P. B. Snell.

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

Dr. G. H. Gallagher, Medical Officer, promoted Senior Medical Officer, Sierra Leone.

„ G. G. Butler, Pathologist, promoted Director of Medical Research Institute, Gold Coast.

„ W. I. Martyn-Clark, Medical Officer, promoted Senior Medical Officer, Gold Coast.

The following Medical Officer was transferred to Nigeria :—

Dr. J. Y. Wood, Senior Medical Officer, Sierra Leone, promoted Assistant Director of Medical Service, Nigeria.

The following Officers were promoted during the year.

Dr. H. T. Palmer, Assistant Director of Medical and Sanitary Service, promoted Deputy Director of Medical and Sanitary Service.

„ T. M. Russell-Leonard, Assistant Director of Medical Service, promoted Assistant Director of Medical and Sanitary Service.

„ L. W. Davies, Senior Medical Officer, promoted Assistant Director of Medical Service.

„ J. Lindsay, Medical Officer, promoted Senior Medical Officer.

„ C. G. Grey, Medical Officer, promoted Senior Medical Officer.

„ W. E. McCulloch, Medical Officer, promoted Pathologist.

„ W. E. Glover, Medical Officer, promoted Senior Medical Officer.

„ W. Allan, Senior Sanitary Officer, promoted Assistant Director of Sanitary Service.

„ J. Cauchi, Medical Officer of Health, promoted Senior Sanitary Officer.

„ G. R. Waller, Medical Officer of Health, promoted Senior Sanitary Officer.

„ A. Robertson, Medical Officer, promoted Medical Officer of Health.

„ H. P. Fowler, Medical Officer, promoted Medical Officer of Health.

NEW APPOINTMENTS.

Fifteen Medical Officers were appointed during the year, including one Lady Medical Officer, one Dentist.

RESIGNATION.

One Medical Officer resigned his appointment.

Two Medical Officers were permanently Invalided.

One Medical Officer's appointment was terminated.

DEATH.

Dr. J. W. B. Hanington, Medical Officer, died at Ibi on 18th March, 1928.

„ A. Crawford, Medical Officer of Health, died in England on 16th October, 1928.

TABLE II.

FINANCIAL.

I.—*Expenditure.*

(a).—PERSONAL EMOLUMENTS.

(1) MEDICAL.

Administrative Officers	} £185,770
Specialists	...	...	...
Senior Medical Officers	...	...	...
Medical Officers (European and African)	...	...	...
Dental Surgeon	...	...	...
European Nursing Staff	...	...	...
Clerical Staff	...	...	...
Dispensers and African Nursing Staff	...	...	...
Other Items under Personal Emoluments	...	...	...

(2) SANITATION.

Administrative Officers	} £39,994
Health Officers	...	...	...
European Sanitary Inspectors	...	...	...
African Sanitary Inspectors	...	...	...
Other Items under Personal Emoluments	...	...	...

(3) MEDICAL RESEARCH.

European Staff	} £5,269
African Staff	

(b)—OTHER CHARGES.

(1) MEDICAL.

	£
Medical, Surgical, Dental and X-Ray	
Equipment and Supplies	33,339
Diets, Provisions and Necessaries	15,943
Other Items	26,186
	<u>£75,468</u>

SPECIAL EXPENDITURE.

	£
Tsetse Fly Investigation	19,711
Hospital Equipment	11,257
Other Items	9,615
	<u>£40,583</u>

(2) SANITATION.

	£
General Sanitary	28,280
Plague Expenses	40,282
Special Expenditure	8,669
Other Items	18,948
	<u>£96,179</u>

(3) MEDICAL RESEARCH.

Other Charges, Miscellaneous	£2,106
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TOTAL, MEDICAL AND SANITARY EXPENDITURE	...	<u>£437,944</u>
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II.—Receipts.

	£	s.	d.
Hospital and Medical Receipts	10,788	0	0
Births and Deaths	12	16	0
	<u>£10,800</u>	<u>16</u>	<u>0</u>

INTER DEPARTMENTAL SERVICES.

RECEIPTS AND EXPENDITURE, MEDICAL DEPARTMENT, FOR THE YEAR 1928.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Hospital and Medical Receipts for the year 1928	10,800	16	0	Marine Services to Medical and Sanitary Department	1,552	14	10
Medical charges against the Nigerian Railway ...	29,436	0	0	Electric Light ...	3,974	4	7
Sanitary charges against the Nigerian Railway ...	1,274	1	2½	Water ...	684	0	0
Excess of Expenditure over Receipts ...	418,556	12	2½	Railway Services ...	8,537	10	0
				Total Personal Emoluments (Medical, Sanitary and Research) ...	230,983	0	0
				Other Charges (Medical, Sanitary and Research)	214,336	0	0
	£460,067	9	5		£460,067	9	5

TABLE III.

METEOROLOGICAL RETURNS FOR 1928.

STATION.	Absolute Shade Max.	Absolute Shade Min.	Average Max.	Average Min.	Relative Humidity.	Rainfall inches.
Ilorin ...	96·7	60·3	90·4	66·8	79·6	49·83
Kaduna ...	94·5	57·0	88·2	62·5	99	50·52
Maiduguri ...	109·3	57·9	98·7	69·7	76·7	23·34
Kano ...	105·2	55·6	94·6	66·9	51·2	34·94
Lokoja ...	103·8	68·2	92·6	71·4	77·1	62·10
Yola ...	103·7	67·1	94·4	71·4	61·6	44·49
Lagos ...	89·0	73·9	85·4	75·5	79·5	79·05
Ibadan ...	101·2	65·5	91·2	71·8	90·3	59·45
Calabar ...	90·3	66·5	84·6	70·9	83·5	141·83
Enugu ...	93·7	64·2	87·7	72·5	85·6	67·96

TABLE IV.
RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928.

Diseases.			IN-PATIENTS.					OUT-PATIENTS.		
			Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
				Admis- sions.	Deaths.					
I.—Epidemic, Endemic, and Infectious Diseases.										
1. Enteric Group—										
(a) Typhoid Fever	...	...	4	...	4	1	...	...	...
(b) Paratyphoid A.	...	...	4	...	4	...	1	...	...
(c) Paratyphoid B.	...	...	3	...	3	...	...	...	...
(d) Type not defined	...	...	6	...	6	...	1	...	...
2. Typhus	...	...	...	...	...	...	...	...	...
3. Relapsing Fever	...	...	...	...	...	...	...	...	...
4. Undulant Fever	...	...	...	...	...	...	...	...	...
5. Malaria—										
(a) Tertian	...	...	3	...	3	...	19	1	...
(b) Quartan	...	...	...	...	...	...	3	...	...
(c) Aestivo-autumnal	...	7	340	1	347	16	885	66	2	
(d) Cachexia	...	1	6	...	7	...	10	1	...	
(e) Blackwater	...	2	16	5	18	...	9	...	3	
6. Smallpox—										
Alastrim	...	...	1	...	1	...	...	...	...
7. Measles	...	...	3	...	3	...	8	1	...
8. Scarlet Fever	...	...	1	...	1	1	1	...	...
9. Whooping Cough	...	...	...	...	...	...	...	...	...
10. Diphtheria	...	...	...	...	...	...	1	...	...
11. Influenza	...	1	104	...	105	1	431	27	...	
12. Miliary Fever	...	...	...	...	...	...	...	...	...
13. Mumps	...	...	2	...	2	...	2	...	...
14. Cholera	...	...	...	...	...	...	...	...	...
15. Epidemic diarrhoea	...	...	...	...	...	...	...	...	...
16. Dysentery—										
(a) Amœbic	...	3	46	...	49	1	74	5	...	
(b) Bacillary	...	...	10	...	10	...	2	...	...
(c) Undefined or due to other causes	...	...	2	...	2	...	17	2	...
17. Plague—										
(a) Bubonic	...	...	...	...	...	...	...	...	...
(b) Pneumonic	...	...	...	...	...	...	...	...	...
(c) Septicaemic	...	...	...	...	...	...	...	...	...
(d) Undefined	...	...	...	...	...	...	...	...	...
18. Yellow Fever	...	...	...	...	...	...	...	...	...
19. Spirochaetosis	...	...	...	...	...	...	...	...	...
ictero-hæmorrhagica	...	...	...	...	...	...	...	...	...
20. Leprosy	...	...	...	...	...	...	...	...	...
21. Erysipelas	...	...	...	...	...	...	...	...	...
22. Acute Poliomyelitis	...	...	...	...	...	...	...	...	...
23. Encephalitis Lethargica	...	...	...	...	...	...	...	...	...
24. Epidemic Cerebro-spinal Fever	...	...	...	...	...	...	...	...	...
25. Other Epidemic Diseases—										
(a) Rubeola (German Measles)	...	...	1	...	1	...	6	...	...
(b) Varicella (Chicken-pox)	...	...	...	...	...	...	1	...	...
(c) Kala-azar	...	...	...	...	...	...	...	...	...
(d) Phlebotomus Fever	...	...	...	...	...	...	4	2	...
(e) Dengue	...	...	4	...	4	...	9	5	...
Carried forward	...	14	556	6	570	20	1,484	160	5	

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928—continued.

Diseases.	IN-PATIENTS.				Remaining in Hospital at end of 1928.	OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.		Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	14	556	6	570	20	1,484	110	5
I.— <i>Epidemic, Endemic, and Infectious Diseases</i> —contd.								
Other Epidemic Diseases—								
(f) Epidemic Dropsy
(g) Yaws
(h) Trypanosomiasis	1	...	1	...	3	...	...
26. Glanders
27. Anthrax
28. Rabies
29. Tetanus	2	...	...
30. Mycosis	1	...	1	...	14	...	...
31. Tuberculosis, Pulmonary and Laryngeal	7	1	7	...	4	...	...
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
(c) Lymphatic System
(d) Genito-urinary	1	...	1	...	...	...	...
(e) Other Organs
37. Tuberculosis disseminated—
(a) Acute
(b) Chronic
38. Syphilis—
(a) Primary	6	...	6	...	46	...	...
(b) Secondary	5	...	5	1	28	...	...
(c) Tertiary	1	...	1	...	3	...	...
(d) Hereditary...
(e) Period not indicated	1	...	...
39. Soft Chancre	5	...	5	...	41	...	...
40. A.—Gonorrhœa and its complications	10	...	10	1	204	3	...
B.—Gonorrhœal Ophthalmia	1	...	1	1	1	...	...
C.—Gonorrhœal Arthritis	1	...
D.—Granuloma Venereum
41. Septicaemia
42. Other Infectious Diseases—Trypanosomiasis	3	...	...
II.— <i>General Diseases not mentioned above.</i>								
43. Cancer or other malignant Tumours of the Buccal Cavity	1	...	1	...	1	...	...
Carried forward ...	15	594	7	609	23	1,835	114	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	15	594	7	609	23	1,835	114	5
II.— <i>General Diseases not men- tioned above—contd.</i>								
44. Cancer or other malignant Tumours of the Stomach or Liver	1	1	1	...	1	...	...
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum	1	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	1	2	1	3	...	...	...	...
49. Cancer or other malignant Tumours of Organs not specified	2	1	2	...	...	...	...
50. Tumours non-Malignant	6	...	6	...	40	...	...
51. Acute Rheumatism
52. Chronic Rheumatism	21	...	21	1	201	13	...
53. Scurvy (including Barlow's Disease)
54. Pellagra
55. Beri-Beri
56. Rickets
57. Diabetes (not including Insi- pidus)	1	...	...
58. Anæmia— (a) Pernicious
(b) Other Anæmias and Chlo- rosis	1	12	...	13	...	239	22	...
59. Diseases of the Pituitary Body
60. Diseases of the Thyroid Gland— (a) Exophthalmic Goitre	1	...	...
(b) Other diseases of the Thyroid Gland, Myxœ- dema	1	...	1	...	...	...	...
61. Diseases of the Para-Thyroid Glands...	1	...	...
62. Diseases of the Thymus
63. Diseases of the Supra-Renal Glands
64. Diseases of the Spleen	1	1	...
65. Leukæmia— (a) Leukæmia
(b) Hodgkin's Disease
66. Alcoholism	5	...	5	...	9	...	...
67. Chronic poisoning by mineral substances (lead, mercury, &c.)
68. Chronic poisoning by organic substances (Morphia, Cocaine, &c.)
Carried forward	17	645	11	662	24	2,329	150	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Rem. aining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	17	645	11	662	24	2,329	150	5
II.— <i>General Diseases not men- tioned above—contd.</i>								
69. Other General Diseases—	15	10	...
Auto-intoxication
Purpura Hæmorrhagica
Hæmophilia
Diabetes Insipidus
III.— <i>Affections of the Nervous System and Organs of the Senses.</i>								
70. Encephalitis (not including Encephalitis Lethargica)	1	1	1	...	...	...	...
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis)	...	1	...	1	...	1	...	...
72. Locomotor Ataxia
73. Other affections of the Spinal Cord	1	...	1	...	1	...	...
74. Apoplexy—
(a) Hæmorrhage
(b) Embolism
(c) Thrombosis
75. Paralysis—
(a) Hemiplegia	2	...	2	1	...	...	...
(b) Other Paralysees	1	...	1	...	...	...	...
76. General Paralysis of the Insane
77. Other forms of mental Alienation	3	...	3	...	9	...	...
78. Epilepsy	2	...	2	...	3	...	...
79. Eclampsia, Convulsions (non- puerperal) 5 years or over
80. Infantile Convulsions
81. Chorea
82. A.—Hysteria	2	...	2	...	6	1	...
B.—Neuritis	44	...	44	...	104	4	...
C.—Neurasthenia	10	...	10	1	84	6	...
83. Cerebral Softening	3	...	...
84. Other affections of the Ner- vous System, such as Paralysis Agitans	15	3	...
85. Affections of the Organs of Vision—
(a) Diseases of the eye	4	...	4	...	9	...	...
(b) Conjunctivitis	3	...	3	...	92	4	...
(c) Trachoma	1	2	...	3	...	2	...	...
(d) Tumours of the Eye	1	...	1	...	...	...	...
(e) Other affections of the Eye	12	...	12	1	78	4	...
86. Affections of the Ear or Mastoid Sinus	5	...	5	1	334	14	...
Carried forward	18	739	12	757	28	3,085	196	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1928—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	18	739	12	757	28	3,085	196	5
IV.—Affections of the Circulatory System								
87. Pericarditis
88. Acute Endocarditis or Myo- carditis
89. Angina Pectoris	2	...	2	...	2	...	...
90. Other Diseases of the Heart—	...	1	...	1	...	2	...	...
(a) Valvular—
Mitral	7	1	9	...	13	1	2
Aortic	1	...	2	...	3	...	...
Tricuspid
Pulmonary
(b) Myocarditis	13	1	13	...	15	...	...
91. Diseases of the Arteries—
(a) Aneurism
(b) Arterio-Sclerosis	1	...	...
(c) Other diseases	1	...	...
92. Embolism or Thrombosis (non- cerebral)
93. Diseases of the Veins—	5	...	...
Hæmorrhoids...	14	...	14	...	68	...	...
Varicose Veins...	2	...	2	...	10	1	...
Phlebitis	2	...	2	...	5	...	...
94. Diseases of the Lymphatic System—
Lymphangitis...	12	...	12	1	26	...	...
Lymphadenitis, Bubo (non- specific)	15	...	15	...	53	2	...
95. Hæmorrhage of undetermined cause	2	...	...
96. Other affections of the Circula- tory System	1	...	1	...	2	...	...
V.—Affections of the Respiratory System.								
97. Diseases of the Nasal Passages—
Adenoids	3	...	...
Polypus	2	...	...
Rhinitis	1	...	1	...	18	1	...
Coryza ...	1	6	...	7	...	182	9	...
98. Affections of the Larynx—
Laryngitis	2	...	2	...	60	3	...
99. Bronchitis—
(a) Acute	20	...	20	...	208	10	...
(b) Chronic	3	...	3	...	56	2	...
100. Broncho-Pneumonia	3	1	...
101. Pneumonia—
(a) Lobar	6	3	6	...	2	...	1
(b) Unclassified	2	...	...
102. Pleurisy, Empyema	6	...	6	1	10	...	...
103. Congestion of the Lungs	1	...	1	...	9	...	...
104. Gangrene of the Lungs
105. Asthma	3	...	3	...	12	...	...
106. Pulmonary Emphysema	1	...	1	...	...	...	...
107. Other affections of the Lungs—	1	...	...
Pulmonary Spirochaetosis
Carried forward ...	22	858	17	880	30	3,861	226	8

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths
		Admis- sions.	Deaths.					
Brought forward	22	858	17	880	30	3,861	226	8
VI.—Diseases of the Digestive System.								
108. A.—Diseases of Teeth or Gums—								
Caries, Pyorrhœa, &c. ... ..	...	14	...	14	...	296	20	...
B.—Other affections of the Mouth—								
Stomatitis ... ..	...	...	...	...	...	34	4	...
Glossitis, &c. ... ..	...	...	...	...	...	7	2	...
109. Affections of the Pharynx or Tonsils—								
Tonsillitis ... ..	...	18	...	18	...	117	6	...
Pharyngitis ... ..	...	2	...	2	...	103	5	...
110. Affections of the Esophagus ...	...	...	...	...	...	...	...	...
111. A.—Ulcer of the Stomach ... ..	...	2	...	2	...	15	4	...
B.—Ulcer of the Duodenum ... ..	...	3	...	3	...	22	3	...
112. Other affections of the Stomach—								
Gastritis	1	79	...	80	...	220	17	...
Dyspepsia, &c.	2	15	...	17	...	283	20	...
113. Diarrhœa and Enteritis—								
Under two years ... ..	...	2	...	2	...	31	6	...
114. Diarrhœa and Enteritis—								
Two years and over ... ..	...	22	...	22	...	223	18	...
Colitis ... ..	...	11	...	11	...	37	2	...
Ulceration ... ..	...	...	...	...	...	1	...	...
114a. Sprue ... ..	...	...	...	...	...	...	...	...
115. Ankylostomiasis ... ..	...	...	...	...	...	2	...	...
116. Diseases due to Intestinal Parasites—								
(a) Cestoda (Tænia) ... ..	...	1	...	1	...	5	...	...
(b) Trematoda (Flukes) ... ..	...	...	...	...	...	...	...	...
(c) Nematoda (other than Ankylostoma)—								
Ascaris ... ..	...	5	...	5	...	6	...	...
Trichocephalus dispar ... ..	...	...	...	...	...	1	...	...
Trichina ... ..	...	...	...	...	...	...	...	...
Dracunculus ... ..	...	...	...	...	...	...	...	...
Strongylus ... ..	...	3	...	3	...	...	...	...
Oxyuris ... ..	...	...	...	...	...	3	...	...
(d) Coccidia ... ..	...	...	...	...	...	2	...	...
(e) Other parasites ... ..	...	...	...	...	...	...	...	...
(f) Unclassified ... ..	...	...	...	...	...	2	...	...
117. Appendicitis	1	40	2	41	...	21	...	...
118. Hernia ... ..	...	4	1	4	...	8	...	...
119. A.—Affections of the Anus, Fistula, &c. ... ..	...	6	...	6	1	19	1	...
B.—Other affections of the Intestines—								
Enteroptosis	1	2	...	3	...	1	...	...
Constipation ... ..	...	4	...	4	...	105	14	...
120. Acute Yellow Atrophy of the Liver ... ..	...	...	...	...	...	...	...	...
121. Hydatid of the Liver ... ..	...	...	...	...	...	...	...	...
Carried forward	27	1,092	20	1,119	32	5,427	348	8

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	27	1,092	20	1,119	32	5,427	348	8
VI.— <i>Diseases of the Digestive System</i> —continued.								
122. Cirrhosis of the Liver—								
(a) Alcoholic ...	...	1	...	1	...	1	...	...
(b) Other forms ...	...	...	...	...	...	1	...	...
123. Biliary Calculus ...	...	1	...	1	...	...	...	...
124. Other affections of the Liver—								
Abscess ...	...	3	...	3	...	7	...	...
Hepatitis ...	...	23	...	23	...	33	5	...
Cholecystitis ...	...	7	...	7	...	3	3	...
Jaundice ...	...	18	...	18	...	11	...	...
125. Diseases of the Pancreas ...	...	1	...	1	...	...	...	...
126. Peritonitis (of unknown cause) ...	...	1	1	1	...	1	...	...
127. Other affections of the Digestive System ...	...	2	...	2	1	12	...	...
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i> .								
128. Acute Nephritis ...	...	3	...	3	...	...	...	...
129. Chronic ...	...	2	1	2	...	3	1	...
130. A.—Chyluria ...	...	...	...	...	...	...	...	...
B.—Schistosomiasis ...	...	...	...	...	...	3	1	...
131. Other affections of the Kidneys—								
Pyelitis, &c. ...	...	5	...	5	...	6	...	...
132. Urinary Calculus ...	...	3	...	3	...	4	...	...
133. Diseases of the Bladder—								
Cystitis ...	...	12	...	12	1	41	14	...
134. Diseases of the Urethra—								
(a) Stricture ...	...	4	...	4	2	15	...	...
(b) Other ...	...	8	...	8	...	60	...	...
135. Diseases of the Prostate—								
Hypertrophy ...	...	...	...	...	...	...	...	2
Prostatitis ...	...	7	...	7	1	28	...	...
136. Diseases (non-Venereal) of the Genital Organs of Man—								
Epididymitis ...	...	4	...	4	...	11	...	...
Orchitis ...	...	2	...	2	...	6	...	...
Hydrocele ...	...	1	...	1	...	3	...	...
Ulcer of Penis ...	...	2	...	2	...	13	...	...
137. Cysts or other non-malignant Tumours of the Ovaries ...	...	...	...	...	...	3	...	...
138. Salpingitis—								
Abscess of the Pelvis ...	...	...	...	...	...	...	1	...
139. Uterine Tumours (non-malignant) ...	...	...	...	...	...	...	1	...
140. Uterine Hæmorrhage (non-puerperal) ...	...	...	...	...	...	...	1	...
141. A.—Metritis ...	...	1	...	1	...	...	2	...
B.—Other affections of the Female Genital Organs ...	...	...	...	...	...	...	...	...
Displacements of Uterus ...	...	...	...	...	...	...	3	...
Amenorrhœa ...	...	1	...	1	...	...	11	...
Dysmenorrhœa ...	...	...	...	...	...	...	10	...
Leucorrhœa ...	...	1	...	1	...	...	1	...
Carried forward ...	27	1,205	22	1,232	37	5,694	402	8

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1928—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths
		Admis- sions.	Deaths.					
Brought forward	27	1,205	22	1,232	37	5,694	402	8
VII.—Diseases of the Genito-urinary System (non-Venereal)—contd.								
142. Diseases of the Breast (non- puerperal)
Mastitis	1	2	...
Abscess of Breast	2	...
VIII.—Puerperal State								
143. A.—Normal Labour	1	...	1	...	...	2	...
B.—Accidents of Pregnancy	...	3	...	3	...	...	...	...
(a) Abortion	5	...	5	...	...	1	...
(b) Ectopic Gestation
(c) Other accidents of Preg- nancy	1	...	1	...	...	5	...
144. Puerperal Hæmorrhage	1	...	1	...	...	...	...
145. Other accidents of Parturition
146. Puerperal Septicæmia
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	9	...	...
152. Boil—	1	15	...	16	...	214	11	...
Carbuncle	26	...	26	2	94	4	...
153. Abscess—	23	...	23	...	51	...	...
Whitlow	4	...	4	2	34	1	...
Cellulitis	2	30	...	32	1	114	3	...
154. A.—Tinea	255	3	...
B.—Scabies	29	...	...
155. Other Diseases of the Skin—
Erythema	1	...	1	...	22	1	...
Urticaria	37	4	...
Eczema	9	...	9	...	161	6	...
Herpes	3	...	3	...	25	2	...
Psoriasis	10	...	...
Elephantiasis
Myiasis	19	...	...
Chigoes	15	...	...
Cutaneous Leishmaniasis
Others	96	6	...
X.—Diseases of Bones and Organs of Locomotion (other than Tuberculous).								
156. Diseases of Bones—
Osteitis	2	...	2	...	6	...	...
157. Diseases of Joints—
Arthritis	1	12	...	13	...	39	4	...
Synovitis	8	...	8	...	30	2	...
158. Other Diseases of Bones or Organs of Locomotion	9	...	9	...	52	2	...
Carried forward	31	1,358	22	1,389	43	7,007	463	8

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1928—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	31	1,358	22	1,389	43	7,007	463	8
XI.— <i>Malformations.</i>								
159. Malformations
Hydrocephalus	1	..	..
Hypospadias...
Spina Bifida, etc.
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	1	1	1	..	..	..	..
169. Suicide by Drowning
170. Suicide by Firearms	1	1	1	..	1	..	1
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	..	7	2	..
Botulism	1	..	..
176. Attacks of poisonous animals
Snake Bite	1	..	1	..	1	..	..
Insect Bite	61	16	..
177. Other accidental Poisonings	..	1	1	1	..	3	..	..
178. Burns (by Fire)	4	1	4	..	20	1	..
179. Burns (other than by Fire)	1	..	1	..	10	..	..
180. Suffocation (accidental)
181. Poisoning by Gas (accidental)
182. Drowning (accidental)
183. Wounds (by Firearms, war excepted)	1	2	..	3	..	1	..	..
184. Wounds (by cutting or stabbing instruments)	30	1	..
185. Wounds (by Fall)	44	..	44	..	211	5	..
186. Wounds (in Mines or Quarries)	..	2	..	2	..	4	..	..
187. Wounds (by Machinery)	2	..	2	..	8	..	..
188. Wounds (crushing, e.g. railway accidents, &c.)	1	..	1	..	1	..	..
Carried forward	32	1,419	26	1,451	43	7,367	488	9

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1928—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	32	1,419	26	1,451	43	7,367	488	9
XIV.— <i>Affections produced by External Causes—contd.</i>								
189. Injuries inflicted by Animals, Bites, Kicks, &c.	2	...	2	...	44	4	1
190. Wounds inflicted on Active Service	1	...	...
191. Executions of civilians by belligerents
192. A.—Over fatigue	1	...	1	...	6	1	...
B.—Hunger or Thirst
193. Exposure to Cold, Frost bite, &c.	2	...	...
194. Exposure to Heat— Heatstroke	3	...	3	...	13	1	..
Sunstroke	3	...	3	...	15	1	...
195. Lightning Stroke	1	...	...
196. Electric Shock
197. Murder by Firearms
198. Murder by cutting or stabbing instruments	1	...	1
199. Murder by other means
200. Infanticide (Murder of an infant under one year)
201. A.—Dislocation	3	...	3	...	6	1	...
B.—Sprain	9	...	9	...	77	3	...
C.—Fracture	1	34	1	35	1	37	...	...
202. Other External Injuries	1	21	...	22	...	336	9	...
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	2	...	...
Ascites	4	...	...
Œdema	2	...	2	...	17	...	...
Asthenia	6	...	6	...	63	2	...
Shock	2	...	2	...	8	...	...
Hyperpyrexia	2	...	2	...	...	1	...
B.—Malingering	2	...	...
XVI.— <i>Diseases, the total of which have not caused 10 Deaths</i> ...								
Tropical Ulcers	7	...	7	...	99	3	...
Pyrexia of uncertain origin	5	...	5	...	11	1	...
Total	34	1,519	27	1,553	44	8,113	516	11

TABLE V.

RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1928.

Diseases.				IN-PATIENTS.				OUT-PATIENTS.			
				Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
					Admis- sions.	Deaths.					
I.—Epidemic, Endemic, and Infectious Diseases.											
1. Enteric Group—											
(a) Typhoid Fever ... ..				...	6	5	6	1	...	...	...
(b) Paratyphoid A. ... ..				...	1	1	1	...	1	...	...
(c) Paratyphoid B. ... ..				...	...	...	...	...	...	...	...
(d) Type not defined ... ..				...	2	...	2	...	1	...	...
2. Typhus ... ..				...	...	...	...	...	...	...	...
3. Relapsing Fever				10	165	19	175	...	90	10	...
4. Undulant Fever ... ..				...	...	...	...	...	...	...	...
5. Malaria—											
(a) Tertian				1	186	4	187	4	1,317	111	...
(b) Quartan ... ..				...	1	...	1	...	13	14	...
(c) Aestivo-autumnal				32	1,543	36	1,575	27	16,125	4,344	4
(d) Cachexia ... ..				...	6	...	6	...	116	37	...
(e) Blackwater ... ..				...	3	2	3	...	1	3	...
6. Smallpox				4	354	79	358	4	947	494	...
Alastrim ... ..				...	...	...	...	...	...	...	...
7. Measles ... ..				...	31	...	31	...	132	34	...
8. Scarlet Fever ... ..				...	...	...	...	...	3	1	...
9. Whooping Cough ... ..				...	5	...	5	...	214	149	1
10. Diphtheria ... ..				...	7	...	7	...	...	...	...
11. Influenza				2	655	28	657	15	4,261	1,278	...
12. Miliary Fever ... ..				...	...	...	...	...	1	1	...
13. Mumps ... ..				...	34	1	34	...	133	44	...
14. Cholera ... ..				...	...	...	...	...	14	3	...
15. Epidemic diarrhoea ... ..				...	9	...	9	...	36	...	...
16. Dysentery—											
(a) Amœbic				13	698	76	711	18	1,289	465	...
(b) Bacillary				3	69	22	72	...	161	25	...
(c) Undefined or due to other causes				7	220	22	227	7	578	157	...
17. Plague—											
(a) Bubonic ... ..				...	26	20	26	1	...	...	...
(b) Pneumonic ... ..				...	19	14	19	...	...	...	...
(c) Septicæmic ... ..				...	22	21	22	...	...	...	...
(d) Undefined ... ..				...	...	...	...	...	...	...	...
18. Yellow Fever ... ..				...	...	...	...	...	...	...	...
19. Spirochaetosis ictero-hæmorrhagica ... ..				...	...	...	...	...	...	...	...
20. Leprosy				244	447	31	691	297	1,634	475	...
21. Erysipelas ... ..				...	7	...	7	1	4	2	...
22. Acute Poliomyelitis ... ..				...	23	11	23	4	...	...	...
23. Encephalitis Lethargica ... ..				...	...	...	...	...	...	...	...
24. Epidemic Cerebro-spinal Fever ... ..				...	15	9	15	1	5	...	1
25. Other Epidemic Diseases—											
(a) Rubella (German Measles) ... ..				...	3	...	3	...	1	1	...
(b) Varicella (Chicken-pox)				14	940	2	954	39	574	41	...
(c) Kala-azar ... ..				...	...	...	...	...	...	...	...
(d) Phlebotomus Fever ... ..				...	...	...	...	...	...	...	...
(e) Dengue ... ..				...	...	...	...	...	2	3	...
(f) Epidemic Dropsy ... ..				...	19	...	19	...	...	...	...
(g) Yaws				39	487	6	526	39	15,453	13,139	...
(h) Trypanosomiasis				5	158	17	163	31	1,075	...	...
Carried forward				374	6,171	426	6,645	489	44,180	20,831	6

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1928—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	374	6,171	426	6,645	489	44,180	20,831	6
<i>I.—Epidemic, Endemic, and Infectious Diseases—contd.</i>								
26. Glanders ... ..	...	...	...	...	...	...	...	...
27. Anthrax ... ..	...	2	...	2	...	1	...	...
28. Rabies ... ..	...	2	...	2	...	2	...	...
29. Tetanus	1	60	33	61	3	25	6	...
30. Mycosis	1	19	1	20	2	41	10	...
31. Tuberculosis, Pulmonary and Laryngeal	10	255	83	265	20	290	69	...
32. Tuberculosis of the Meninges or Central Nervous System ... ..	...	3	2	3	...	1	1	...
33. Tuberculosis of the Intestines or Peritoneum ... ..	...	22	10	22	...	8	5	...
34. Tuberculosis of the Vertebral Column	4	27	3	31	3	25	11	...
35. Tuberculosis of Bones and Joints	4	30	3	34	7	36	16	...
36. Tuberculosis of other organs—								
(a) Skin or Subcutaneous Tissue (Lupus) ... ..	...	2	...	2	...	19	6	...
(b) Bones ... ..	...	4	2	4	...	2	2	...
(c) Lymphatic System ... ..	...	11	1	11	...	19	15	...
(d) Genito-urinary ... ..	...	1	...	1	...	...	...	...
(e) Other Organs	1	18	2	19	1	7	5	...
37. Tuberculosis disseminated—								
(a) Acute ... ..	...	1	...	1	...	6	4	...
(b) Chronic ... ..	...	7	...	7	...	2	...	...
38. Syphilis—								
(a) Primary	21	270	1	291	16	1,398	519	...
(b) Secondary	22	390	12	412	30	2,687	1,691	...
(c) Tertiary	15	273	19	288	15	2,169	1,733	...
(d) Hereditary ... ..	...	12	...	12	...	111	54	3
(e) Period not indicated	3	79	...	82	5	817	601	...
39. Soft Chancre ... ..	...	78	...	78	3	409	13	...
40. A.—Gonorrhœa and its complications	24	733	7	757	22	6,890	677	...
B.—Gonorrhœal Ophthalmia	3	30	...	33	...	59	38	...
C.—Gonorrhœal Arthritis	1	53	3	54	3	330	94	...
D.—Granuloma Venereum ... ..	...	4	...	4	1	27	1	...
41. Septicæmia	34	41	27	75	...	3	...	...
42. Other Infectious Diseases—	...	345	23	345	37	341	68	...
<i>II.—General Diseases not mentioned above.</i>								
43. Cancer or other malignant Tumours of the Buccal Cavity ... ..	...	4	2	4	1	6	3	...
44. Cancer or other malignant Tumours of the Stomach or Liver ... ..	...	17	11	17	1	4	3	...
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum ... ..	...	5	1	5	1	4	2	...
46. Cancer or other malignant Tumours of the Female Genital Organs ... ..	...	13	...	13	...	...	13	...
47. Cancer or other malignant Tumours of the Breast	1	8	1	9	2	2	8	...
48. Cancer or other malignant Tumours of the Skin	1	18	5	19	2	18	10	...
Carried forward	520	9,008	678	9,808	664	59,939	26,509	9

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	520	9,008	678	9,808	664	59,939	26,509	9
II.—General Diseases not mentioned above—contd.								
49. Cancer or other malignant Tumours of Organs not specified ... ..	...	32	5	32	3	15	5	...
50. Tumours non-Malignant	12	238	13	250	13	675	209	...
51. Acute Rheumatism ... ..	...	...	...	...	...	...	...	...
52. Chronic Rheumatism	22	535	8	557	17	12,791	3,611	1
53. Scurvy (including Barlow's Disease) ... ..	...	6	...	6	...	2	...	...
54. Pellagra ... ..	...	...	...	...	...	1	1	...
55. Beri-Beri	1	2	1	3	...	1	...	...
56. Rickets ... ..	...	...	...	...	...	8	7	...
57. Diabetes (not including Insipidus)	1	10	4	11	1	16	...	...
58. Anæmia:—								
(a) Pernicious ... ..	...	...	...	...	...	...	...	...
(b) Other Anæmias and Chlorosis	5	80	3	85	10	837	335	...
59. Diseases of the Pituitary Body ... ..	...	...	...	...	...	2	...	...
60. Diseases of the Thyroid Gland:—								
(a) Exophthalmic Goitre ... ..	...	9	1	9	...	19	23	...
(b) Other diseases of the Thyroid Gland, Myxœdema ... ..	...	15	4	15	1	36	51	...
61. Diseases of the Para-Thyroid Glands ... ..	...	29	2	29	1	3	...	...
62. Diseases of the Thymus ... ..	...	...	...	...	...	...	...	...
63. Diseases of the Supra-Renal Glands ... ..	...	2	...	2	...	4	...	...
64. Diseases of the Spleen	2	34	2	36	...	685	334	...
65. Leukæmia:—								
(a) Leukæmia ... ..	...	1	...	1	...	5	5	...
(b) Hodgkin's Disease ... ..	...	1	...	1	1	1	1	...
66. Alcoholism ... ..	...	6	...	6	...	5	...	...
67. Chronic poisoning by mineral substances (lead, mercury, &c.) ... ..	...	3	...	3	...	4	4	...
68. Chronic poisoning by organic substances (Morphia, Cocaine, &c.) ... ..	...	...	...	...	...	...	...	...
69. Other General Diseases:—								
Auto-intoxication ... ..	...	7	...	7	...	8	4	...
Purpura Hæmorrhagica ... ..	...	...	...	...	...	...	1	...
Hæmophilia ... ..	...	...	...	...	...	...	...	...
Diabetes Insipidus ... ..	...	...	...	...	...	1	...	...
III.—Affections of the Nervous System and Organs of the Senses.								
70. Encephalitis (not including Encephalitis Lethargica) ... ..	...	8	...	8	...	9	...	...
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis)	4	35	25	39	...	7	1	...
72. Locomotor Ataxia	1	15	1	16	2	13	...	...
73. Other affections of the Spinal Cord	5	15	1	20	2	10	3	...
Carried forward	573	10,091	748	10,664	715	75,097	31,104	10

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1928—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total Cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	573	10,091	748	10,664	715	75,097	31,104	10
III.—Affections of the Nervous System and Organs of the Senses—contd.								
74. Apoplexy:—								
(a) Hæmorrhage ... ..	...	20	13	20	1	9	1	...
(b) Embolism ... ..	...	1	...	1	...	1	...	...
(c) Thrombosis	1	8	6	9	...	1	...	...
75. Paralysis:—								
(a) Hemiplegia	5	30	5	35	2	41	12	...
(b) Other Paralyses	2	42	3	44	8	87	18	...
76. General Paralysis of the Insane ... ..	...	9	6	9	...	20	7	...
77. Other forms of mental Alienation	139	84	27	223	148	77	15	...
78. Epilepsy	1	92	9	93	3	244	95	...
79. Eclampsia, Convulsions (nonpuer- peral) 5 years or over ... ..	...	2	1	2	1	5	1	...
80. Infantile Convulsions ... ..	...	2	1	2	...	9	5	...
81. Chorea ... ..	...	6	...	6	1	3	2	...
82. A.—Hysteria ... ..	...	15	...	15	2	232	20	...
B.—Neuritis ... ..	...	62	1	62	1	1,114	202	...
C.—Neurasthenia	1	15	...	16	2	202	105	...
83. Cerebral Softening ... ..	...	2	1	2	...	10	...	...
84. Other affections of the Nervous System, such as Paralysis Agitans ... ..	...	15	...	15	...	589	204	...
85. Affections of the Organs of Vision:—								
(a) Diseases of the eye	2	55	...	57	2	1,205	240	...
(b) Conjunctivitis	3	205	...	208	3	4,254	1,492	...
(c) Trachoma ... ..	...	5	...	5	...	53	20	...
(d) Tumours of the Eye ... ..	...	6	...	6	...	76	25	...
(e) Other affections of the Eye	5	117	2	122	8	1,424	265	...
86. Affections of the Ear or Mastoid Sinus	4	73	2	77	1	4,057	1,431	...
IV.—Affections of the Circulatory System.								
87. Pericarditis ... ..	...	18	7	18	...	24	3	...
88. Acute Endocarditis or Myocarditis	1	29	7	30	3	51	14	1
89. Angina Pectoris ... ..	...	5	1	5	...	2	3	...
90. Other Diseases of the Heart:—								
(a) Valvular:—								
Mitral	6	98	18	102	8	362	120	1
Aortic ... ..	...	21	5	21	1	56	17	...
Tricuspid ... ..	...	1	1	1	...	5	...	...
Pulmonary ... ..	...	2	...	2	...	6	1	...
(b) Myocarditis	5	61	12	66	4	137	42	...
91. Diseases of the Arteries:—								
(a) Aneurism	1	14	4	15	1	45	4	...
(b) Arterio-Sclerosis ... ..	...	3	2	3	...	12	2	...
(c) Other diseases	1	5	1	6	...	14	8	...
92. Embolism or Thrombosis (non- cerebral) ... ..	...	5	1	5	1	3	4	...
Carried forward	750	11,219	884	11,969	916	89,527	35,482	12

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	750	11,219	884	11,969	916	89,527	35,282	12
IV.— <i>Affections of the Circulatory System—contd.</i>								
93. Diseases of the Veins:—								
Hæmorrhoids	2	71	...	73	6	422	85	...
Varicose Veins ... ..	...	5	...	5	...	29	5	...
Phlebitis ... ..	...	7	1	7	...	11	...	...
94. Diseases of the Lymphatic System—								
Lymphangitis	2	37	...	39	1	247	48	...
Lymphadenitis, Bubo (non-specific)	20	409	2	429	7	1,645	291	...
95. Hæmorrhage of undetermined cause ... ..	...	12	1	12	...	27	5	...
96. Other affections of the Circulatory System ... ..	...	6	2	6	...	24	13	...
V.— <i>Affections of the Respiratory System.</i>								
97. Diseases of the Nasal Passages—								
Adenoids ... ..	...	1	...	1	...	22	1	...
Polypus ... ..	...	3	...	3	...	6	4	...
Rhinitis ... ..	...	4	...	4	...	117	39	...
Coryza ... ..	...	22	...	22	...	1,421	780	...
Others	4	1	...	5	...	216	113	...
98. Affections of the Larynx—								
Laryngitis ... ..	...	16	...	16	1	424	83	...
99. Bronchitis—								
(a) Acute	10	655	20	665	18	14,596	3,378	16
(b) Chronic	4	190	7	194	4	6,856	1,992	...
100. Broncho-Pneumonia	7	175	47	182	7	130	57	1
101. Pneumonia—								
(a) Lobar	21	879	184	900	24	565	93	1
(b) Unclassified	5	246	58	251	8	85	12	...
102. Pleurisy, Empyema	15	164	13	179	6	448	52	...
103. Congestion of the Lungs ... ..	...	5	...	5	2	4	1	...
104. Gangrene of the Lungs ... ..	...	1	1	1	...	2	...	...
105. Asthma	2	36	1	38	...	117	24	...
106. Pulmonary Emphysema ... ..	...	3	1	3	...	4	1	...
107. Other affections of the Lungs—								
Pulmonary Spirochaetosis ... ..	...	8	1	8	...	42	3	...
VI.— <i>Diseases of the Digestive System.</i>								
108. A.—Diseases of Teeth or Gums—								
Caries, Pyorrhœa, &c. ... ..	...	44	1	44	1	2,806	945	...
B.—Other affections of the Mouth ... ..	...	1	1	1	...	12	2	...
Stomatitis	1	26	1	27	...	942	371	...
Glossitis, &c. ... ..	...	12	1	12	...	710	125	...
109. Affections of the Pharynx or Tonsils—								
Tonsillitis ... ..	...	60	...	60	1	712	243	...
Pharyngitis	1	16	...	17	...	492	84	...
Carried forward	842	14,324	1,227	15,166	1,002	122,632	44,338	30

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	842	14,324	1,227	15,166	1,002	122,632	44,338	30
VI.— <i>Diseases of the Digestive System—contd.</i>								
110. Affections of the Esophagus ...	...	1	...	1	...	7	3	...
111. A.—Ulcer of the Stomach ...	...	4	...	4	...	8	3	...
B.—Ulcer of the Duodenum ...	...	2	...	2	...	1	...	...
112. Other affections of the Stomach—								
Gastritis ...	1	97	3	98	3	2,069	592	...
Dyspepsia, &c. ...	...	77	1	77	2	3,435	941	...
113. Diarrhoea and Enteritis								
Under two years ...	3	126	19	129	2	1,103	533	4
114. Diarrhoea and Enteritis—								
Two years and over ...	6	520	42	526	14	3,825	791	1
Colitis ...	2	60	1	62	...	410	138	...
Ulceration ...	...	5	1	5	...	2	1	...
114a. Sprue ...	...	...	...	...	...	...	...	...
115. Ankylostomiasis ...	8	176	14	184	4	476	131	...
116. Diseases due to Intestinal Parasites—								
(a) Cestoda (Taenia) ...	...	29	1	29	...	3,907	603	...
(b) Trematoda (Flukes) ...	1	3	...	4	...	5	...	...
(c) Nematoda (other than								
Ankylostoma) ...	1	10	...	11	...	321	54	...
Ascaris ...	...	88	...	88	2	5,162	3,976	...
Trichocephalus dispar ...	...	...	...	...	...	8	1	...
Trichina ...	...	...	...	...	...	9	4	...
Dracunculus ...	13	407	3	420	11	2,040	202	...
Strongylus ...	...	...	...	...	...	...	...	...
Oxyuris ...	...	...	...	...	...	84	15	...
(d) Coccidia ...	...	...	...	...	...	3	3	...
(e) Other parasites ...	...	6	...	6	...	236	16	...
(f) Unclassified ...	...	17	...	17	...	257	70	...
117. Appendicitis ...	...	30	6	30	...	52	5	...
118. Hernia ...	50	1,088	69	1,138	84	1,095	63	1
119. A.—Affections of the Anus,								
Fistula, &c. ...	9	105	7	114	7	148	41	...
B.—Other affections of the								
Intestines—								
Enteroptosis ...	...	2	2	2	...	55	698	...
Constipation ...	3	107	1	110	...	19,249	4,263	...
120. Acute Yellow Atrophy of the Liver ...	...	4	1	4	...	...	...	...
121. Hydatid of the Liver ...	...	...	...	...	...	...	...	...
122. Cirrhosis of the Liver—								
(a) Alcoholic ...	...	24	9	24	1	21	4	...
(b) Other forms ...	...	3	...	3	1	7	...	...
123. Biliary Calculus ...	...	...	...	...	...	1	1	...
124. Other affections of the Liver—								
Abscess ...	1	45	4	46	3	18	2	...
Hepatitis ...	...	61	8	61	2	156	40	...
Cholecystitis ...	...	6	1	6	...	14	2	...
Jaundice ...	1	62	7	63	11	170	22	...
Carried forward ...	941	17,489	1,427	18,430	1,149	166,986	57,556	36

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
Brought forward	941	17,489	1,427	18,430	1,149	166,986	57,556	36
VI.— <i>Diseases of the Digestive System</i> —(contd.)								
125. Diseases of the Pancreas ... ..	...	5	1	5	2	1	...	...
126. Peritonitis (cf unknown cause) ...	...	31	13	31	1	12	6	...
127. Other affections of the Digestive System	1	29	2	30	2	263	83	...
VII.— <i>Diseases of the Genito-urinary System</i> (non-Venereal)								
128. Acute Nephritis	7	88	21	95	4	52	23	...
129. Chronic	6	47	17	53	2	52	28	...
130. A.—Chyluria ... ..	...	2	...	2	...	1	...	...
B.—Schistosomiasis	2	40	2	42	4	156	7	...
131. Other affections of the Kidneys— Pyelitis, &c.	1	28	5	29	2	28	11	...
132. Urinary Calculus ... ..	...	4	...	4	...	5	1	...
133. Diseases of the Bladder— Cystitis	4	77	5	81	4	292	96	...
134. Diseases of the Urethra— (a) Stricture	13	225	8	238	13	355	5	...
(b) Other	3	44	1	47	6	165	6	...
135. Diseases of the Prostate— Hypertrophy ... ..	...	...	...	...	...	...	...	...
Prostatitis	2	7	2	9	...	29	...	...
136. Diseases (non-Venereal) of the Genital Organs of Man— Epididymitis ... ..	...	116	...	116	5	265	...	...
Orchitis	4	76	...	80	1	353	...	...
Hydrocele	15	217	1	232	12	468	...	...
Ulcer of Penis	3	95	...	98	5	306	...	...
Others	3	72	...	75	...	110	...	...
137. Cysts or other non-malignant Tumours of the Ovaries ... ..	...	28	3	28	1	2	76	...
138. Salpingitis	1	28	1	29	...	...	109	...
Abscess of the Pelvis	1	8	...	9	...	2	5	...
139. Uterine Tumours (non-malignant)	1	24	...	25	...	1	26	...
140. Uterine Hæmorrhage (non-puer- peral) ... ..	...	10	1	10	...	...	55	...
141. A.—Metritis	1	43	1	44	3	...	86	...
Endometritis	2	...	...	2	...	...	...	...
B.—Other affections of the Female Genital Organs— Displacements of Uterus	3	44	...	47	4	...	140	...
Amenorrhœa ... ..	...	21	1	21	3	...	45	...
Dysmenorrhœa ... ..	...	5	...	5	...	...	298	...
Dysmenorrhœa ... ..	...	73	...	73	2	...	537	...
Leucorrhœa ... ..	...	7	...	7	2	...	105	...
142. Diseases of the Breast (non-puer- peral)— Mastitis	1	21	...	22	...	26	165	...
Abscess of Breast ... ..	...	14	2	14	...	2	68	...
Carried forward	1,015	19,018	1,514	20,033	1,225	169,932	59,537	36

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1928—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	1,015	19,018	1,514	20,033	1,225	169,932	59,537	36
VIII.— <i>Puerperal State.</i>								
143. A.—Normal Labour	5	210	1	215	7	...	...	...
B.—Accidents of Pregnancy—	...	3	...	3	...	...	26	...
(a) Abortion	3	67	1	70	1	...	86	...
(b) Ectopic Gestation ... ..	...	2	1	2	...	...	3	...
(c) Other accidents of Preg- nancy	3	60	5	63	1	...	107	...
144. Puerperal Hæmorrhage ... ..	...	6	...	6	...	...	5	...
145. Other accidents of Parturition ...	2	68	11	70	...	...	11	...
146. Puerperal Septicæmia ... ..	...	12	8	12	...	...	7	...
147. Phlegmasia Dolens ... ..	...	1	...	1	...	...	1	...
148. Puerperal Eclampsia ... ..	...	3	1	3	...	...	38	...
149. Sequelæ of Labour ... ..	...	5	...	5	...	...	7	...
150. Puerperal affections of the Breast	...	2	...	2	...	...	4	...
IX.— <i>Affections of the Skin and Cellular Tissues.</i>								
151. Gangrene	5	32	11	37	2	245	40	...
152. Boil	1	164	5	165	1	1,986	274	...
Carbuncle	8	33	...	41	1	382	73	...
153. Abscess	27	676	17	703	31	2,042	352	...
Whitlow	2	140	5	142	5	1,405	323	...
Cellulitis	24	529	3	553	29	4,078	865	...
154. A.—Tinea ... ..	...	45	...	45	...	4,842	935	...
B.—Scabies	4	101	...	105	5	3,604	1,565	...
155. Other Diseases of the Skin—	...	1	...	1	...	101	26	...
Erythema ... ..	...	15	...	15	...	267	47	...
Urticaria ... ..	...	49	...	49	3	1,926	479	...
Eczema ... ..	...	12	...	12	...	198	47	...
Herpes ... ..	...	5	...	5	...	99	37	...
Psoriasis ... ..	...	21	6	256	22	331	60	...
Elephantiasis ... ..	...	1	...	1	...	59	48	...
Myiasis	3	2	...	5	...	120	64	...
Chigoes ... ..	...	...	...	...	...	...	...	...
Cutaneous Leishmaniasis	...	288	...	238	22	2,751	1,432	...
Others ... ..	...	...	...	...	...	...	...	...
X.— <i>Diseases of bones and Organs of Locomotion (other than Tuber- culous).</i>								
156. Diseases of Bones—	...	...	...	...	...	...	...	...
Osteitis	9	121	6	130	25	459	150	...
157. Diseases of Joints—	...	...	...	...	...	...	...	...
Arthritis	16	296	8	312	15	2,853	1,049	...
Synovitis	4	138	1	142	6	893	177	...
158. Other Diseases of Bones or Organs of Locomotion ... ..	...	103	4	103	7	2,763	381	...
Carried forward	1,152	22,393	1,609	23,545	1,410	201,336	68,256	36

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)

FOR THE YEAR 1928—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	1,152	22,393	1,609	23,545	1,410	201,336	68,256	36
XI.—Malformations.								
159. Malformations—	...	7	...	7	...	15	3	...
Hydrocephalus ... ..	...	12	1	12	...	22	8	...
Hypospadias ... ..	...	3	...	3	...	2	...	...
Spina Bifida, etc. ... ..	...	5	...	5	...	5	1	...
Others	11	...	...	11	...	...	...	...
XII.—Diseases of Infancy.								
160. Congenital Debility ... ..	...	14	1	14	...	15	29	5
161. Premature Birth ... ..	...	5	2	5	...	...	9	5
162. Other affections of infancy ... ..	...	23	8	23	1	50	57	2
163. Infant neglect (infants of three months or over) ... ..	...	1	...	1	...	6	10	...
XIII.—Affections of Old Age.								
164. Senility—	...	13	6	13	...	51	15	...
Senile Dementia ... ..	...	1	...	1	...	5	1	1
XIV.—Affections produced by External Causes.								
165. Suicide by Poisoning ... ..	...	...	...	...	...	...	...	...
166. Corrosive Poisoning (Intentional) ... ..	...	1	1	1	...	1	...	...
167. Suicide by Gas Poisoning ... ..	...	...	...	...	...	...	...	...
168. Suicide by Hanging or Strangula- tion ... ..	...	1	1	1	...	...	1	...
169. Suicide by Drowning ... ..	...	...	...	...	...	2	...	...
170. Suicide by Firearms ... ..	...	...	...	...	...	...	...	...
171. Suicide by cutting or stabbing In- struments ... ..	...	5	3	5	2	...	...	...
172. Suicide by jumping from a height ... ..	...	...	...	...	...	...	...	...
173. Suicide by crushing ... ..	...	...	...	...	...	...	...	...
174. Other Suicides ... ..	...	...	...	...	...	1	...	...
175. Food Poisoning—	...	4	2	4	...	4	1	...
Botulism ... ..	...	...	...	...	...	3	...	...
176. Attacks of poisonous animals ... ..	...	...	...	...	...	7	2	...
Snake Bite ... ..	...	30	1	30	...	87	12	...
Insect Bite ... ..	...	11	...	11	...	204	29	...
177. Other accidental Poisonings	1	19	7	20	...	24	13	...
178. Burns (by Fire)	2	132	25	134	10	660	197	...
179. Burns (other than by Fire)	2	28	...	30	1	449	102	...
180. Suffocation (accidental) ... ..	...	...	...	...	...	29	7	...
181. Poisoning by Gas (accidental) ... ..	...	1	...	1	...	...	...	...
182. Drowning (accidental) ... ..	...	...	...	...	...	1	...	...
183. Wounds (by Firearms, war excepted)	7	82	7	89	4	572	88	...
184. Wounds (by cutting or stabbing instruments)	25	441	15	466	18	7,994	1,536	...
185. Wounds (by Fall)	19	255	14	274	19	4,927	1,137	...
186. Wounds (in Mines or Quarries)	6	123	6	129	2	1,298	18	...
187. Wounds (by Machinery)	7	40	5	47	3	2,337	12	...
Carried forward	1,232	23,650	1,714	24,882	1,470	220,117	71,544	49

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1928—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1927.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1928.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	1,232	23,650	1,714	24,882	1,470	220,117	71,544	49
XIV.— <i>Affections produced by External Causes—contd.</i>								
188. Wounds (crushing, e.g. railway accidents, etc.)	2	88	5	90	2	2,125	667	5
189. Injuries inflicted by Animals, Bites, Kicks, etc.	1	58	...	59	...	881	161	...
190. Wounds inflicted on Active Service ... ..	...	1	...	1	...	10	4	...
191. Executions of civilians by belligerents ... ..	...	...	...	...	...	...	...	...
192. A.—Over fatigue ... ..	...	...	...	...	...	2	1	...
B.—Hunger or Thirst ... ..	...	13	7	13	...	3	...	...
193. Exposure to Cold, Frost bite, etc. ... ..	...	...	...	...	...	...	...	...
194. Exposure to Heat—								
Heatstroke ... ..	...	...	...	...	...	3	...	...
Sunstroke ... ..	...	1	...	1	...	...	1	...
195. Lightning Stroke ... ..	...	...	...	...	...	1	...	...
196. Electric Shock ... ..	...	1	...	1	...	...	...	...
197. Murder by Firearms ... ..	...	...	...	...	...	1	1	2
198. Murder by cutting or stabbing instruments ... ..	...	...	...	...	...	...	...	...
199. Murder by other means ... ..	...	...	...	...	...	...	...	...
200. Infanticide (Murder of an infant under one year) ... ..	...	...	...	...	...	...	...	...
201. A.—Dislocation	1	34	1	35	2	80	17	...
B.—Sprain	1	76	...	77	1	1,059	85	...
C.—Fracture	46	407	36	453	33	329	60	...
202. Other External Injuries	43	1,013	16	1,056	35	18,322	1,768	...
203. Deaths by Violence of unknown cause ... ..	...	3	3	3	...	3	...	3
XV.— <i>Ill-Defined Diseases.</i>								
204. Sudden Death (cause unknown) ... ..	...	...	...	...	...	2	...	2
205. A.—Diseases not already specified or ill-defined— ... ..	...	4	2	4	...	17	6	...
Ascites	9	73	24	82	4	79	34	...
Edema	2	55	13	57	4	346	63	...
Asthenia	1	31	7	32	...	327	50	...
Shock ... ..	...	8	2	8	1	8	2	...
Hyperpyrexia ... ..	...	13	1	13	...	57	5	...
B.—Malingering ... ..	...	12	2	12	...	342	3	...
XVI.— <i>Diseases, the total of which have not caused 10 Deaths</i>								
Tropical Ulcers	214	1,944	54	2,158	223	27,211	6,059	..
Total	1,561	27,612	1,888	29,173	1,779	272,462	81,629	61

APPENDICES.

ANDREW DONALDSON, F.R.S.E., F.R.S.,
Director of the Edinburgh Museum of Natural History.

APPENDICES

APPENDIX A.

ANNUAL REPORT OF THE MEDICAL RESEARCH
INSTITUTE, 1928.

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, 1932

BY

ANDREW COXNALL, M.D., F.R.S., D.Sc., and B.
Director of Medical Research Institute

MEDICAL RESEARCH INSTITUTE,

LAGOS, NIGERIA,

30th March, 1929.

ANNUAL REPORT, MEDICAL RESEARCH INSTITUTE, 1928.

SIR,

I have the honour to present the Annual Report of the Medical Research Institute for 1928.

2. The subjects treated are Rat Plague, Blackwater Fever, Histology (mainly tumours), Rabies, Dermatology, Snakes, Bacteriological Water Analysis and Entomology.

3. Dr. E. C. Smith, Dr. J. A. Young, M.C., and Mrs. Connal, M.B.E., have contributed the reports on Dermatology and Rabies, Bacteriological Water Analysis, and Entomology respectively, in that order.

4. The Director was on duty from 1st March until 31st December, as was also the Honorary Entomologist. Dr. E. C. Smith was on duty from 1st January until 15th November and Dr. J. A. Young was on duty from 19th September until 31st December.

5. Mr. E. F. Hines and Mr. F. W. Randoll were on duty for the year.

I have the honour to be,

Sir,

Your obedient servant,

A. CONNAL,

Director of Medical Research Institute.

The Honourable The Director,
Medical and Sanitary Service,
Nigeria.

RAT PLAGUE.

In this, the fifth year of plague in Lagos (the first human case of plague was demonstrated in July, 1924), the number of rats examined has reached a higher total, namely, 75,639, than in any previous year. The proportion of plague-infected rats is comparatively high, as will be seen from a comparison with the figures obtained in previous years (Table I).

TABLE I.

Year.	Rats examined.	Rats infected.	Infection-rate.
1924 (last 5 months) ...	6,348	147	1 in 43
1925 ...	36,370	273	1 in 133
1926 ...	42,830	1,020	1 in 42
1927 ...	57,049	676	1 in 84
1928 ...	75,639	1,214	1 in 62

That the higher proportion of plague-rats in 1928, compared with 1927, is due to the greater number examined and the greater diagnostic ability gained, is unlikely, as the human cases were correspondingly high. In the above table, only rodents have been considered. During the past five years, the shrew, *Crocidura manni*, has been trapped in considerable numbers, and, according to the record-books, it was shown that, in 1924, there were four positive shrews in October and four in November. Again in 1926 there would appear to have been one positive shrew in August and one in September. These facts, alone, are suggestive, and when more supervision was devoted to the registration of the species in the records, no more positive shrews were found. It is believed, although it cannot be proved, that the recording of positive shrews was due to clerical errors.

The figures, 75,639, are made up of 70,067 black rats (*Rattus rattus*), 2,418 brown rats (*Rattus norvegicus*) and 2,153 "Swamp" rats (*Dasymys rufulus*). There was, in addition, one specimen of the "pouched" rat, (*Cricetomys gambianus*).

The "swamp" rats were kindly identified by Mr. M. A. C. Hinton, Deputy Keeper, Department of Zoology, British Museum (Natural History).

During the first three months of the year, 8,310 mice (*Mus musculus*) were examined by means of spleen smears only. The findings were consistently negative, so that, although large numbers were caught thereafter, no further examinations were done.

Shrews (*C. manni*) to the number of 3,022 were also examined, with negative results.

As signs of plague were found only in the genus *Rattus*, the description of the infection, which follows, is confined to that found in the black and the brown rats, a total of 1,214 infections in 73,485 animals (70,067 black and 3,418 brown rats). Of the black rats 69,215 were brought in dead and 852 alive; of the brown rats 3,376 were dead and forty-two alive; there were, therefore, 72,591 rats brought in dead and 894 alive.

The live rats were chloroformed without delay and a flea-count was made.

The dissection of the rats was carried out by the procedure already described in previous reports. After receiving a serial number, which indicated species and place of capture, the animal was pinned out belly uppermost, on a board. An incision from pubis to chin was made and the skin reflected. By this means, buboes in the cervical, axillary and

groin regions were exposed, and congestion and subcutaneous haemorrhages were observable. The abdomen and thorax were then opened, when the presence or absence of pelvic, lumbar or mesenteric buboes was ascertained, intestinal haemorrhage was looked for, and the condition of the liver, the spleen and the supra-renals was noted. In the chest cavity, pleural effusion clear or haemorrhagic was the object of search.

The sources of the rats were (1) Collecting stations of which there were three, where payment was made to any private individual for his contribution to the bag of rodents, (2) official rat-catchers, (3) Spray-gangs and (4) the Port Health Office. Positive findings were obtained in 942 animals from the first source, in 171 from the second source, in ninety-two from the third source and in nine from the fourth.

The average daily number of rats examined was 200, the highest being 489 and the lowest twenty-four (a Sunday). The highest weekly number was 1,918 (17th-23rd June) and the lowest 834 (23rd-29th December). The highest monthly number was 7,951 in July and the lowest 4,350 in December.

There were sixty-one days on which there were no positive findings, the longest consecutive period being five days, from 6th to 10th April, inclusive, during which 427 rodents were dealt with, averaging eighty-five a day. The longest unbroken series of daily positive findings was one of fifty-five days, from 10th September to 3rd November, inclusive, the positives ranging from one to nineteen a day during that time, totalling 395 and averaging seven per day, the number of rats examined being 11,255, averaging 204 per day. The week containing the lowest percentage of infected rats occurred in April (15th to 21st), when there were only four positives (0.23%), in 1,686 rats.

The week yielding the highest proportion of infected rats was in October to November (28th October to 3rd November) when there were fifty-six positives in 1,150 rats, that is 4.86 *per cent*.

The month showing the highest percentage infection was, as in previous years, October, 3.97 *per cent*, being the infected rate, the full figures being 5,882 black and brown rats examined and 234 found to be positive.

The month in which the lowest infection occurred was April, the total number of rats examined being 6,365, the positives being twenty-five and the percentage being 0.39 infected.

In these two months, also, *i.e.*, April and October, the percentage of infection was higher in the brown rat than in the black; in all the other months, the reverse was the case, and actually, in July, there were no positives in 361 brown rats.

Throughout the year, the number of black rats brought for examination, daily, was much greater than the number of brown; the proportion varied from thirty-two to one in December to thirteen to one in August; over the year, the proportion of black rats, in the total catch, was twenty to one of the brown (actual figures 70,067 black, 3,418 brown).

Amongst the black rats, the great majority were *Rattus rattus* but there were many which could not be definitely placed owing to variations probably due to mixed mating; on the other hand, it was possible definitely to distinguish in the total number of *Rattus rattus*, 1,961 specimens of *Rattus rattus frugivorus* and 395 examples of *Rattus rattus alexandrinus*. No attempt was made to record the proportion of females to males, but a careful record of pregnancy was kept, and the figures are rather striking. For the first three months of the year, the percentage of pregnant individuals amongst the rats caught was over five, whilst in the remaining nine months of the year the percentage

hovered, about three, varying from 2.90 in April to 3.90 in June. The three months' period when pregnancies were high (January, February, March), followed a period of three months in 1927 (October, November, December) when plague infection was high. Most of the plague infected rodents were adults but when the infection was high, as in July, August, September, October and November the proportion of young to adult amongst the positives was on an average one to nine, varying from one to six and a half in July to one to twelve in September. By young rat is meant any rat which measured five inches or less from tip of nose to root of tail.

POST-MORTEM SIGNS OF PLAGUE IN RATS.

Macroscopic.—Based on records of 1,214 infections.

General congestion.—This proved to be the most frequent sign of infection. It was definitely noted as absent in sixty-four cases, but in addition there were thirty-four occasions on which the note "missed at P.M." occurred in the records. This means that no naked-eye signs were observed and the diagnosis was made only after microscopic examination of a stained spleen smear. General congestion was therefore absent in ninety-eight cases or just over eight *per cent*. In 201 it was noted as slight but in the remainder it was a marked feature, frequently observable beneath the skin of limbs and abdomen as the rat lies pinned on the board awaiting dissection.

Marked Rigor Mortis.—This was seldom seen, for the reason that most of the rats had been dead for some time before examination.

Buboes.—Buboes were observed in 1,076 cases and they were definitely noted as absent in 104; in addition, however, it must be presumed that buboes were absent in most of those cases labelled "missed at P.M." so that actually buboes were absent in 138, a proportion of nearly one in eight. It is true, however, that several of the individuals noted as "missed at P.M." were in a state of decomposition too advanced for accurate recognition of macroscopic signs of disease. Cervical buboes, single and bilateral, greatly out-numbered all the others, there being 547 single and 154 bilateral, that is 701 in the total of 1,076, equal to sixty-five *per cent*. In combination with buboes in other situations they were present in an additional forty-seven cases, the commonest association being with axillary buboes (eighteen cases). Where the cervical bubo was single it was right-sided in 268 and situated in 219 on the left side.

Axillary buboes, single or bilateral, were next in numerical order, amounting to 113 of which 111 were single and two bilateral, this being ten *per cent*. of the total. They occurred in combination with other buboes in an additional twenty-eight cases. When single, they were right-sided in forty-nine and left-sided in forty-five, this proportion being fairly close to that obtaining with cervical buboes, *i.e.*, one left-sided to 1.22 right-sided in the former and one left-sided to 1.08 right-sided in the latter.

Groin buboes, single thirty and bilateral three, were less numerous, forming only three *per cent*. of the total. They occurred in combination, however, much more frequently than did the cervical or axillary buboes, being found 111 times in association with other buboes, principally lumbar. When single, they were right-sided in eleven and left-sided in three, again a striking difference from the cervical and the axillary figures.

Pelvic buboes, single, numbered only three and they were all right-sided. In combination with buboes in other situations they occurred thirty-one times.

TABLE II.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cervical, single	22	19	29	13	42	28	58	42	75	110	76	33	547
" bilateral	11	6	4	...	12	7	20	13	18	29	22	12	154
" and axillary	3	...	1	...	...	...	4	2	1	3	4	...	18
" axillary and groin	...	...	...	...	...	...	...	...	...	1	...	...	1
" and groin	...	2	...	...	1	1	...	...	...	...	...	...	4
" groin and pelvic	...	...	...	...	...	...	...	...	...	...	...	...	1
" and lumbar	2	...	1	...	1	1	1	...	...	4	...	...	10
" and pelvic	...	...	...	...	...	...	...	...	...	...	...	...	1
" and lumbar	...	1	...	1	...	...	...	2	...	1	3	...	8
Axillary, single	4	5	1	...	7	13	14	21	15	17	8	6	111
" bilateral	1	...	...	...	...	...	...	...	1	...	...	...	2
" and groin	...	...	...	...	...	...	...	1	...	1	1	...	3
" groin, pelvic and lumbar	...	...	...	...	...	1	...	1	1	...	...	...	4
" and lumbar	...	...	...	...	...	...	...	...	...	1	...	...	1
" and lumbar	4	6	7	1	...	5	1	1	2	2	1	...	30
Groin, single	...	...	3	...	...	1	...	...	...	...	...	1	3
" bilateral	...	...	...	...	...	...	1	...	1	2	...	...	3
" and pelvic	...	...	...	...	...	...	1	2	...	...	1	...	7
" pelvic and lumbar	14	3	1	...	4	5	6	8	9	21	12	4	87
" and lumbar	...	...	...	...	1	1	1	...	...	...	...	...	3
Pelvic, single	...	...	...	...	...	1	1	...	6	5	1	1	15
" and lumbar	1	1	1	3	...	4	6	5	6	12	7	3	49
Lumbar, single	...	...	...	...	...	...	2	...	...	4	1	...	7
" bilateral	1	1	...	...	2	1	1	...	...	...	...	...	6
Mesenteric	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals	63	44	48	18	70	70	117	99	135	214	138	60	1,076

Cervical R. 268 L. 219. Axillary R. 49 L. 45. Groin R. 11 L. 3. Lumbar R. 27 L. 14.

Lumbar buboes, single forty-nine, bilateral seven form five *per cent.* of the total, but they occurred in combination with buboes in other situations 133 times.

Where they were single, twenty-seven were right-sided and fourteen left-sided. It is apparent therefore, that cervical and axillary buboes are almost as frequently left-sided as right-sided, but with groin, pelvic and lumbar buboes, there is a greater tendency to the right side.

Mesenteric buboes numbered six.

The monthly figures and the various combinations are seen in Table II. (See page 9.)

Abscesses.—Sixteen abscesses were met with, in four of which *P. pestis* was demonstrable in stained smears. In two, although *P. pestis* was not recognised in stained smears, inoculation of guinea-pigs from the fresh material caused fatal plague and in the remainder *P. pestis* was not found in stained smears nor did inoculated guinea-pigs show signs of plague.

In January, bilateral cervical abscesses were found in one rat, smears showing typical *P. pestis*. In February there was a similar case. In May, a rat with a right cervical abscess and a left cervical bubo showed *P. pestis* in the smears from both lesions. In June a mesenteric abscess showed *P. pestis* in a stained smear. There were also a cervical, an axillary and a splenic abscess which were negative in stained smears, by culture and by inoculation of guinea-pigs. In August, a lumbar abscess and a cervical abscess were negative in stained smears but caused plague when the material was rubbed into the scarified skin of guinea-pigs. An axillary and a spleen abscess in the same month were negative, as regards plague. Two cervical abscesses in October, one axillary in September and a splenic and a cervical abscess in November were negative. It will be noted that, of sixteen abscesses, four were recognised as due to plague, from stained smears alone, two required animal inoculation for a diagnosis of plague and ten were negative by stained smear, by macroscopic signs, by culture and by animal inoculation. In no instance were the rats with positive abscesses the only plague-infected animals recognised in the day's bag, so that there is still no evidence that plague in Lagos is being kept alive by means of chronic or possibly resolving cases in rats. In fact as compared with the positive abscesses in 1927 there were five positive abscesses in that year, three of which required animal inoculation before the diagnosis was established, whereas in 1928 only two out of six positives required animal inoculation.

Pleural Effusion.—This sign was present in 963 cases, or seventy-nine *per cent.* The fluid was clear straw-coloured in 842 and in 121 it was more or less blood-tinged. The proportion of haemorrhagic to clear pleural effusions varied between one to three in February and one to thirteen in October. Haemorrhagic effusion was associated with haemorrhages elsewhere in nine instances; in eight there was haemorrhage in the intestine and in one there was subcutaneous haemorrhage in the flank.

Haemorrhagic pleural effusion was associated with a "mottled" liver in thirty-five, a "speckled" liver in eight and with a "pale" liver in three cases. In one instance there was a speckled spleen. Table III gives the situation of the bubo in the cases of haemorrhagic pleural effusion.

TABLE III.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo ...	1	1	—	—	1	—	—	1	—	1	—	2	7
Cervical ...	7	6	4	—	12	3	6	6	11	12	12	2	81
Cervical and axillary	—	—	—	—	—	—	1	1	—	—	—	—	2
Axillary ...	—	—	—	—	1	2	3	3	1	—	1	1	12
Axillary and groin	—	—	—	—	—	—	—	1	—	—	—	—	1
Groin ...	—	1	2	—	—	2	—	—	—	—	—	—	5
Groin and lumbar	3	—	1	—	—	—	—	—	1	1	3	1	10
Lumbar ...	—	—	—	—	—	—	—	—	—	—	1	1	2
Mesenteric ...	—	1	—	—	—	—	—	—	—	—	—	—	1
	11	9	7	—	14	7	10	12	13	14	17	7	121

The Liver.—This organ generally showed well-marked changes. Two of these are well described by Dr. Paisley (West African Medical Journal, Vol. I, No. 2, October, 1927, page 36, paragraph (4)). The most common appearance is what has been termed "mottled"; "the organ is congested, the normal demarcation of the lobules is indistinct and small greyish patches, which fade imperceptibly into the purplish congested areas, appear."

The next commonest appearance is the "speckled" liver which may be regarded as a more advanced stage of the "mottled"; here "the surface is covered with well-defined white spots and streaks. These vary from spots the size of a pin-head to very fine specks which give an appearance as if the surface had been dusted with pepper. Speckling is often confined to one lobe or part of a lobe and is most marked, as a rule, at the edges."

To these, other two types of liver, less commonly met with, have to be added namely, the "pale" liver, which gives the appearance of being fatty, and the "congested" liver, which is encountered in the early stages of the disease. In the total of 1,214 positive rats examined, the liver is described as "mottled" in 534, "speckled" in 232, normal in 115, "pale" in twenty-nine and "congested" in twenty-eight, a total of 938, the organ being labelled "putrid" in the great majority of the remainder. Tables IV, V, VI, VII and VIII show the situation of the buboes, with each type of liver described. The term "normal", it may be mentioned is descriptive of the naked-eye appearance only and possibly more careful observation would have enabled some of the organs so noted, to be transferred to the group of "congested" livers. In any case, however, such were not either "speckled", or "mottled" and, also, were not "pale".

TABLE IV.
"MOTTLED" LIVERS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo ...	1	...	...	1	4	1	2	2	3	9	9	6	38
Cervical ...	7	6	4	1	25	18	41	29	35	77	55	24	322
" and axillary	1	...	...	...	...	...	3	...	...	2	4	...	10
" " groin	...	1	...	...	...	1	...	...	...	...	...	...	2
" " pelvic	...	...	...	...	...	...	...	1	...	...	...	...	1
" " lumbar	...	...	...	...	...	...	...	2	...	...	3	...	5
" groin and lumbar	1	...	1	...	...	...	...	...	...	2	...	...	4
Axillary ...	2	1	1	...	3	4	4	11	8	12	5	4	55
" and lumbar	...	...	...	...	...	...	...	...	...	1	...	...	1
" groin and lumbar	...	...	...	...	...	...	...	...	...	1	1	...	2
" " pelvic and lumbar	...	...	...	...	...	...	...	1	...	...	...	...	1
Groin ...	1	...	4	...	...	1	1	...	2	...	1	...	10
" and pelvic	...	...	...	...	...	...	...	1	...	...	...	1	2
" and lumbar	5	1	1	...	1	4	4	5	3	11	3	4	42
" pelvic and lumbar	...	...	...	...	...	...	...	1	1	2	...	...	4
Pelvic ...	...	...	...	...	1	...	1	...	...	...	...	...	2
" and lumbar	...	...	...	...	...	1	1	...	5	2	1	1	11
Lumbar ...	...	...	...	...	...	3	2	1	1	6	5	1	19
Mesenteric ...	...	1	...	...	1	1	...	...	...	...	...	...	3
Totals ...	18	10	11	2	35	34	59	54	58	125	87	41	534

TABLE V.
"SPECKLED" LIVERS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo ...	...	...	1	...	1	...	1	1	7	6	...	1	18
Cervical ...	6	7	12	8	6	3	15	8	29	17	16	6	133
" and axillary ...	1	...	1	...	...	...	...	1	...	...	...	...	3
" " pelvic ...	...	...	...	...	...	1	...	...	...	...	...	...	1
" " lumbar ...	...	...	...	1	...	...	...	...	...	1	...	...	2
" groin and lumbar ...	1	...	...	...	1	...	...	...	...	1	...	...	3
Axillary ...	1	3	...	...	3	3	1	4	3	4	2	2	26
" and groin ...	...	...	...	...	...	...	...	...	...	1	1	...	2
" groin, pelvic and lumbar ...	...	...	...	...	...	...	...	...	1	...	...	...	1
Groin ...	1	1	4	...	...	...	...	...	...	1	...	...	7
" and pelvic ...	...	...	...	...	...	...	1	...	...	...	...	...	1
" and lumbar ...	6	...	...	...	1	1	1	...	5	5	2	...	21
" pelvic and lumbar ...	...	...	...	...	...	...	...	...	...	...	1	...	1
Pelvic and lumbar ...	...	...	...	...	...	...	...	...	1	2	...	...	3
Lumbar ...	...	...	...	...	...	...	1	...	2	4	1	...	8
Mesenteric ...	...	...	...	...	1	...	1	...	...	...	...	...	2
Totals ...	16	11	18	9	13	8	21	14	48	42	23	9	232

TABLE VI.
NORMAL LIVERS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo ...	1	...	...	...	3	2	...	...	3	2	2	...	13
Cervical ...	7	3	...	...	7	3	7	7	7	10	11	4	66
Cervical and axillary ...	1	...	...	...	...	...	...	1	1	1	...	...	4
Axillary ...	2	...	...	...	...	2	3	...	3	1	1	...	12
Groin ...	...	2	...	...	...	...	...	...	...	1	...	...	3
" and pelvic ...	...	...	...	...	...	1	...	...	...	...	...	...	1
" and lumbar ...	1	2	...	...	...	...	1	1	...	1	1	...	7
" pelvic and lumbar ...	...	...	...	...	...	...	...	1	...	...	...	...	1
Lumbar ...	...	...	...	...	...	...	3	...	1	2	1	...	7
Mesenteric ...	1	...	...	...	...	...	...	...	...	...	...	...	1
Totals ...	13	7	...	...	10	8	14	10	15	18	16	4	115

TABLE VII.—“ PALE ” LIVERS.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo ... ..	...	...	...	...	...	...	1	...	1	...	2	...	4
Cervical	4	2	1	...	1	2	2	...	1	2	1	...	16
Cervical and axillary	...	...	...	...	...	...	1	...	...	...	...	...	1
Axillary ... ..	...	...	...	...	...	1	1	...	...	...	...	...	2
Groin ... ..	...	1	...	...	...	...	...	...	...	...	...	...	1
Groin and lumbar	1	...	...	...	...	...	...	...	...	...	...	...	1
Lumbar ... ..	...	...	...	...	...	...	...	2	1	...	...	...	3
Pelvic and lumbar	...	...	...	...	...	...	...	...	...	1	...	...	1
	5	3	1	...	1	3	5	2	3	3	3	...	29

TABLE VIII.—“ CONGESTED ” LIVERS.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo	1	1	...	...	1	1	...	4	2	10
Cervical	1	1	...	5	1	3	11
Cervical, groin and lumbar	1	...	...	...	...	...	...	1
Axillary	1	...	...	1
Groin	1	...	...	...	...	...	...	...	...	1
Groin and lumbar	3	...	...	3
Lumbar	1	...	...	...	1
	2	1	1	1	2	2	9	5	5	28

The Spleen.—Congestion and enlargement of this organ were the rule. In fifteen cases, however, there was a speckled condition of the spleen, closely similar to but rather coarser than that seen in the liver. In each instance the liver also showed the speckled appearance except in two cases where it was noted as “ putrid ”. In one case the pleural effusion was haemorrhagic and in another there was subcutaneous haemorrhage in the axillae and flanks.

TABLE IX.—SPECKLED SPLEENS.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
No bubo	1	1	...	...	2
Cervical	1	2	1	...	...	...	...	...	3	...	...	7
Cervical and axillary	1	...	...	...	...	...	...	...	...	...	1
Axillary	1	...	1	...	2
Axillary, groin pelvic and lumbar	1	...	...	...	1
Groin and lumbar	1	...	1	...	...	...	2
	...	1	3	1	...	...	1	...	4	4	1	...	15

Table IX shows the situation of the bubo in the cases where the spleen was speckled.

Intestinal haemorrhage.—Table X shows the situation of the bubo in the cases where intestinal haemorrhage was present. This condition has already been commented on, in previous reports. In 1927, one case in seven showed the lesion as compared with one case in nine during 1928.

TABLE X.—INTESTINAL HAEMORRHAGE.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
No bubo ...	1	3	...	...	3	1	2	...	...	4	2	...	16
Cervical ...	9	5	4	...	6	9	11	8	5	8	3	4	72
Cervical and axillary	1	...	...	...	...	...	1	...	...	...	...	...	2
Cervical and groin	...	1	...	...	...	...	...	...	...	...	...	...	1
Axillary ...	1	1	...	...	...	1	1	1	2	...	...	2	9
Axillary and lumbar	...	...	...	...	...	...	...	...	...	1	...	...	1
Groin ...	1	2	2	...	...	...	...	...	...	...	...	...	5
Groin and lumbar	2	2	...	...	...	1	...	1	2	2	...	1	11
Groin, pelvic and lumbar	...	...	...	...	...	...	1	...	...	...	...	...	1
Pelvic and lumbar	...	...	...	...	...	...	...	...	2	1	...	...	3
Lumbar ...	...	1	...	...	...	...	3	3	...	2	2	...	11
Mesenteric ...	...	1	...	...	1	1	...	...	...	...	...	...	3
	15	16	6	...	10	13	19	13	11	18	7	7	135

Subcutaneous haemorrhages.—These occur in the cervical region the axilla and in the flanks. Occasionally it is difficult to be sure they are not due to injury. Table XI shows the situation of the bubo in the cases which had these haemorrhages.

TABLE XI.—SUBCUTANEOUS HAEMORRHAGES.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
No bubo ...	—	—	—	—	—	—	1	—	—	—	—	—	1
Cervical ...	13	10	7	—	6	6	3	5	—	1	—	1	52
Cervical and axillary	2	—	—	—	—	—	—	—	—	—	1	—	3
Cervical and pelvic	—	—	—	—	—	1	—	—	—	—	—	—	1
Cervical, groin and lumbar	2	—	1	—	—	—	—	—	—	—	—	—	3
Axillary ...	2	3	1	—	2	—	1	—	1	—	—	—	10
Groin ...	2	—	2	—	—	—	—	—	—	—	—	—	4
Groin and pelvic...	—	—	—	—	—	1	—	—	—	—	—	—	1
Groin and lumbar	3	1	—	—	—	1	—	—	1	1	—	—	7
Groin, pelvic and lumbar	—	—	—	—	—	—	—	1	—	—	—	—	1
Lumbar ...	—	—	—	—	—	1	—	—	—	—	—	—	1
Total ...	24	14	11	—	8	10	5	6	2	2	1	1	84

Subcutaneous haemorrhage in the cervical region was recorded in twenty-eight cases, confined to the cervical region in fourteen; associated with axillary, flank and intestinal haemorrhage in one, with axillary and flank haemorrhages in three, with axillary and pleural haemorrhage in one, with flank and pleural haemorrhages in two, with only flank haemorrhages in three, with only axillary haemorrhages in one, with only intestinal haemorrhage in one and with pleural haemorrhage in two. Subcutaneous haemorrhages in the axillary region, occurred in twenty-five cases and were confined to that region in sixteen; apart from the occasions above recorded, they occurred with flank and intestinal haemorrhages in one, with only flank haemorrhages in eight and with only pleural haemorrhage in one.

Flank haemorrhage was the most frequent form of subcutaneous haemorrhage. It was found in fifty-seven cases and was confined to that region in thirty-five; in addition to the associations above recorded, it occurred with only intestinal haemorrhage in three cases and with only pleural haemorrhage in one.

Supra-renal congestion.—This was observed in 520 cases or 42.75 per cent.

The naked-eye appearances described above were the signs relied on as affording evidence of plague-infection.

It is, perhaps, not necessary to state that they were not the method of diagnosis. Diagnosis was made only after having demonstrated *Pasteurella pestis* in bubo, abscess, liver or spleen. When the naked-eye appearances suggested plague, smears were made from bubo, from liver and from spleen. These were stained with carbol-thionin-blue after fixation by heat. That the microscopic examination is the only reliable method is amply demonstrated by the recording of thirty-four cases which were "missed at P.M." that is, there were either none of the naked eye signs recorded above, or decomposition had proceeded so far as to mask these signs. It has to be stated too, that in every single case as a routine measure a smear was taken from the spleen or from the liver, stained and examined, so that the diagnosis in every case, either positive or negative, is based on the microscopic appearances primarily, and only secondarily on the naked eye signs. As already recorded, in a few cases, neither the naked eye nor the microscope were successful in establishing a diagnosis, recourse having been necessary to guinea-pig inoculation.

It may be said that the typical plague rat in Lagos shows a cervical bubo, general congestion, pleural effusion, a mottled liver and congested spleen and supra-renals. The bubo, however, may be situated elsewhere, and may also be multiple or it may be absent, the liver may be speckled, congested, pale, "normal" or putrid, the pleural effusion may be absent, or haemorrhagic in character. The spleen may be speckled. The only sign of plague may be a cervical, a lumbar or other abscess which requires animal inoculation for the establishment of a diagnosis. As regards the microscopic signs of plague, it is seldom that difficulty arises in the recognition of the plague bacillus. Its size, shape and bipolarity as beautifully shown by carbol thionin blue, its gram-negative character, its disposition—singly and evenly spread, never clumped, and its being usually practically unmixed with other organisms, render the picture perfectly clear. In some cases the organism is more numerous in the bubo than in the organs, sometimes the reverse is the case but nearly always they are abundant in both.

Difficulty may occasionally arise where the organism is mostly or entirely present as "involution forms" and the difficulty is increased if the rat be in an advanced state of decomposition. The photographs show some of the appearances of stained smears, under the microscope.

The chart shows the incidence of rat plague in 1928 and in the previous year. It may have been noted in the Annual Report for 1927 that the term retroperitoneal was applied to some of the buboes. This term has now been discarded in favour of "lumbar", as being less cumbersome and more descriptive. It may be observed too, that "pelvic" buboes are not so numerous in 1928 as they were in 1927; this is mainly because those buboes lying just above the pelvis which were formerly called pelvic are now classed as lumbar, the term pelvic being reserved for those buboes actually in the pelvic cavity.

ECTOPARASITES OF THE LAGOS RODENTS.

Ectoparasites were collected from both live and dead rats. In the latter case the means of collection were necessarily mechanical and the results give no real indication of the number of fleas or other insects per rat. All dead rats were brought to Ereko laboratory in a pail of disinfectant. After thoroughly shaking the pail and removing the rats, the disinfectant was passed through a sieve. The retained matter was then washed off, into a white basin and the ectoparasites were collected. For the reason that practically all the rats had been dead for some time, when taken from the traps or received at the collecting station, and were therefore cold, most of their flea-population had emigrated elsewhere. Table XII shows the monthly totals of fleas obtained from dead rats and Table XIII the number obtained from live rats. It will be seen that the fleas obtained from dead rats averaged 0.086 per rat whereas the average from live rats was 3.89 per rat. Both tables show,

however, that in August and September the average of fleas per rat was higher than in any other months and it may be noted that this rise preceded a big increase in the actual number of rats found infected with plague. The fleas collected were practically all either *Xenopsylla cheopis* or *X. brasiliensis*. The only other fleas were *Ctenocephalus canis* 1♂ 6♀♀ and *Pulex irritans* 1♂, and these are not included in the Tables.

It will be observed that in each month the number of *X. cheopis* exceeded the number of *X. brasiliensis* the proportion sometimes being as high as three to one. Male fleas were more numerous than female fleas, this being more evident with *X. cheopis* than with *X. brasiliensis*. The monthly catch of female *X. cheopis* only twice outnumbered the male catch, whereas, in the case of *X. brasiliensis* the female catch was higher than the male catch on six occasions and the numbers were equal on two occasions. Fleas were obtained from the live rats by putting the cage, securely tied in a white cloth bag, into a box and pouring some chloroform over. After an interval sufficient to ensure that insects and rodents were dead, each rat was thoroughly searched and all insects collected also from cage and bag.

TABLE XII.
FLEAS FROM DEAD RATS.

Month.	X. cheopis.			X. brasiliensis.			Total.	Rattus.			Fleas per rat.		
	♂	♀	Total.	♂	♀	Total.	Fleas.	ratt.	norv.	Total.	cheop.	bras.	Total.
January ...	138	139	277	94	67	161	438	5,213	297	5,510	0.050	0.029	0.079
February ...	118	98	216	38	47	85	301	5,140	270	5,410	0.040	0.015	0.055
March ...	212	193	405	104	95	199	604	5,624	230	5,854	0.069	0.034	0.103
April ...	211	160	371	78	78	156	527	6,102	225	6,327	0.058	0.024	0.083
May ...	245	167	412	66	76	142	554	6,608	341	6,949	0.059	0.020	0.079
June ...	229	194	423	57	63	120	543	7,062	207	7,269	0.058	0.016	0.074
July ...	194	196	390	68	59	127	517	7,501	359	7,860	0.049	0.016	0.065
August ...	198	196	394	148	119	267	661	5,324	401	5,725	0.068	0.046	0.115
September ...	274	222	496	194	138	332	828	6,187	412	6,599	0.075	0.050	0.125
October ...	192	175	367	93	93	186	553	5,557	272	5,829	0.062	0.032	0.094
November ...	168	127	295	79	90	169	464	4,677	232	4,909	0.060	0.034	0.094
December ...	101	88	189	42	48	90	279	4,220	130	4,350	0.043	0.020	0.064
	2,288	1,955	4,235	1,061	973	2,034	6,269	69,215	3,376	72,591	0.058	0.028	0.086

TABLE XIII. FLEAS FROM LIVE RATS.

Month.	X. cheopis.			X. brasiliensis.			Total.	Rattus.			Fleas per rat.		
	♂	♀	Total.	♂	♀	Total.	Fleas.	ratt.	norv.	Total.	cheop.	bras.	Total.
January ...	71	59	130	33	12	45	175	81	1	82	1.58	0.54	2.12
February ...	91	76	167	69	102	171	338	81	3	84	1.98	2.03	4.01
March ...	136	112	248	60	40	100	348	92	1	93	2.66	1.07	3.74
April ...	37	38	75	23	14	37	112	36	2	38	1.94	0.94	2.88
May ...	48	24	72	40	26	66	138	53	3	56	1.28	1.17	2.45
June ...	163	112	275	78	54	132	407	104	...	104	2.64	1.26	3.91
July ...	118	76	194	63	27	90	284	89	2	91	2.13	0.98	3.11
August ...	176	111	287	104	77	181	468	82	12	94	3.05	1.92	4.97
September ...	165	93	258	293	120	413	671	92	13	105	2.45	3.93	6.38
October ...	74	61	135	31	30	61	196	48	5	53	2.54	1.15	3.69
November ...	60	48	108	36	17	53	161	42	...	42	2.57	1.26	3.83
December ...	73	52	125	41	22	63	188	52	...	52	2.40	1.21	3.61
	1,212	862	2,074	871	541	1,412	3,486	852	42	894	2.32	1.57	3.89

PASTEURELLA PESTIS IN SMEARS FROM BUBO AND
SPLEEN.

Fig. 1.

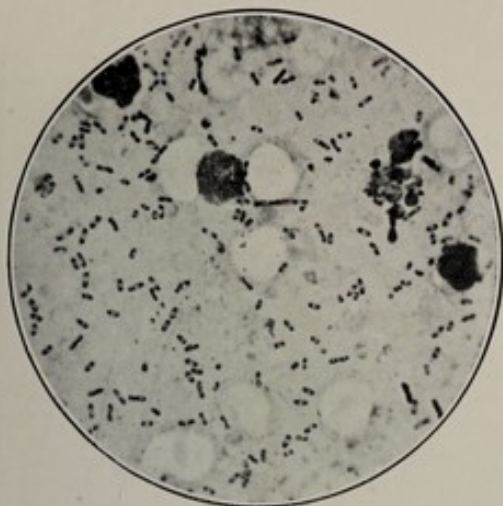


Fig. 2.

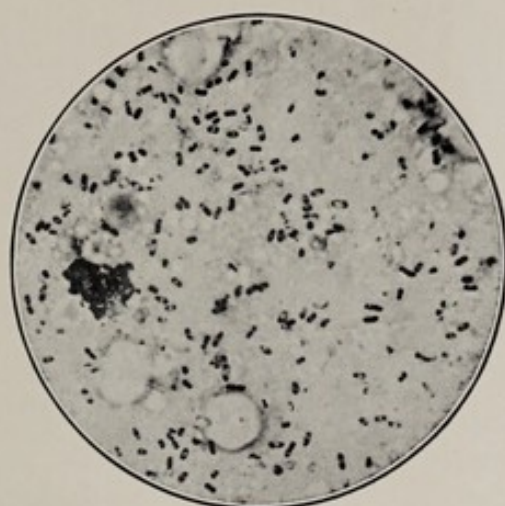


Fig. 3.

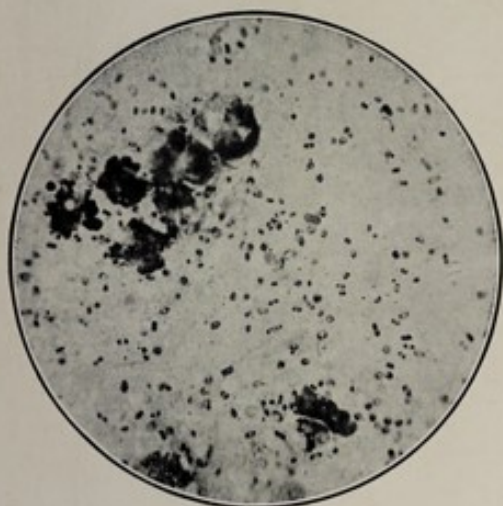


Fig. 4.

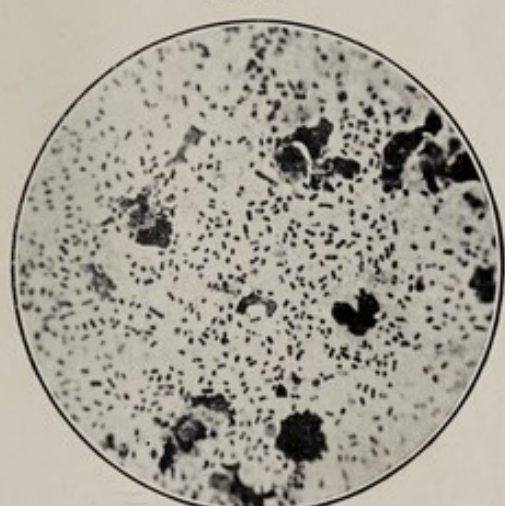


Fig. 5.

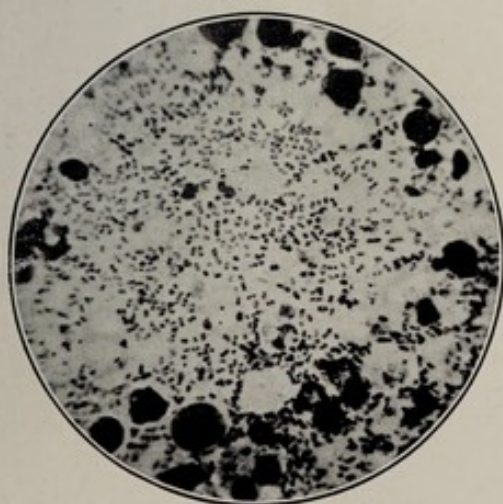


Fig. 6.

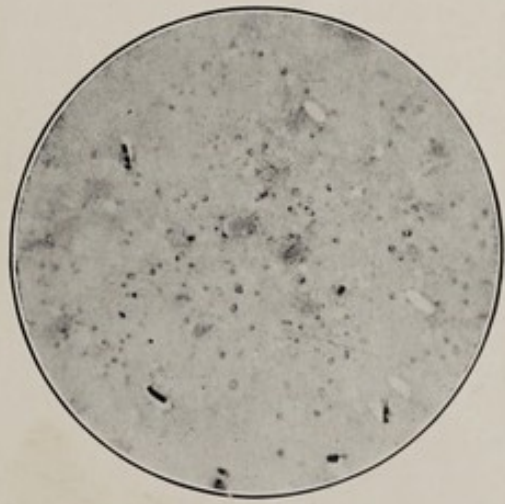
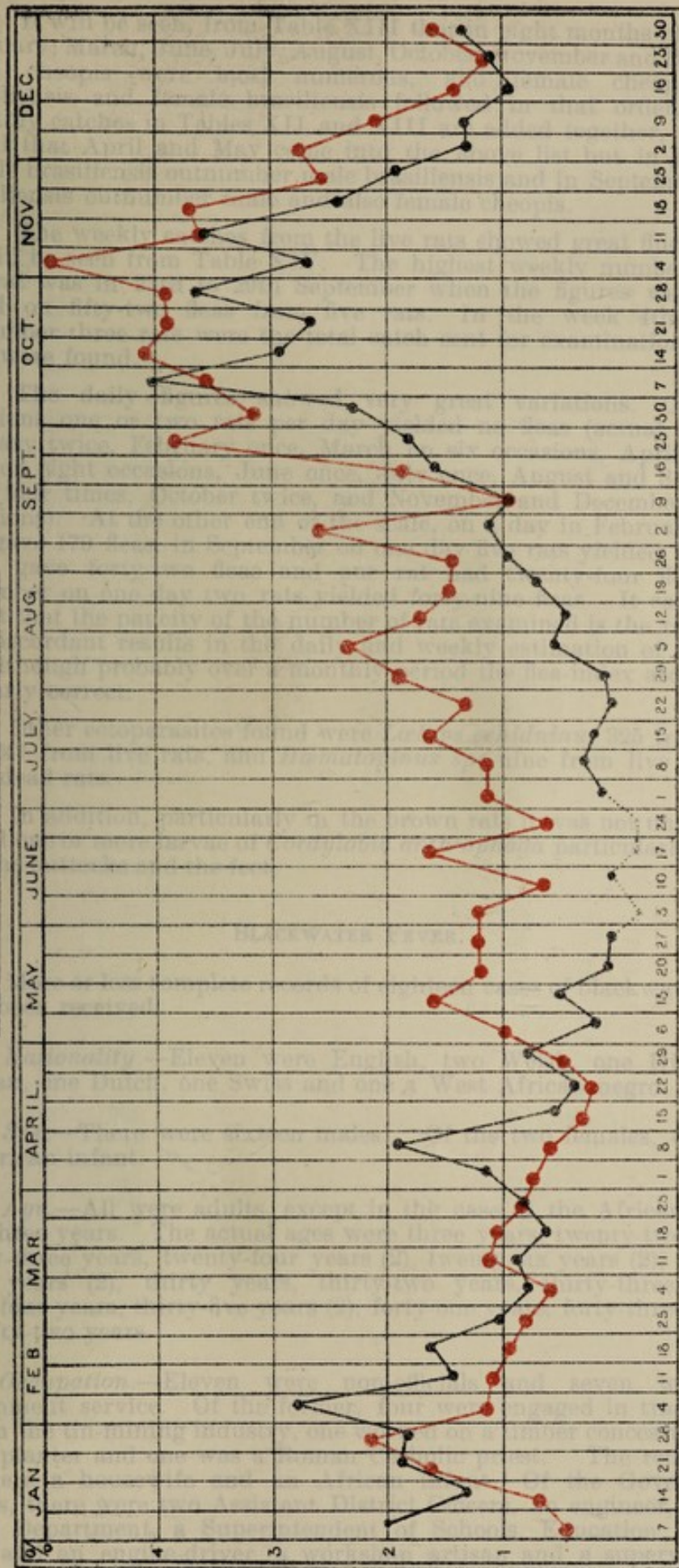


Fig. 6 shows what may be seen in a smear from the bubo or spleen of
a putrid rat.



SHOWING WEEKLY PERCENTAGE OF INFECTED RATS.



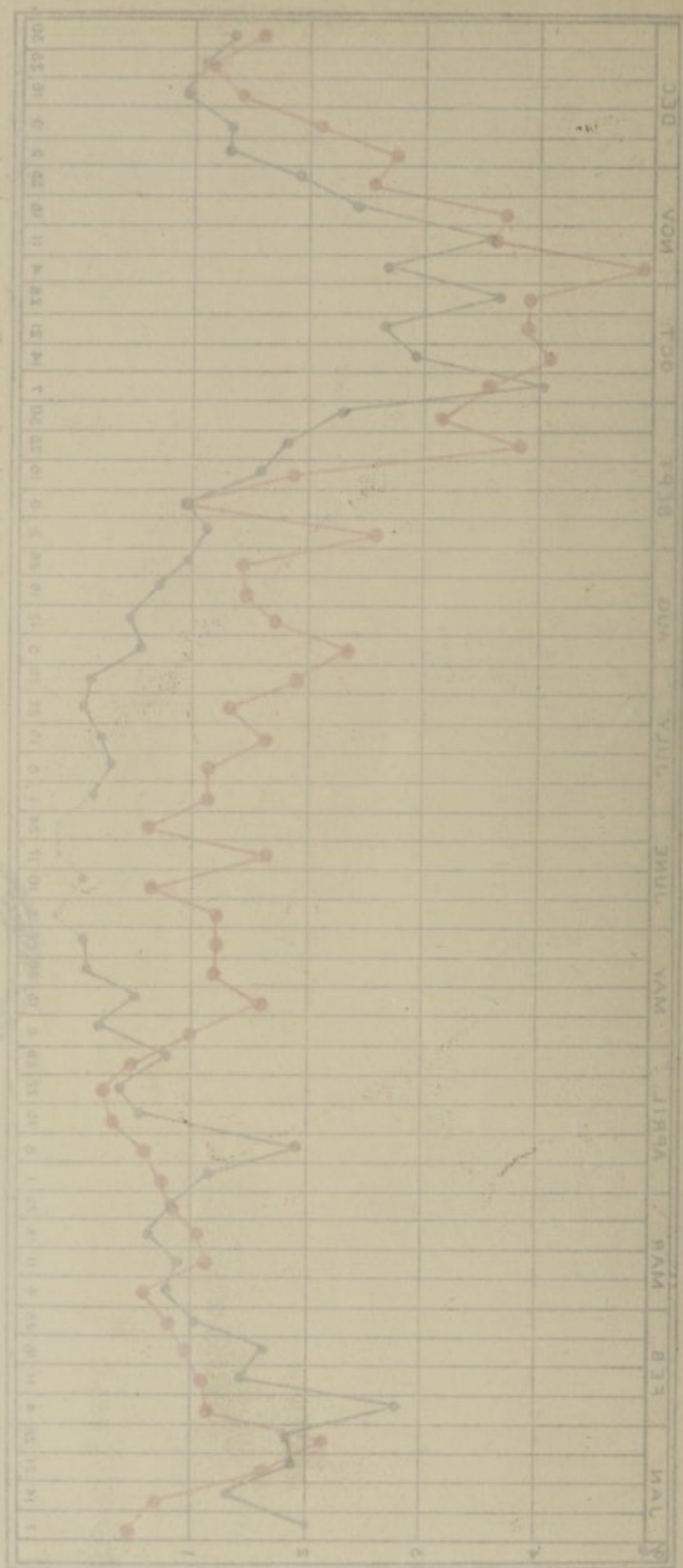
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1929
1930

Percentage of infected rats



SHOWING WEEKLY PERCENTAGE OF INFECTED RATS

It will be seen, from Table XIII that in eight months of the year (January, March, June, July, August, October, November and December) male cheopis were most numerous, and female cheopis, male brasiliensis and female brasiliensis followed in that order. If the monthly catches in Tables XII and XIII are added together, it will be found that April and May come into the above list but in February female brasiliensis outnumber male brasiliensis and in September, male brasiliensis outnumber male and also female cheopis.

The weekly catches from the live rats showed great fluctuations, as will be seen from Table XIV. The highest weekly number of fleas per rat was in 23rd to 29th September when the figures were 10.40, based on fifty-two fleas from five rats. In the week 4th to 10th November three rats were the total catch sent for examination and no fleas were found.

The daily figures showed very great variations. On many occasions one or two rats per day yielded no fleas (actual findings, January twice, February once, March on six occasions, April on five, May on eight occasions, June once, July once, August and September each four times, October twice, and November and December on five occasions). At the other end of the scale, on a day in February fifteen rats gave 170 fleas, in September on one day five rats yielded 152 fleas, three gave forty-two fleas and one rat had twenty-four fleas. In December on one day two rats yielded forty-nine fleas. It cannot but be felt that the paucity of the number of rats examined is the reason for the discordant results in the daily and weekly estimation of fleas per rat, although probably over a monthly period the flea-index ascertained is nearly correct.

Other ectoparasites found were *Laelaps echidninus* 325 from dead and 247 from live rats, and *Hæmatopinus* sp. nine from live and 320 from dead rats.

In addition, particularly in the brown rats it was not uncommon to find one or more larvae of *Cordylobia anthropaga* particularly on the tail, the buttocks and the feet.

BLACKWATER FEVER.

More or less complete records of eighteen cases of blackwater fever have been received.

Nationality.—Eleven were English, two Welsh, one Irish, one German, one Dutch, one Swiss and one a West African negro.

Sex.—There were sixteen males. Of the two females, one was an African infant.

Age.—All were adults, except in the case of the African infant aged three years. The actual ages were three years, twenty-two years, twenty-three years, twenty-four years (2), twenty-six years (2), twenty-seven years (2), thirty years, thirty-two years, thirty-three years, thirty-four years, thirty-five years (2), forty-one years, forty-three years, and fifty-two years.

Occupation.—Eleven were non-officials and seven were in Government service. Of the former, four were engaged in trade, two were in the tin-mining industry, one worked on a timber concession, one was a planter and one was a Roman Catholic priest. The remaining two were a housewife and an African infant. Of the Government officials, there were two Assistant District Officers, an engineer, Public Works Department, a Superintendent of Schools, Education Department, and an engine-driver, a workshop artisan and a supervisor of warehouses, Nigerian Railway.

TABLE XIV.

WEEKLY INDEX, FLEAS PER RAT.

Week ending.	X. cheopis			X. brasiliensis.			Full total.	Rats searched.	Fleas per rat.
	♂	♀	Total.	♂	♀	Total.			
7th Jan. ...	16	13	29	5	2	7	36	23	1.59
14th " ...	9	9	18	1	2	3	21	12	1.75
21st " ...	16	10	26	12	5	17	43	14	3.07
28th " ...	15	8	23	11	1	12	35	12	2.91
4th Feb. ...	21	28	49	8	9	17	66	31	2.12
11th " ...	15	11	26	1	1	2	28	16	1.75
18th " ...	18	31	49	3	1	4	53	20	2.65
25th " ...	42	22	64	59	89	148	212	32	6.62
3rd Mar. ...	34	22	56	18	9	27	83	24	3.45
10th " ...	38	32	70	20	23	43	113	22	5.13
17th " ...	11	10	21	14	7	21	42	13	3.23
24th " ...	10	9	19	6	2	8	27	10	2.70
31st " ...	53	42	95	4	3	7	102	30	3.40
7th Apr. ...	7	7	14	1	...	1	15	6	2.50
14th " ...	13	17	30	1	2	3	33	8	4.12
21st " ...	9	3	12	14	8	22	34	13	2.61
28th " ...	8	10	18	7	4	11	29	9	3.22
5th May ...	14	11	25	21	20	41	66	29	2.34
12th " ...	18	8	26	9	4	13	39	10	3.90
19th " ...	9	3	12	10	2	12	24	11	2.18
26th " ...	1	1	2	...	...	...	2	3	0.66
2nd June ...	12	9	21	1	...	1	22	12	1.83
9th " ...	48	16	64	32	31	63	127	32	3.96
16th " ...	6	16	22	6	6	12	34	12	2.83
23rd " ...	77	63	140	13	11	24	164	34	4.82
30th " ...	26	10	36	26	6	32	68	19	3.57
7th July ...	21	7	28	3	2	5	33	17	1.94
14th " ...	19	9	28	29	10	39	67	15	4.46
21st " ...	36	23	59	18	4	22	81	14	5.78
28th " ...	23	22	45	6	7	13	58	26	2.23
4th Aug. ...	27	23	50	10	6	16	66	32	2.06
11th " ...	38	33	71	27	17	44	115	25	4.60
18th " ...	40	26	66	1	8	9	75	15	5.00
25th " ...	62	32	94	24	16	40	134	21	6.35
1st Sept. ...	33	15	48	59	38	97	145	23	6.30
8th " ...	41	21	62	51	23	74	136	24	5.66
15th " ...	36	44	80	206	83	289	369	44	8.38
22nd " ...	16	7	23	21	8	29	52	10	5.20
29th " ...	67	18	85	5	2	7	92	24	3.83
6th Oct. ...	10	9	19	19	11	30	49	11	4.45
13th " ...	31	28	59	3	4	7	66	18	3.66
20th " ...	14	7	21	5	7	12	33	6	5.50
27th " ...	19	17	36	4	8	12	48	18	2.66
3rd Nov. ...	7	...	7	...	...	...	7	3	2.33
10th " ...	...	...	...	...	...	...	...	3	0.00
17th " ...	6	12	18	3	4	7	25	10	2.50
24th " ...	32	23	55	20	13	33	88	20	4.40
1st Dec. ...	15	13	28	13	10	23	51	6	8.50
8th " ...	30	21	51	12	14	26	77	28	2.74
15th " ...	26	20	46	1	2	3	49	12	4.08
22nd " ...	3	2	5	3	1	4	9	6	1.50
29th " ...	14	8	22	25	5	30	52	5	10.40
30th & 31st	...	1	1	...	...	...	1	1	1.00
	1,212	862	2,074	871	541	1,412	3,486	894	3.89

Locality.—Ten cases occurred in the Southern Provinces (Lagos four, Enugu two and Abeokuta, Abonema, Burutu and Sapele one case each), and seven were in the Northern Provinces (Jos three, and Azare, Ilorin, Maidugari and Odara one case each) and one case in British Cameroons, namely at Buea.

Season.—There was one case in January, one in February, two in May, three in June, three in July, three in August, one in September, one in October and three in November.

Period of residence in the district.—Excluding the negro-infant (who spent her three years of life in Lagos) the periods were one month, two months, three months (2), four months (2), five months (2), eight months (3), nine months, twelve months, thirteen months (2), fourteen months and seventeen months.

Length of present tour.—The period resident since last in a temperate climate was three months, four months (2), five months (2), six months (2), eight months (3), nine months, twelve months, thirteen months (2), fourteen months, seventeen months, and several years.

Total residence in tropics.—This amounted to eight months (2), one year, thirteen months, fourteen months, two years, three years (3), seven years, eight years (4), nine years, fourteen years and twenty years.

Personal prophylactic measures against malaria.

Case 1.—Swiss, male, age 34; twenty years in tropics, two months in district, present tour several years, repeated attacks of malaria, irregular use of mosquito net, no regular quinine prophylaxis.

Case 2.—English, male, age 35; seven years in tropics, seventeen months in district, present tour seventeen months, several previous attacks of malaria, uses mosquito curtain and says he is a regular quinine-taker.

Case 3.—English, male, age 52; eight years in Nigeria, rest of his life in India, present tour nine months, nine months in district, has had malaria repeatedly, also an attack of blackwater fever in 1924, says he takes five grains quinine daily but admits possibility of occasional omission.

Case 4.—English, male, age 26; three years in Nigeria, one month in district, six months present tour, has had some twelve attacks of malaria, took fifteen grains quinine in tabloid form every ninth day, under home medical advice.

Case 5.—English, male, age 30; eight years in Nigeria, eight months in district, present tour eight months, several attacks of malaria, blackwater fever in 1927, certified by employer to have taken five grains of quinine daily.

Case 6.—Dutch, male, age 33; eight years in Nigeria, four months in district, present tour four months, very frequent attacks of "fever" used a mosquito net, took 0.25 gm. bihydrochloride of quinine in cachet, not every day.

Case 7.—German, male, age 27; three years in Nigeria, thirteen months in district, present tour thirteen months, frequent attacks of malaria, blackwater fever in 1926, irregular in taking quinine.

Case 8.—Welsh, male, age 41; one year in Nigeria, seven years in Mesopotamia, one year in district but travelled over long distances daily by train, present tour one year, numerous attacks of malaria, used mosquito net but not mosquito boots, took five grains quinine daily in tabloid or in liquid form.

Case 9.—English, male, age 24; two years in Nigeria, five months in district, present tour five months, several slight attacks of malaria, used a mosquito net and was stated to be a regular quinine taker.

Case 10.—African, female, age 3; never away from Lagos, "several" attacks of "fever", blackwater fever, 1927, occasionally received $1\frac{1}{4}$ grains quinine when "feverish".

Case 11.—English, female, age 27; fourteen months in Nigeria, fourteen months in district, present tour fourteen months, has had several attacks of fever, uses a mosquito net but does not wear mosquito boots, was a regular quinine taker but took none for two weeks before present attack.

Case 12.—English, male, age 43; fourteen years in Nigeria, five months in district, present tour five months, has had malaria, uses mosquito net but does not wear mosquito boots, does not take quinine.

Case 13.—Welsh, male, age 22; eight months in Nigeria, eight months in district, eight months present tour, two attacks of malaria, took a five-grain tabloid of quinine daily.

Case 14.—English, male, age 26; thirteen months in Nigeria, thirteen months in district, present tour thirteen months, several attacks of malaria, took five grains quinine irregularly.

Case 15.—English, male, age 35; eight years in West Africa, four months in district, present tour four months, frequent attacks of malaria, uses a mosquito net but not mosquito boots, takes quinine hydrochloride in five-grain tablets but sometimes forgets and sometimes runs out of it.

Case 16.—English, male, age 32; nine years in Nigeria, three months in district, present tour three months, malaria "on and off" since arrival, uses mosquito curtain and mosquito boots, takes five grains quinine daily but admits frequent omission.

Case 17.—English, male, age 23; eight months in Nigeria, eight months in district, present tour eight months, had attack of malaria, habits as regards prophylaxis against malaria doubtful.

Case 18.—English, male, age 24; three years in Nigeria, three months in district, six months present tour, had several attacks of malaria and suffered from boils, took five grains quinine daily and used mosquito net and mosquito boots.

ONSET OF ILLNESS AND QUININE ADMINISTRATION.

Case 1.—Patient, who only took quinine when he felt unwell, had fever, malaise, headache and rigor, followed by nausea and vomiting, on afternoon of 22nd January, 1928. Took ten grains quinine hydrochloride, in tablet form at 7.30 p.m. At 9 p.m. he had another rigor and black water was passed at 10 p.m. (Fatal case, seventy-eight hours).

Case 2.—Patient presented himself for advice on 17th February, 1928, on account of daily recurring headache during the previous ten days. He was at once admitted to hospital where his temperature was found to be 99.4°F , pulse 88 and the spleen was enlarged three fingers' breadth below costal margin. The urine was dark sherry colour, with a cloud of albumen. Quinine hydrochloride, $1\frac{1}{4}$ grains in solution was given four times during 18th February, 1928, and twice during the morning of 19th February, 1928, soda bicarbonate being also administered. At noon there was a rigor, the temperature rose, and the urine passed shortly thereafter was pink in colour. (Fatal case, five days, anuria).

Case 3.—For two weeks patient had been feeling out of sorts, on the last two days of which period, he had "fever." He did not increase his daily dose of five grains quinine until the first day of the third week, 22nd May, 1928, when in addition to his morning five grains he took ten grains quinine hydrochloride in solution at 5 p.m. At 5.30 p.m. there was a rigor of half-an-hour's duration and at 7 p.m. he passed black water.

Case 4.—Was subject to malarial attacks. He took fifteen grains quinine in tabloid form every ninth day as advised by his medical specialist in London. The attack was sudden. Having taken his fifteen grains quinine at 9 a.m. on the 9th day (31st May, 1928) at noon he had a rigor, was sick, and on getting up to pass urine he saw it was black.

Case 5.—History indirectly ascertained. Apparently no more quinine taken than the usual evening five grain dose on 10th June, 1928. Some four hours afterwards patient complained of "chills" and backache and passed dark urine. (Fatal case, fourteen days (syncope)).

Case 6.—Fourteen days previously had "slight fever". Drove a car 130 miles on 11th June, 1928, and felt very tired. Took twelve grains quinine bihydrochloride in cachet form and rested in afternoon complaining of pain in small of back. Towards evening he vomited, felt very ill and became semi-conscious, at 9 p.m. he had a rigor and passed port-wine coloured urine.

Case 7.—Presumably he was feeling unwell, as he took twelve grains quinine hydrochloride in the evening of 19th June, 1928. At 6 a.m. on 20th June, 1928, he had a rigor and passed black water. (Fatal case, sixty hours).

Case 8.—Patient had an attack of subtertian malaria (parasites in blood) on 12th July, 1928. He received ten grains of quinine in solution on that day and on the next day he had that dose again (*i.e.*, five grains in morning and five in evening). By the evening of 13th July, 1928, the fever was gone. On the morning of 14th July, 1928, after five grains quinine in solution, his temperature being 97°F, at 9 a.m. he was writing a letter and got up to pass urine, which he found was the colour of stout.

Case 9.—For a week previous to 21st July, 1928, he had been feeling "not well". Every night he went to bed feeling tired and once every night he awoke, feeling cold all over. There was backache. On 19th July, 1928, he was admitted to hospital and on that day he received two five-grain doses of quinine. On 20th July, 1928, he had three five-grain doses quinine hydrochloride in liquid form, the last dose being taken in the evening. There was no rigor but at 2 a.m. he awoke to pass black water. (Fatal case, forty hours).

Case 10.—An African baby brought to the dispensary with a history of fever, ushered in by a "convulsion." A dose of two and a half grains of quinine was given, after which the urine was noticed to be black.

Case 11.—Patient admitted to hospital on 31st July, 1928. For a week previously she had not been feeling well, during which time she had taken no quinine. On admission, the temperature was 103°F, the pulse 120 and she complained of headache and pains all over the body. On 31st July, 1928, 1st August, 1928, and 2nd August, 1928, nine grains quinine hydrochloride were given intramuscularly and on 3rd August, 1928, and 4th August, 1928, five grains in solution were given by the mouth four times each day. The last dose was taken at 6 p.m. At 4 a.m. on 5th August, 1928, there was a rigor during which black water was passed.

Case 12.—Patient felt shivery in the evening of 23rd August, 1928. Next day he felt no better and at 6 p.m. and again at 10 p.m. he took five grains quinine, on his own initiative, after what he called a "shivering fit". On 25th August, 1928, at 7 a.m., 1 p.m., and 4.30 p.m. he took five grains quinine, all in tabloid form (hydrochloride) and at 10 a.m. on 26th August, 1928 he passed black water.

Case 13.—Patient sought medical advice after a fortnight's malaise, characterised by headache, nausea and elevation of temperature. During this period, he affirmed, he had taken his usual five

grains quinine each day. On 24th August, 1928, the day on which he first consulted the medical officer, crescents were found in the blood smear. He was given an intramuscular injection of quinine, one gramme on this day. At noon on 26th August, 1928, there was a definite rigor, and at 5 p.m. on the same day he passed reddish-black urine.

Case 14.—Had felt out of sorts for five days, and had vomited on each of these days. On two of the days, on his own initiative he took ten grains quinine and on the other days took five grains. In the early hours of 29th September, 1928, he felt very ill and called in the medical officer. He was at once admitted to hospital and received ten grains quinine. There was no rigor but at 7.30 a.m. on that date the urine passed was black.

Case 15.—Admitted to hospital on 4th October, 1928, with advanced anaemia. Liver enlarged. Spleen not palpable. Temperature 99.4°F. There was no albumin in the urine. States he had been "running a temperature" up to 104°F for a week previously, but had played tennis in spite of diarrhoea, colicky pains and epigastric discomfort. Blood examination showed subtertian rings and five grains quinine hydrochloride, in solution were given on 4th October, 1928, and on 5th October, 1928. At 9.30 a.m. on 6th October, 1928, he received an intramuscular injection of nine grains quinine bihydrochloride. At 4.45 p.m. on that day he had a rigor lasting one hour and at 5.45 p.m. he passed black water. (Fatal case, five days).

Case 16.—Awoke early on morning of 4th November, 1928, feeling out of sorts, headache and general malaise. This increased during the day and at 10 p.m. he had a severe rigor, followed by a high temperature and vomiting. Later he passed what he described as "curious coloured urine". At 6 a.m. on 5th October, 1928, he took ten grains quinine in tabloid form, and shortly afterwards got out of bed to pass urine, which he realised was red.

Case 17.—Patient was admitted to hospital suffering from soft sores (penile) and a groin abscess, on 12th October, 1928. These healed fairly rapidly on 29th October, 1928, he developed a typical attack of subtertian malaria during which parasites were found in the blood smear. He was put on ten grains quinine (hydrochloride) twice daily and the temperature became normal on 1st November, 1928, remaining so until 5th November, 1928. On the morning of 5th November, 1928, he had his routine ten grains quinine (hydrochloride in solution). At 2 p.m. on that day, his temperature being then 101.2°F, he passed "port-wine" urine. There was no rigor. (Fatal case, fifty-six hours).

Case 18.—Felt seedy on 12th November, 1928, with slight rise of temperature. Took fifteen grains quinine on that day, ten grains on 13th November, 1928, fifteen grains on 14th November, 1928, and thirty grains on 15th November, 1928. At 9 a.m. on 16th November, 1928, took ten grains quinine hydrochloride and passed black water half-an-hour later. He had had a rigor at 11 p.m. on 14th November, 1928.

COURSE OF ILLNESS.

Case 1.—Lived just over three days after appearance of black-water. He looked "toxic" from the beginning. Air hunger appeared on the first day. There was collapse after each attack of vomiting. Urine diminished in quantity and cleared slightly.

Case 2.—Patient lived five days. Each day the urine grew darker, from a light sherry-red to a dark porter colour, and the daily quantity of albumen steadily lessened until there was anuria on the fifth day.

Case 3.—Urine which was porter-colour in evening of 22nd May, 1928, was clear at 9 a.m. on 23rd May, 1928. On 24th May, 1928, it was a light port colour and was clear again on 25th May, 1928. On 29th May, 1928, there were two "bursts" of haemoglobinuria, with clear

urine in the intervals and on 30th May, 1928, following a rigor and rise of temperature there was a marked return of haemoglobinuria. The urine was clear on 31st May, 1928, but there were two slight relapses on 3rd June, 1928, and one on 6th June, 1928. Thereafter convalescence was rapid.

Case 4.—Apparently a mild case. Patient not seen till third day of illness. The urine cleared on the fourth day. There was some diarrhoea at the outset, vomiting occurred only twice and restlessness was the most marked feature.

Case 5.—Patient was not seen by a medical officer. Apparently it was thought that he had recovered, the urine having cleared and the vomiting having stopped after six days' illness. On the fourteenth day, however, there was a severe bout of vomiting, during which the patient suddenly collapsed and died.

Case 6.—Temperature varied between 103°F and 99.2°F on 11th June, 1928, and 12th June, 1928, urine steadily cleared and on 13th June, 1928, temperature was normal and urine clear.

Case 7.—Few data. Had rigor and passed black urine 6 a.m. on 20th June, 1928, passed no urine on 21st June, 1928, or on 22nd June, 1928, and died on last date.

Case 8.—Patient was distressed and anxious for a few hours. Urine cleared entirely within thirty-six hours, and temperature remained normal after first day.

Case 9.—Patient very restless. Urine passed in fair quantity, died within two days of onset of hæmoglobinuria.

Case 10.—Mother refused to bring child into hospital. Treated as out-patient. Urine cleared after first day, but darkened again on third day, after two and a half grains quinine. Urine cleared again next day and child remained well.

Case 11.—Urine cleared within twenty-four hours and patient was not ill.

Case 12.—Urine although very dark-red on first day, lightened in colour on second day and was clear on third day. The patient was not distressed and had no vomiting.

Case 13.—Urine was passed in good quantity throughout illness. First period of hæmoglobinuria lasted two days, temperature being 101°F or less. On third day urine was clear and temperature normal. On fourth day temperature shot up to 104°.8F and urine became red again. With falling temperature on fifth day urine became clear. On sixth day temperature rose to 102°.8F and urine was again red. From seventh day onwards temperature was normal and urine clear.

Case 14.—Dark urine was passed in minute quantities for the first two days of illness. Thereafter there was complete anuria for a period of five days, after which the patient gradually recovered. After the first day, there was little or no febrile disturbance, but vomiting was a feature for the first week.

Case 15.—Duration of illness, three days, urine did not clear, temperature varied between 105°.6F and 100°.4F vomiting became persistent and patient died in coma.

Case 16.—Mild case. Temperature fell from 103°.8F to normal in first twenty-four hours, urine cleared within forty-eight hours. There was no vomiting.

Case 17.—Illness lasted two and a half days, the temperature varied between 106°.4F and 101°.2F the urine did not clear but diminished greatly in quantity, nervous prostration profound, vomiting incessant. Died in delirium.

Case 18.—Although urine did not clear for six days and the temperature varied between 103°F and 98°.4F for that period, there was little vomiting or other discomfort and recovery was rapid.

The blood was examined in thirteen cases. In four, malaria parasites (subtertian) were demonstrated before the onset of hæmoglobinuria, case 8—subtertian rings two days before, pigmented mononuclears day of hæmoglobinuria, case 13—crescents two days before, case 15—subtertian rings on day before and case 17—subtertian rings five days before onset of hæmoglobinuria. In eight the blood was examined on the first day of hæmoglobinuria four being negative and four showing subtertian rings. In one case, the blood examined only on the second day, was negative.

A differential leucocyte count was done in eight cases. The figures with regard to four are:—

DIFFERENTIAL LEUCOCYTE COUNT, FOUR CASES.

Case.	Day.	Polymorph.	Lymphocyte.	L. Mononuclear.	Eosinophil.	Basophil.
9	1st	37	56	6	—	1
10	2nd	38	53.6	4	4.4	—
11	1st	53	38	9	—	—
12	1st	61	32	6	—	1

DIFFERENTIAL LEUCOCYTE COUNT IN ADDITIONAL FOUR CASES.

Case.	Day.	P.	S.	L.	M.	E.	T.	Ma.	My.	Par.	Pigm.
8	* 1st ...	64	19.6	2.8	10.8	1.2	1.2	0.4	—	—	Yes
	2nd ...	57.6	19.2	3.2	16.4	1.6	1.6	0.4	—	—	—
	7th ...	57.2	19	1.6	14.8	3.6	3.2	—	1.6	—	—
15	Day before	49.8	14.2	3	29.6	—	2.4	1	—	Yes	Yes
	† 1st ...	77.6	6.8	2.4	8.8	0.4	2	—	2	—	—
	‡ 2nd ...	78	7.2	0.8	12	—	2	—	—	—	—
17	Week before	79.6	4	1.2	13.6	0.4	0.8	0.4	—	Yes	Yes
	§ 1st ...	58.8	10.8	3.6	25.2	—	1.6	—	—	—	—
	2nd ...	57.6	12.8	5.2	24.4	—	—	—	—	—	—
18	3rd ...	46	11.6	4.4	37.2	—	0.8	—	—	—	—
	1st ...	86	8	0.4	4.8	—	0.4	0.4	—	—	—
	2nd ...	64.4	19.2	2.4	13.2	—	0.8	—	—	—	—

* One mononuclear erythrophage encountered in counting 500 leucocyte.

† Two normoblasts

‡ Four

§ Many vacuolated mononuclears

P=polymorph S=small and L=large, lymphocyte M=mononuclear, E=eosinophil T=transitional,
Ma=mast, My=myocyte, Par=parasite, Pigm=pigment.

ARNETH COUNT IN FOUR CASES.

Case.	Day.	I.	II.	III.	IV.	V.
8	1st ...	72	21.6	6	0.4	—
	2nd ...	74.4	19.6	4.8	0.8	0.4
	7th ...	56.8	27.6	15.2	0.4	—
15	Day before	84.4	13.4	2.2	—	—
	1st ...	53.6	34.4	10.8	1.2	—
	2nd ...	64.4	24.4	11.2	—	—
17	Week before	73.2	20.8	6	—	—
	1st ...	77.2	19.2	3.6	—	—
	2nd ...	75.6	21.2	3.2	—	—
18	3rd ...	75.2	21.6	3.2	—	—
	1st ...	61.6	31.6	6.4	0.4	—
	2nd ...	71.2	22	6	0.8	—

Summary.—In eighteen cases of blackwater fever there were eleven recoveries and seven deaths. There had been a previous attack of blackwater in four cases, the present attack proving fatal in two.

There was a history of previous attacks of malaria in all cases. There was a relapse in four cases, two cases having one relapse, one having two and one having four relapses before the urine finally cleared. Subtertian malarial parasites were demonstrated either just before or during the first day of hæmoglobinuria in eight cases.

HISTOLOGY.

Pieces of tissue have been received in fair numbers, for examination. Their variety and their general interest are great, and in most cases they were accompanied by good clinical notes.

Simple new growths numbered twenty-six, in which the fibroma predominated.

Malignant tumours amounted to thirty-six of which twenty-one were carcinomatous and fifteen sarcomatous.

Nine specimens of "tumours" due to *Onchocerca volvulus* were received.

There were nine specimens which were shown to be tubercular, and there were five which were most probably gummatous.

Pieces of tissue showing chronic inflammatory changes numbered twenty-nine and other specimens included six pieces of liver, five sections of lung, three of spleen, two of kidney, a brain showing the capillaries blocked with sporulating malaria parasites, and a cord showing definite degeneration in the posterior columns.

The more important tissues are detailed below.

Carcinomata.

<i>Situation.</i>				<i>Diagnosis.</i>
1. Gland	...	...	...	Squamous carcinoma.
2. Gland	...	...	...	Solid cancer.
3. Scalp	...	...	...	Solid cancer.
4. Skin	...	...	...	Squamous cancer.
5. Gland	...	...	...	Carcinoma.
6. Parotid	...	...	...	Carcinoma.
7. Cervix	...	...	...	Solid carcinoma.
8. Parotid	...	...	...	Cancer.
9. Parotid	...	...	...	Adeno-carcinoma.
10. Liver	...	...	...	Primary cancer.
11. Finger	...	...	...	Squamous cancer.
12. Mouth	...	...	...	Adamantinoma.
13. Eyeball	...	...	...	Epithelioma.
14. Breast	...	...	...	Adeno-carcinoma.
15. Orbit	...	...	...	Cylindroma.
16. Palate	...	...	...	Carcinoma.
17. Eye	...	...	...	Epithelioma.
18. Parotid	...	...	...	Myxo-chondro-ado-carcinoma.
19. Shoulder	...	...	...	Squamous cancer.
20. Liver	...	...	...	Adeno-carcinoma.
21. Cervix	...	...	...	Carcinoma.

Sarcomata.

<i>Situation.</i>				<i>Diagnosis.</i>
22. Gland	...	...	...	Melanotic sarcoma.
23. Gland	...	...	...	Mixed cell sarcoma.
24. Finger	...	...	...	Spindle cell sarcoma.
25. Foot	...	...	...	Mixed cell sarcoma.
26. Tibia	...	...	...	Osteosarcoma.
27. Neck	...	...	...	Round cell sarcoma.
28. Thigh	...	...	...	Round cell sarcoma.
29. Retroperitoneal	...	...	...	Round cell sarcoma.
30. Liver	...	...	...	Lympho-sarcoma.
31. Chest	...	...	...	Lympho-sarcoma.
32. Foot	...	...	...	Melanotic sarcoma.
33. Toe	...	...	...	Melanotic sarcoma.
34. Parotid	...	...	...	Round cell sarcoma.
35. Uterus	...	...	...	Myosarcoma.
36. Cheek	...	...	...	Melanotic sarcoma.

Simple Tumours.

<i>Situation.</i>				<i>Diagnosis.</i>
37. Neck	...	...	...	Fibroma.
38. Eyelid	...	...	...	Fibroma.
39. Neck	...	...	...	Myxo-adenoma.
40. Vagina	...	...	...	Papilloma.
41. Jaw	...	...	...	Epulis.
42. Foot	...	...	...	Papilloma.
43. Back	...	...	...	Fibroma.
44. Chest	...	...	...	Fibroma.
45. Breast	...	...	...	Fibro-adenoma.
46. Foot	...	...	...	Fibroma.
47. Arm	...	...	...	Fibroma.
48. Jaw	...	...	...	Osteoma.
49. Intestine	...	...	...	Hæmangioma.
50. Knee	...	...	...	Fibroma.
51. Breast	...	...	...	Fibro-adenoma.
52. Scalp	...	...	...	Neuroma.
53. Scalp	...	...	...	Papilloma.
54. Foot	...	...	...	Fibro-myxoma.
55. Scrotum	...	...	...	Myoma.
56. Testicle	...	...	...	Fibro-adenoma.
57. Testis	...	...	...	Fibroma.
58. Jaw	...	...	...	Epulis.
59. Breast	...	...	...	Adenoma.
60. Skin	...	...	...	Papilloma.
61. Abdomen	...	...	...	Dermoid.
62. Thyroid	...	...	...	Goitre.

Tumours due to Onchocerca volvulus

63. Elbow	...	...	...
64. Skin	...	...	...
65. Skin	...	...	...
66. Shoulder	...	...	...
67. Back	...	...	...
68. Chest	...	...	...
69. Sacrum	...	...	...
70. Skin	...	...	...
71. Scalp	...	...	...

Tuberculosis.

72.	Testicle	...	...	...
73.	Omentum	...	...	...
74.	Gland	...	...	...
75.	Gland	...	...	...
76.	Gland	...	...	...
77.	Gland	...	...	...
78.	Lung	...	...	...

Gumma.

79.	Back	...	...	...
80.	Bone	...	...	...
81.	Leg	...	...	...
82.	Liver	...	...	...
83.	Leg	...	...	...

SNAKES.

Through the kindness of many medical officers and others a collection of snakes has been accumulated. The following are the identifications:—

Typhlopidae.

1. *Typhlops braminus*.
2. *Typhlops zenkeri*.

Booidae.

3. *Python sebae*.
4. *Python regius*.

*Colubridae.**Aglypha.*

5. *Tropidonotus olivaceus*.
6. *Tropidonotus ferox*.
7. *Boodon lineatus*.
8. *Lycophidium semicinctum*.
9. *Lycophidium irroratum*.
10. *Hormonotus modestus*.
11. *Mehelyea pœnsis*.
12. *Mehelyea capensis*.
13. *Mehelyea crossii*.
14. *Chlorophis irregularis*.
15. *Chlorophis heterolepidotus*.
16. *Philothamnus variegatus*.
17. *Gastropyxis smaragdina*.
18. *Hapsidophrys lineata*.
19. *Coronella coronata*.
20. *Grayia smythii*.
21. *Grayia tholloni*.
22. *Prosymna meleagris*.
23. *Dasypeltis macrops*.
24. *Dasypeltis scabra*.

Opisthoglypha

25. *Tarbophis variegatus*.
26. *Leptodeira hotambœia*.
27. *Leptodeira guineensis*.
28. *Dipsadomorphus blandingii*.
29. *Rhamphiophis* sp.
30. *Psammophis sibilans*.
31. *Psammophis regularis*.
32. *Psammophis elegans*.
33. *Elapops modestus*.

Proteroglypha.

34. *Naia melanoleuca*.
35. *Naia nigricollis*.
36. *Naia* sp.
37. *Dendraspis jamesonii*.

Viperidae.

38. *Causus rhombeatus*.
39. *Causus lichtensteinii*.
40. *Bitis arietans*.
41. *Bitis gabonica*.
42. *Atractaspis irregularis*.
43. *Atractaspis aterrima*.
44. *Atractaspis corpulenta*.
45. *Atractaspis hildebrandtii*.

The snakes were obtained from the following localities:—

- Lagos.—Nos. 1, 2, 5, 7, 10, 13, 14, 16, 19, 23, 24, 26, 30, 31, 32, 33, 35, 38, 40, 41, 42 and 45.
- Lokoja.—Nos. 7, 8, 9, 14, 16, 22, 25, 26, 30, 32, 38, 39 and 40.
- Sapele.—Nos. 3, 10, 17, 30, 31, 34, 37 and 38.
- Abeokuta.—Nos. 7, 15, 16, 22, 31, 35, 38 and 43.
- Ibi.—Nos. 7, 14, 16, 30, 35 and 38.
- Ilorin.—Nos. 16, 26, 29, 30, 35 and 38.
- Makurdi.—Nos. 3, 8, 27, 38 and 40.
- Warri.—Nos. 3, 20, 30 and 38.
- Zaria.—Nos. 3 and 16.
- Oshogbo.—No. 31.
- Minna.—No. 35.

DERMATOLOGY.

The examination of patients attending the African Hospital, Lagos, was maintained throughout the year with the exception of a short period which was spent investigating yaws and gangosa at Mamfe.

The conditions which received special attention are:—

1. "Crab-yaws".
2. Gangosa.
3. Creeping-eruption.
4. Mycetoma.
5. Tinea flava.
6. Molluscum contagiosum.
7. Psoriasis.
8. Dermatitis venenata.

"Crab-yaws".—This condition, with its unscientific terminology has been, time and again, a bone of contention among tropical writers. There are those who believe the condition to be a late manifestation of yaws. Others think a species of tinea is involved. It is quite probable that both theories are correct inasmuch as lesions do occur which are similar clinically but differ aetiologically. The condition is to be met with most frequently among the native soldiery, the police and the prison warders and a series of photographs of the lesions is shown. As regards the illustration No. 5 this is a condition which probably has nothing to do with yaws but is represented since it may be mistaken for such. It is regarded as being a non-specific hyperkeratosis for the following reasons:—

- (1) No history of yaws could be obtained—since the patient was an intelligent Hausa, this can probably be relied on.
- (2) No pain and no tenderness whatever.
- (3) The condition is sharply confined to that portion of the foot used in walking.
- (4) The appearance is that of simple callus formation—no pitting or eroding present.
- (5) The patient states he has had it since he was born and that it frequently "sheds itself."
- (6) When cut into, it is of a consistency similar to the rind of bacon, not the extreme dry hardness of yaws hyperkeratosis.

The indications are that the disease "crab-yaws" is a true post-yaws manifestation for the following reasons:—

1. Those affected give a definite history of having had yaws.
2. The cases react well to N.A.B. administration and if persevered in, cure will result. By cure is meant disappearance of all tenderness and pain, gradual subsidence of the lesion with eventual regeneration of skin over the areas involved.
3. The failure to find any fungal elements in scrapings and sections after prolonged examination and on successive days.
4. The fact that exquisitely similar lesions have been experimentally produced in monkeys by Schobl (1).

In some of the lesions irregularly eroded areas are the dominant feature, in others, a moth-eaten effect is produced by the formation of dry cribriform areas. It is not always symmetrical and it may be present to a much more advanced degree on one foot. The condition is essentially a chronic one extending over years. Pain is usually

TYPES OF CRAB YAWS.

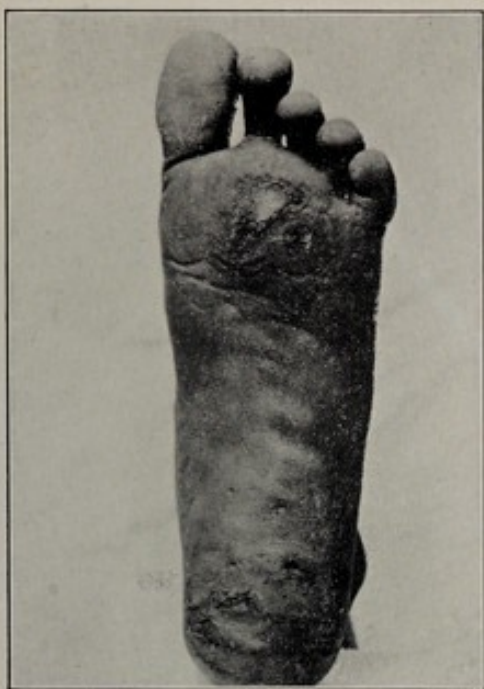


Fig. 1.

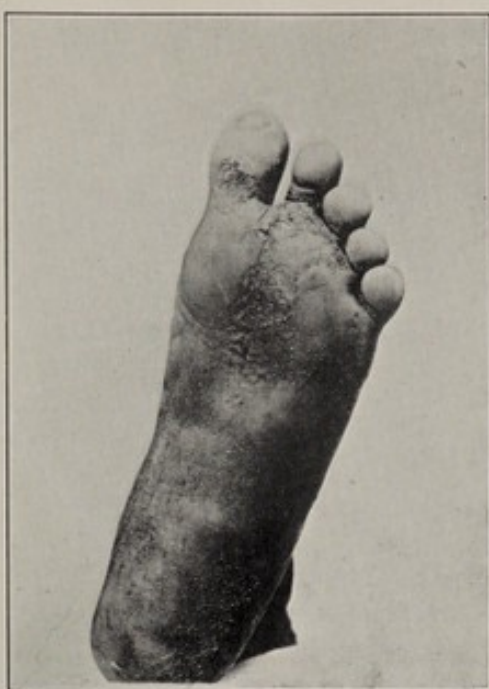


Fig. 2.



Fig. 3.

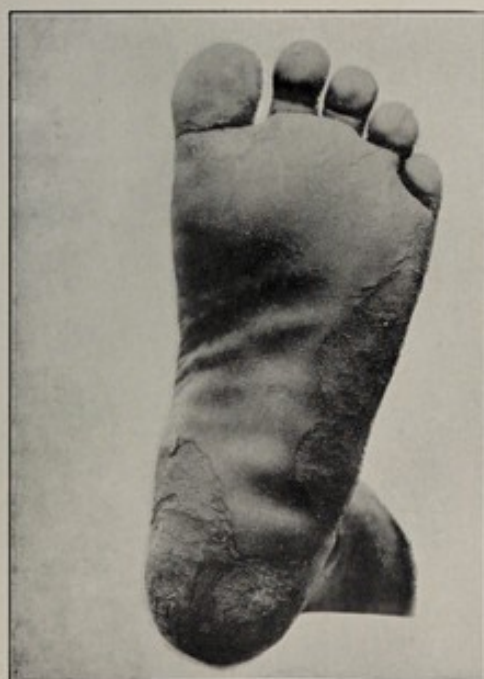


Fig. 4.



Fig. 5.
(See Note in text).



TYPES OF CRAB YAWS.

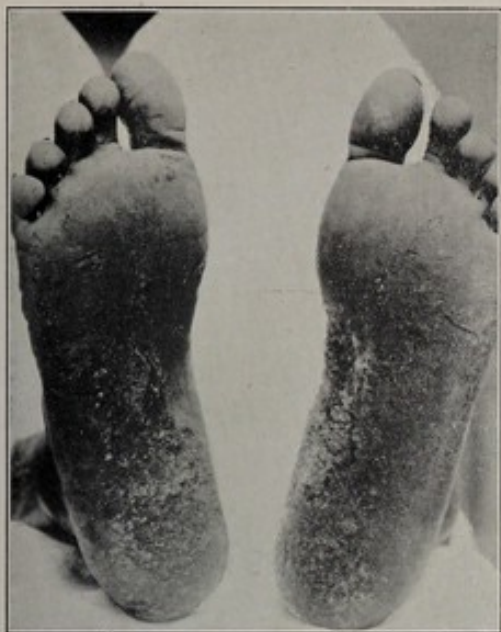


Fig. 6.

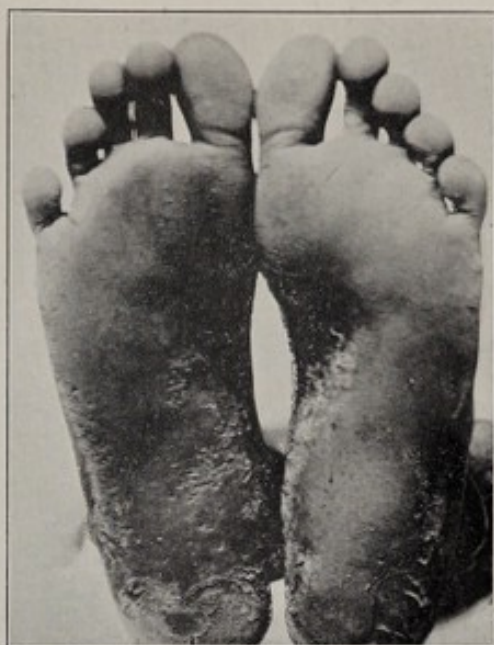


Fig. 7.

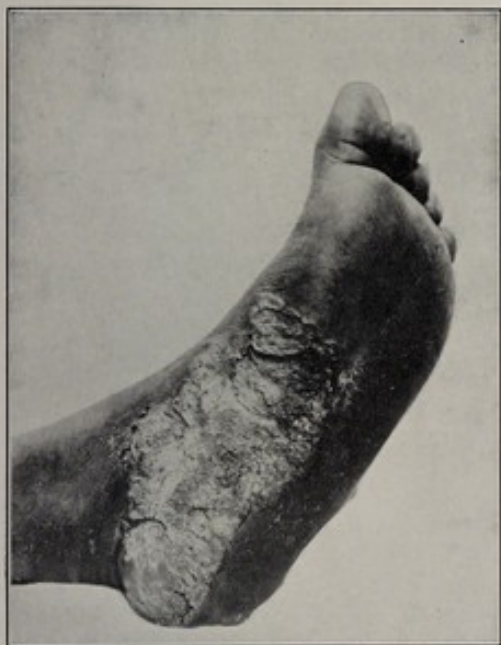


Fig. 8.

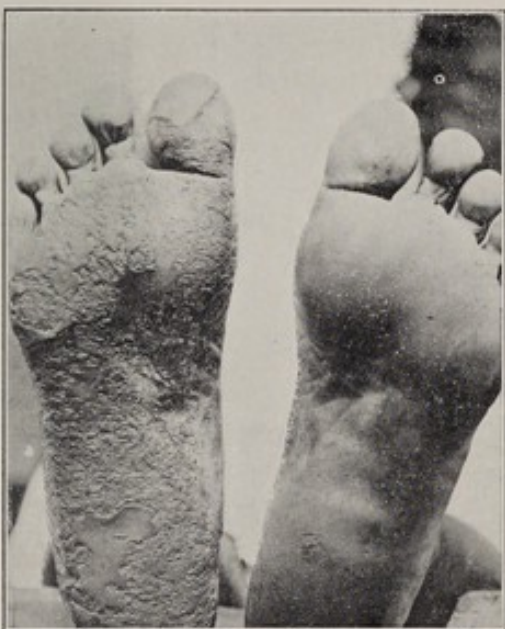


Fig. 9.

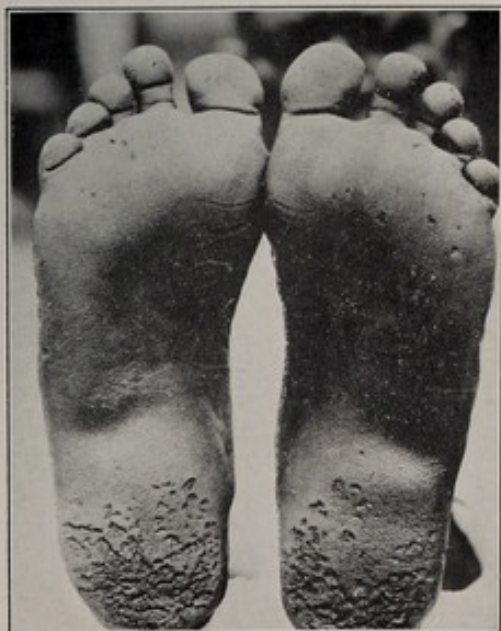


Fig. 10.



Fig. 11.



complained of, this becoming intensified after prolonged walking, particularly on hard roads. Tenderness on pressure is a constant symptom. A similar but relatively mild form of the condition is occasionally met with on the hands and is presumably due to the same aetiological factor. Numerous biopsies were made and histologically examined. Hyper—and parakeratosis were present to a remarkable degree and in the deeper layers of this thickened epidermis areas of round cell infiltration were noted.

Gangosa.—Since the condition known as gangosa was reported to be endemic in Mamfe and the surrounding parts of the Cameroons it was considered advisable to study the disease on the spot. Dr. C. Wilson, M. O. Mamfe, gave every facility and by his keenness and help about twenty cases of gangosa were seen. Many of these were in various stages of recovery but several fresh cases were obtained and investigated. As far as one can tell from the histories obtainable the course of the lesion is as follows. When children they have all had yaws, some having had several attacks. Later, about puberty, a recrudescence occurs or perhaps they again become infected. This "superinfection" instead of producing typical lesions (*i.e.*, lesions characteristic of yaws), tends rather to a localisation in certain areas, particularly the facial region. It is possible that this localisation is to be explained by the assumption of a certain amount of immunity in those involved. Most frequently the history given is that the condition commenced as a sore within the nose, this sore going on to ulceration and extension into the surrounding parts involving in turn the nasal cartilages, the surrounding skin and the upper lip. The soft and hard palate also suffer. The upper lip may be destroyed to such an extent that the teeth are laid bare. The age shows wide variation and the condition can occur at the age of fourteen or thereabouts. Both sexes seem equally predisposed to the condition. It is deplorable how long a person will suffer from such a condition without soliciting medical aid and in many of the cases seen at Dr. Wilson's out-patient clinique at Mamfe the tissues were bathed in a purulent discharge resulting from secondary sepsis. When this has been cleared away the ulcerated areas usually present a well marked, firm, sometimes an everted or raised, irregular edge. The base of such an ulcer is uneven and formed of vascular tissue akin to "proud" granulation tissue. This bleeds readily on rubbing. Induration is present but not to any marked extent and fixation to the deeper structures is not great. Pain is complained of but handling does not evoke marked tenderness. Nodules adjacent to the ulcerated area such as are seen in lupoid conditions, have not been noted in these untreated cases. On examination of the nasal passages and pharynx, ulceration, shallow in character with a well marked, thin, slightly raised outline, can often be detected in the region of the alae nasi, the nasal cartilages, soft or hard palate or the posterior wall of the pharynx. In more advanced cases free communication exists between the nasal and buccal cavities owing to the loss of tissue following upon the ulceration. In connection with the facial lesion just described there exist others, either of the crusted, raised type characteristic of yaws or of the chronic, scarred variety, in situations such as the forehead, hands, arms, back, etc. The course of these lesions is invariably a chronic one extending over a period of years. Reaction to N.A.B. administration is marked, the ulcerated areas clearing up and being replaced by firm scar tissue but the treatment to be successful must be continued over a sufficiently long period, in some cases extending over several months.

Sections show the condition to belong to that lumber-room of obscure histological conditions—the granulomata. It is hoped to give a full account of the histological appearances later when the examination of the biopsies made has been completed. Examination of serum expressed from ulcerated areas, after washing with warm saline, failed to reveal spirochaetes.

No absolute proof has as yet been advanced to establish the connection between the condition known as gangosa and the causative organism of yaws and by way of a differential diagnosis the following conditions, among others, must always be borne in mind:—

1. Lupus.
2. Leishmania.
3. Syphilis.
4. Malignant changes.
5. Rhinoscleroma.
6. Blastomycosis or other allied conditions.

The clinical appearances, the history, the reaction to intravenous medication, the predilection for bone destruction and the histological findings all tend to eliminate a diagnosis of lupus. With regard to leishmania, it is unlikely that the diagnostic bodies would have been passed over both in the smears and sections made from these cases. Syphilis is usually more rapid in its course and furthermore, syphilis, as judged from a clinical aspect is not to be regarded as a prevalent disease among the natives of these parts.

Rhinoscleroma and blastomycosis can be excluded on histological grounds alone. One is forced back to the original suggestion, with which many text-books are in agreement, that gangosa is definitely connected with framboesia. In support of this view, the following statements, almost identical with those already advanced in connection with "crab-yaws" are put forward.

1. The condition is prevalent in areas where yaws is endemic.
2. The histories obtained seem to show a relation between yaws and this late ulcerative stage.
3. The unquestionable response to N.A.B. medication.
4. The histological findings—inasmuch as they tend to eliminate other causative factors.
5. The experimental work in monkeys carried out by Schobl (1).
6. Native opinion must not be disregarded. These people (in the Mamfe area) have known the disease as far back as they can remember and they have had the opportunity of seeing it in all its guises. It is their unshaken belief that the condition is a sequel to yaws.

Photographs, illustrative of some aspects of the disease are shown. Whilst engaged in investigating gangosa some excellent examples of yaws dactylitis were seen in young children.

Creeping-eruption.—Three more cases of this interesting condition, illustrated in the last annual report, were seen. From one of these Dr. Elmes excised an area of about half an inch radius, taking the most advanced point of the lesion as centre. On subsequent examination the parasite was found in serial sections. It would appear to be a larval nematode and is probably a similar parasite to that already described by Fülleborn and others.

Mycetoma.—No new cases have been seen during the year. The fungus isolated from the two cases referred to in the Annual Report for 1927, have been examined by Mr. Tate of Cambridge University who has kindly reported on them as being apparently, *Actinomyces pelletieri*.—(Laveran 1906).

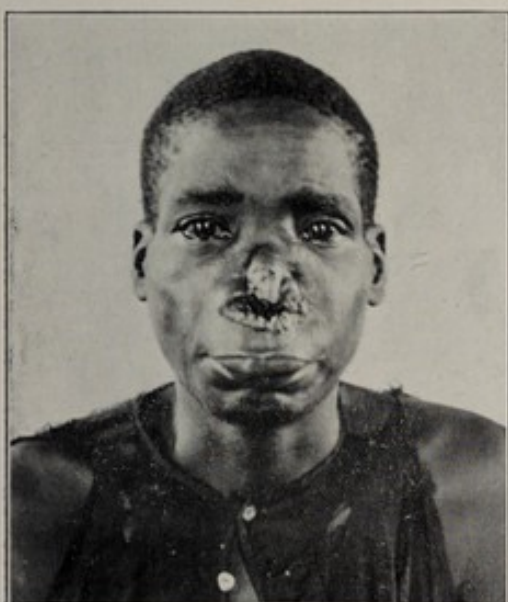
SOME EXAMPLES OF GANGOSA.



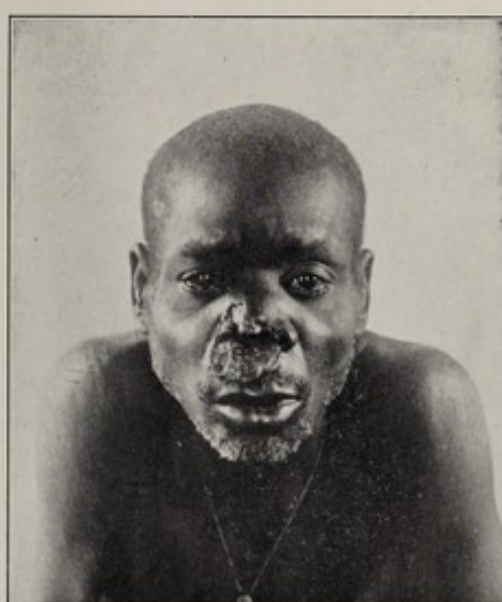
An advanced case sent by Dr. Nelson, Abeokuta. Male adult, three years duration.



An early case sent by Dr. Stephens, Ilorin. A ten year old boy. Duration one year.



Two untreated cases seen at Dr. Wilson's dispensary at Mamfe.
ANNULAR YAWS.



HERPES.



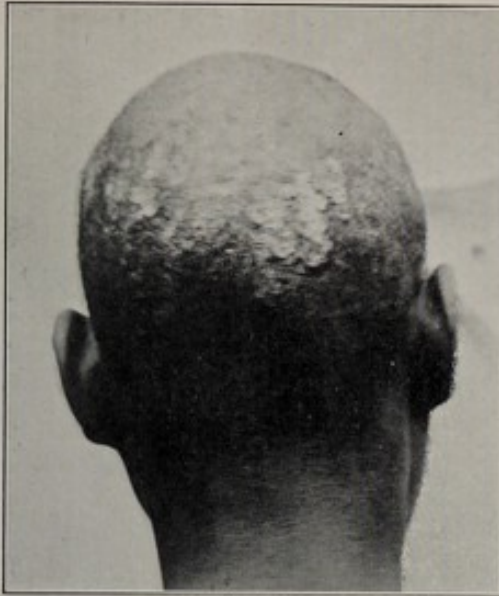
A case seen in Lagos, a young pagan woman. Complete disappearance after three injections of N. A. B.



A well marked case in the popliteal area. Confirmed histologically.



FAVUS.



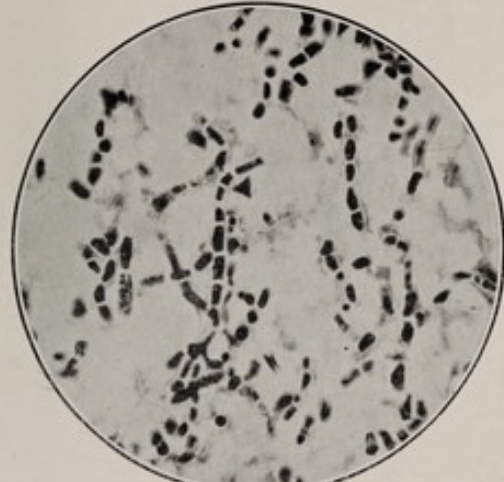
Clinically, the case showed nothing characteristic, merely heaped up scaly grey masses.



The culture on Sabouraud's glucose agar. After six weeks.



Section showing the dense felted mass of fungus on the surface of the epithelium.



A portion of the fungus under higher power showing the characteristic structure.

SCABIES IN RABBITS.



The condition as seen on the paws.



An infected ear (left) and a normal ear (right) for purposes of comparison.



Tinea flava.—Following Acton's (2) work in India and Macleod's (3) experimental researches in England, cultures were made of the scrapings of many cases of *tinea flava* on the special, media recommended (a modified Petroff). After about five days, growth commenced and after four weeks or more had given rise to a dry greyish-white coral-like formation. Microscopic examination showed masses of gram-positive elongated, yeast-like bodies. When grown in broth attempts at mycelial production were noted. Thick emulsions of the cultures were made in saline and were injected intra- and subcutaneously into twelve native and one European volunteers. Results have been negative in all cases. Though it seems probable that the fungus isolated may be the organism responsible for *Tinea flava*, it must be regarded with some doubt until the condition has been reproduced experimentally or until the fungus has been proved capable of pathogenicity.

Molluscum contagiosum.—One case (kindly sent by Dr. Savage), was seen and confirmed histologically. The patient was a year old baby and had one molluscum body situated above the right nipple. A somewhat similar case was seen in Port Harcourt in 1926 and in neither case did the mother show any sign of infection.

Psoriasis.—Several cases occurred throughout the year of which only one could be considered free from a specific taint. This case (kindly sent by Dr. Elmes) was a male prisoner and was typical clinically and histologically. Dr. Stewart was kind enough to take over the case and the condition rapidly cleared up under X-ray treatment. A typical case was also seen in a European in whom large scaly plaques were present on the extensor aspects of the arms. Examinations of the scrapings for fungi was negative and the condition was completely cured by X-ray (Dr. Stewart). The efficacy of X-ray in cases of genuine psoriasis is well worth taking cognisance of though naturally it can only be made use of in one or two of the larger stations.

Dermatitis venenata.—In one instance this condition was strongly suspected. The case, a boy, presented himself with a finely vesicular rash on the face and upper part of the chest. He stated that he and another boy had been playing with the leaves of a certain lily with which they had "flogged" themselves. The same evening the rash appeared. Leaves from the same lily (identified by the boy) were obtained and were rubbed into his skin in various places and also into the skin of two other natives and one European. The results were in each case negative. Sections and smears of some of the original vesicles failed to disclose any causative organism.

Other dermatological conditions which attracted attention were Favus, Bockhart's impetigo and Herpes.

A case of favus was reported in 1926 from which the fungus was obtained and found to be *Achorion schonleinei*. Another case was encountered in the present year and the same type of fungus isolated. Illustrations are appended.

References—

- (1) Schobl, Otto. Experimental Yaws in Phillipine monkeys and a critical consideration of our knowledge concerning framboesia in the light of recent experimental evidence. The Phillipine Journal of Science, Vol. XXXV, No. 3, March, 1928.
- (2) Hugh W. Acton and Ganapati Panj a Seborrhœic Dermatitis or Pityriasis capitis. A lesion caused by the *Malassezia ovale*. Indian Medical Gazette, November, 1927, Vol. LXII, No. 11, pages 603-614.
- (3) J. M. H. Macleod and G. B. Dowling. An experimental study of the Pityrosporon of Malassez, its Morphology, cultivation and pathogenicity. British Journal Derm and Syphilis, April, 1928, No. 474, Vol. XL, No. 4, pages 139-148.

Bockhart's Impetigo.—A readily recognisable and frequently met with condition in the out-patient department. It consists in a septic infection of the hair follicles, usually on the legs, so that each hair is surrounded by a little pustule of which it forms the axis. The cases can prove very resistant to treatment medicinally and autogenous vaccines have been found decidedly helpful. The causative organism in *Staphylococcus aureus*.

Herpes.—Several good examples of *herpes*, including one case of the *ophthalmic* variety with well marked *iritis*, were noted. One case is illustrated.

Leishmania.—Since Dr. McCulloch's very interesting paper (4) all suspicious looking sores and ulcers have been examined with especial care but so far all attempts at finding the parasite have met with no success.

Scabies in rabbits.—On several occasions it was observed that some of the rabbits, maintained at the Institute for experimental purposes, showed a greyish flaky condition of the aural cavities. The same condition was present in a lesser degree on the paws. The flakes were dry in character and were so massed together as to form thick crumbly ridges. The animals involved were emaciated and obviously in very poor condition. At first the condition was regarded as being mycotic but when the scales were subsequently examined in KOH solution innumerable *Sarcoptes scabiei* were found. Specimens were examined by Mrs. Connal (The Entomologist) who confirmed the finding. Knowing the cause of the condition, one was at once struck with the similarity between it and the Norwegian type of scabies.

Rabies.—Six cases of canine rabies were reported during the year, five of which have been investigated fully and from one of them successful inoculation of rabbits has been made. It was found that formalin fixed tissues gave good results as regards the demonstration of Negri bodies. The brains of one hundred normal dogs were obtained through the kindness of Dr. Turner, Medical Officer of Health, Lagos, and were examined histologically. Some of them showed bodies within the ganglion cells which might, if hastily examined, be mistaken for Negri bodies. These bodies, however, can easily be differentiated by their poor staining capacity and their lack of structure. Further, they were more or less of a uniform size.

Publications made during the year.—

(1) *Moniliasis Linguae*.

Journal of Tropical Medicine and Hygiene, No. 9,
Vol. XXXI, May 1st, 1928.

(2) *Pseudo-leprosy*.

W.A.M.J., Vol. II, No. 1, July, 1928.

(3) *Tinea flava*.

Journal of Tropical Medicine and Hygiene, No. 14,
Vol. XXI, July 16th, 1928.

(4) *Mycetoma in Nigeria*.

Trans Roy. Soc Tropical Medicine and Hygiene, Vol. XXII,
No. 2, August, 1928.

(5) *Canine Rabies in Nigeria*.

W.A.M.J. Vol. II, No. 2, August, 1928.

Reference—

(4) McCulloch, W. E., *Ulcers in Northern Nigeria*, etc.

West African Medical Journal II, No. 1, July, 1928,
pp. 96-106.

BACTERIOLOGICAL REPORT ON THE IJU WATER SUPPLY.

In the spring of 1927, in addition to the routine weekly examination, a more detailed bacteriological examination was commenced. As plating on McConkey medium was part of the routine work, all colonies found in this medium were "fished" for identification. Material accumulated more rapidly than it could be dealt with and illness cut short the investigation at this stage. Two or three dozen representative strains were, however, taken to England and tested there. Judging from these it was evident that *B. coli* was rare, that members of the lactis aerogenes group were fairly common, and that there was a relatively high proportion of atypical coliform organisms, a number of these being of the M.R. +, V.P. +, type.

The investigation was recommenced in the last quarter of this year. Owing to the closing down of wells in Lagos and to extensions of the water mains, there had been an increased call on the Iju Water Works. At the request of the Sanitary Department the routine weekly examination was made, not by random sampling from various stand-pipes, but by sampling at fixed points at such intervals of time as would ensure as far as possible the same water being tested at various stages.

The points selected were:—

- (1) Iju River at the intake.
- (2) The Service Reservoir.
- (3) Yaba Laboratory (5 miles from Lagos).
- (4) Ereko Dispensary (near the entrance to Lagos).
- (5) The Native Hospital (1½ miles into the town).

Total Counts.—In the case of the filtered water 10 ccs. were distributed over four agar plates. As regards the source water, while 1-10 dilutions were put up, it was found that 1 cc. distributed over four plates usually gave countable plates. The counts at twenty-four hours are given below as the averages for the whole period

Iju River	...	...	708	per cc.
Service Reservoir	...	...	32	" "
Yaba Laboratory	...	...	27	" "
Ereko Dispensary	...	...	25	" "
Native Hospital	...	...	27	" "

During the first month the Yaba figures were the lowest. Later they were a little higher probably owing to local interference with the main as a result of the extension of the water supply to the Yaba settlement.

One noticeable feature macroscopically was the comparatively high proportion of aerobic spore-bearing organisms in the filtered water as compared with the source water. This was ascribed to growth in the filter beds themselves.

Qualitative Analysis.—To permit of correlation with earlier work, glucose bile salt peptone broth was retained for the first few weeks as the presumptive test for *B. coli*, five tubes being inoculated with each quantity tested.

The results briefly stated were that gas-forming organisms could be detected in 0.01 cc. of the source water and in 1 cc. of the filtered water. Plating on McConkey medium from tubes showing acid and gas revealed very few *B. coli*. The great majority of coliform organisms isolated were unclassifiable owing to their irregular behaviour in the various media.

The fact that *Cl. welchii* could be detected in 5 ccs. of the source water suggested that the *B. coli* were being inhibited by other glucose fermenters. Lactose bile-salt peptone broth was substituted as the presumptive test and plating on McConkey medium carried out as early as possible.

Organisms fermenting lactose within forty-eight hours could be detected in 0.1 cc. of the source water. The quantity of the filtered water showing lactose fermenters was usually 10 ccs. On one occasion these were found in 1 cc.

For the confirmative test for *B. coli*, colonies were fished from the McConkey plates and tested for acid and gas formation in glucose, maltose, mannite, lactose, saccharose, and salicin. No organism was passed as *B. coli* unless it fermented the first four carbohydrates, and in addition produced acid and clot in milk within three days, and indol in peptone water, was M.R.+, V.P.—, and failed to grow in Koser's citrate medium. The last two of the carbohydrates were used in the final identification.

B. coli of recent faecal origin could be demonstrated always in 1 cc. and more rarely in 0.1 cc of the source water. They were demonstrated on only one occasion in the filtered water and then only in three tubes out of ten seeded with 10 ccs. of reservoir water. In the same sample lactose fermenters were found in 1 cc. (five positive tubes out of five).

Of 138 coliform organisms examined in detail, seventy-nine were *B. coli*, twenty-one belonged to the *lactis aerogenes* group, and thirty-eight were atypical. Owing to selection these figures indicate nothing but the relative proportions of the seventy-nine *B. coli* were, as under:—

Bact. coli commune	...	14	...	17.7%
Bact. coli communiore	...	29	...	36.7%
Bact. neapolitanum	...	29	...	36.7%
Bact. acidi lactici	...	7	...	8.9%
		79	...	100.0

In only three out of the 138 coliform organisms was there imperfect correlation between the results of the indol and citrate tests.

In five of the thirty-eight unclassified organisms there was imperfect correlation of the results of the M.R. and V.P. tests. (N.B.A. large number of M.R.+V.P.+ organisms were found among the coliform organisms isolated from the glucose bile-salt tubes).

Remarks.—The relative proportions of the various types of organisms found make interpretation of the findings difficult. Judged by the *B. coli* standard, the filtered water would be passed as excellent while the source water would appear fairly pure as a "raw" water. On the other hand one is faced with the presence of *Cl. welchii* in 5 ccs of the source water. It has been estimated that there are 6,000 natives living in the small water shed, some of the villages lying within 300 yards of the stream. Helminthic infections and other intestinal complaints are so common round Lagos that the normal proportions of intestinal flora may be unbalanced to a certain extent, but this could scarcely result in such a marked extinction of the *B. coli* group as is evident here in a water which judged by a sanitary survey must be classed as contaminated.

It would appear that there is some factor in the water capable of killing off or at least inhibiting the coliform group as a whole with possibly a predilection for the *B. coli*. From the commencement of the investigation in 1927 (and also in previous routine work) it was noted that tubes seeded with smaller quantities might show growth while tubes seeded with larger quantities might show none. This

phenomenon occurred so frequently that there appeared to be more than sampling error behind it and it was with this in view that at least five tubes were seeded with each quantity examined this year, the sample bottles being thoroughly shaken before the seeding. On October 31st, five 1 cc and five 0.5 cc quantities were seeded into glucose bile salt broth. No gas was produced in any of the ten tubes within forty-eight hours yet the McConkey plates showed coliform organisms to be present in a concentration of over 1 per c.c. In twenty-four hours two of the first series, three of the second and one of the third showed acid and gas. The remaining three tubes of the first series showed no growth or change of colour but agar plates were made from each tube. The following day one plate showed a few colonies and the corresponding glucose tube now showed growth and acid formation. The other two plates were sterile and the corresponding glucose tubes appeared still unchanged but examination by dark ground illumination showed a few bacilli in one tube. Agar plates were again made from these two tubes.

The following day (seventy-two hours) the first glucose tube now showed acid and gas, the second tube still remained sterile and the third tube showed acid, the corresponding agar plate showing colonies with such a peculiar appearance that they suggested a possible bacteriophage. As on subculturing the same appearance was presented, cultures were filtered and the filtrate tested for phage action on a number of coliform organisms with negative results. Culturally the organism appeared to belong to the *Lactis aerogenes* group and later produced acid and gas in glucose in twenty-four hours in spite of its delayed action during isolation.

These results are merely suggestive that there may be some inhibiting factor present and they are not put forward as proof. In the circumstances, however, taking into consideration the high incidence of *Cl. welchii* and the unsatisfactory situation as regards probable pollution of the water, it is felt that too great reliance should not be placed on the routine estimation of *B. coli* in the filtered water.

ENTOMOLOGY.

Two thousands one hundred and fourteen collections of mosquito larvae were received from the Medical Officer of Health during the periods March to June and July to December. They were taken from fifty-five different sources or receptacles and contained fifteen different species and one variety. They were:—

<i>Aedes argenteus</i>	...	...	...	in 2,100 collections.
<i>Culex nebulosus</i>	...	...	...	838 "
<i>Anopheles gambiae</i>	...	...	...	127 "
<i>Culex fatigans</i>	...	...	...	33 "
<i>Culex duttoni</i>	...	...	...	14 "
<i>Culex decens</i>	...	...	...	12 "
<i>Aedes luteocephalus</i>	...	...	...	10 "
<i>Culex decens</i> var <i>invidiosus</i>	...	...	...	10 "
<i>Culex thalassius</i>	...	...	...	9 "
<i>Eretmopodites quinquevittatus</i>	...	...	...	2 "
<i>Lutzia tigripes</i>	...	...	...	2 "
<i>Aedes irritans</i>	...	...	...	1 collection.
<i>Uranotænia annulata</i>	...	...	...	1 "
<i>Aedes africanus</i>	...	...	...	1 "
<i>Culex horridus</i> (<i>Cyathomyia fusca</i>)	...	...	...	1 "

Two or more species occurred in the same collection as follows:—

Barrel.—

<i>Aedes argenteus</i> and <i>Culex nebulosus</i>	in 2 collections.
<i>Aedes argenteus</i> and <i>Culex fatigans</i>	1 collection.
<i>Culex nebulosus</i> and <i>Culex decens</i>	1 "
<i>An. gambiae</i> and <i>Culex nebulosus</i>	1 "
<i>Aedes argenteus</i> and <i>Culex decens</i>	1 "

Borrowpit.—

Culex nebulosus, An. gambiæ and
Culex decens var. invidiosus ... in 1 collection.

Canoe.—

An. gambiæ and Culex thalassius ... ,, 4 collections.

Catchpit.—

Aedes argenteus and Culex nebulosus ,, 2 collections.

Aedes argenteus and An. gambiæ ... ,, 1 collection.

Aedes argenteus and Culex decens ... ,, 1 ,,

An. gambiæ and Culex nebulosus ... ,, 1 ,,

Culex nebulosus, Culex decens var.
invidiosus and An. gambiæ ... ,, 1 ,,

Culex fatigans and Culex nebulosus ... ,, 1 ,,

Drain.—

An. gambiæ and Aedes argenteus ... ,, 1 ,,

Pail.—

Aedes luteocephalus and Culex
grahami ... ,, 1 ,,

Pot.—

Aedes argenteus and Culex nebulosus ,, 4 collections.

Aedes argenteus and An. gambiæ ... ,, 2 ,,

Aedes argenteus, Culex nebulosus and
Culex fatigans ... ,, 1 collection

Culex nebulosus and Culex decens ... ,, 1 ,,

Swamp.—

An. gambiæ and Culex decens var.
invidiosus ... ,, 2 collections.

An. gambiæ, Culex decens var.
invidiosus and Aedes irritans ... ,, 1 collection.

Tin.—

Aedes argenteus and Culex nebulosus ,, 5 collections.

Aedes argenteus, Culex nebulosus and
Culex duttoni ... ,, 1 collection.

Aedes argenteus and Culex fatigans ... ,, 1 ,,

Aedes argenteus and Aedes luteocephalus
... ,, 1 ,,

Culex nebulosus and An. gambiæ ... ,, 1 ,,

Well.—

Aedes argenteus and Culex fatigans ... ,, 1 ,,

Zinc lined case.—

Culex decens and Lutzia tigripes ... ,, 1 ,,

The combinations of two larvæ were:—

Aedes argenteus and Culex nebulosus in 13 cases.

Aedes argenteus and An. gambiæ ... ,, 4 ,,

An. gambiæ and Culex thalassius ... ,, 4 ,,

An. gambiæ and Culex nebulosus ... ,, 3 ,,

Aedes argenteus and Culex fatigans ... ,, 2 ,,

Aedes argenteus and Culex decens ... ,, 2 ,,

Culex decens and Culex nebulosus ... ,, 2 ,,

Culex decens var. invidiosus and
An. gambiæ ... ,, 2 ,,

<i>Aedes argenteus</i> and <i>Aedes luteocephalus</i>	...	...	...	in 1 case.
<i>Culex decens</i> and <i>Lutizia tigripes</i>	...	...	...	" 1 "
<i>Culex nebulosus</i> and <i>Culex fatigans</i>	...	...	...	" 1 "
<i>Aedes luteocephalus</i> and <i>Culex grahami</i>	...	...	...	" 1 "

The combinations of three larvæ were:—

<i>Aedes argenteus</i> , <i>Culex nebulosus</i> and <i>Culex fatigans</i>	...	...	...	in 2 cases.
<i>Culex nebulosus</i> , <i>An. gambiæ</i> and <i>Culex decens</i> var. <i>invidiosus</i>	...	...	...	" 2 "
<i>Culex decens</i> var. <i>invidiosus</i> , <i>An. gambiæ</i> and <i>Aedes irritans</i>	...	...	...	" 1 case.
<i>Culex nebulosus</i> , <i>Aedes argenteus</i> and <i>Culex duttoni</i>	...	...	...	" 1 "

The sources or receptacles were fifty-five in number, namely:—

Bamboo pole, banana stump, barrel, basin, bottle, borrowpit, box of instruments, calabash, canoe, catchpit, cement floor, coconut, cooler, corrugated iron, cradle, cup, demijohn, drain, drum, dustbin, fallen leaf, filter, flower pot, go-cart, grindstone, gun, gutters, hole in ground, hopper of barge, ice chest, irrigation channel, jug, kettle, mortar, motor, orange tree, pail, pan, pawpaw, pigeon cage, plate, pool, pot, powder keg, roof of stable, swamp, tank, tin, tree, tyre, vat, watering can, water valve case, well, zinc lined case.

The sources or receptacles in their order of attraction were:—

Pot	...	...	...	1,072 collections.
Tin	...	...	...	252 "
Catchpit	...	...	...	156 "
Barrel	...	...	...	113 "
Drum	...	...	...	89 "
Canoe	...	...	...	59 "
Pail	...	...	...	33 "
Pool	...	...	...	30 "
Tyre	...	...	...	30 "
Drain	...	...	...	27 "
Cement floor	...	...	...	26 "
Pan	...	...	...	22 "
Bottle	...	...	...	16 "
Pawpaw	...	...	...	16 "
Tree hole	...	...	...	16 "
Well	...	...	...	16 "
Basin	...	...	...	12 "
Borrowpit	...	...	...	12 "
Flower pot	...	...	...	11 "
Calabash	...	...	...	9 "
Cooler	...	...	...	9 "
Ice chest	...	...	...	8 "
Kettle	...	...	...	8 "
Jug	...	...	...	7 "
Motor	...	...	...	7 "
Swamp	...	...	...	7 "
Filter	...	...	...	6 "
Corrugated iron	...	...	...	4 "
Watering can	...	...	...	4 "
Banana stump	...	...	...	3 "
Go-cart	...	...	...	3 "
Mortar	...	...	...	3 "
Tank	...	...	...	3 "
Grindstone	...	...	...	2 "
Gutters	...	...	...	2 "
Plate	...	...	...	2 "
Zinc box	...	...	...	2 "

Bamboo	...	...	1	collection.
Box of instruments	...	...	1	"
Coconut	...	...	1	"
Cradle	...	...	1	"
Cup	...	...	1	"
Demijohn	...	...	1	"
Dustbin	...	...	1	"
Fallen leaf	...	...	1	"
Gun	...	...	1	"
Hole in ground	...	...	1	"
Hopper of barge	...	...	1	"
Irrigation channel	...	...	1	"
Orange tree	...	...	1	"
Pigeon cage	...	...	1	"
Powder keg	...	...	1	"
Roof of stable	...	...	1	"
Vat	...	...	1	"
Water valve case	...	...	1	"

The full data are given in Table XV.

In September, Mr. James Y. Brown, European Sanitary Inspector, began a survey of the swamps in Lagos, Ikoyi and Ebute Metta and up to the end of December forty collections were received

Survey 1.—Swamp near Epetedo tidal overgrown with grass *An. gambiæ*.

Survey 2.—Same swamp but in the open. *An. gambiæ*.

Survey 3.—Ditch at Epetedo overgrown with grass. *Culex decens*.

Survey 4.—Swamp near Tapa Street overgrown. *An. gambiæ*.

Survey 5.—In seepage outcrop in banana clump. Shaded. *Culex decens* and *An. gambiæ*.

Survey 6.—In old Mohammedan Cemetery. Mangrove and long grass. *An. gambiæ*.

Survey 7.—Okesuna swamp. Brackish water. *An. gambiæ*.

Survey 8.—Stagnant pool in same swamp—in the open. *An. gambiæ*.

Survey 9.—Okesuna swamp grass around. *An. gambiæ*.

Survey 10.—Another part of same swamp same conditions. *An. gambiæ*.

Survey 11.—Another part of same swamp. *An. gambiæ*.

Survey 12.—MacGregor Bridge swamp. *An. gambiæ*.

Survey 13.—Swamp near MacGregor Bridge. *An. gambiæ*.

Survey 14.—Mangrove swamp on north side of Ikoyi Road. *An. gambiæ*.

Survey 15.—Different part of same swamp. *Culex rima*.

Survey 16.—Another part of same swamp. *Culex rima*.

Survey 17.—Drinking pool west of Ije Village on the east side of MacGregor Canal open, grass round edge of pool *An. gambiæ*.

Survey 18.—Open pool north of Ije Village. *Culex decens*.

Survey 19.—Small shaded pool north of Ije Village. *Culex decens*.

Survey 20.—Another pool north of Ije Village. *Culex decens* and *Uranotænia balfouri*.

Survey 21.—Swamp, east of Ije Village—shaded. *An. gambiæ*.

TABLE 15—continued.

Source.	Larvae.	Mar.	April.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Catchpit ...	Culex fatigans and Culex nebulosus ...	...	...	...	...	...	...	...	1	...	1
	An. gambiae, Culex nebulosus and Culex decens var. invidiosus ...	...	...	...	...	...	...	...	1	...	1
Cement Floor ...	Aedes argenteus ...	...	...	7	5	...	1	3	...	...	16
	Culex nebulosus ...	2	1	1	3	...	...	3	...	...	10
Coconut ...	Aedes argenteus ...	...	...	...	1	...	...	...	...	...	1
Cooler ...	Aedes argenteus ...	...	...	1	4	...	1	1	...	...	7
	Culex nebulosus ...	...	1	...	...	...	1	...	...	...	2
Corrugated Iron ...	Aedes argenteus ...	...	...	1	1	...	...	...	...	...	2
	Culex nebulosus ...	...	...	...	2	...	...	...	...	...	2
Cradle ...	Culex nebulosus ...	...	...	...	...	...	...	1	...	...	1
Cup ...	Culex nebulosus ...	...	...	...	1	...	...	...	...	...	1
Demijohn ...	Aedes argenteus ...	...	...	...	...	...	...	1	...	...	1
Drain ...	An. gambiae ...	...	1	1	1	1	...	1	1	1	7
	Aedes argenteus ...	...	...	...	1	...	1	1	2	1	6
	Culex fatigans ...	...	...	...	...	...	1	...	...	1	2
	Culex nebulosus ...	...	1	4	...	...	2	...	2	2	11
	Aedes argenteus and An. gambiae ...	...	...	...	...	...	...	...	1	...	1
Drum ...	Aedes argenteus ...	3	4	9	9	5	7	9	3	6	55
	Culex duttoni ...	...	...	...	...	...	...	1	...	...	1
	Culex nebulosus ...	...	5	7	10	...	4	2	4	1	33
Dustbin ...	Culex nebulosus ...	...	1	...	...	...	...	...	...	...	1
Fallen Leaf ...	Aedes argenteus ...	...	...	...	1	...	...	...	...	...	1
Filter ...	Aedes argenteus ...	...	1	1	1	...	2	...	...	...	5
	Culex nebulosus ...	...	...	...	...	...	...	...	1	...	1
Flower Pot ...	Aedes argenteus ...	...	2	1	1	...	1	2	1	...	8
	Culex nebulosus ...	1	...	...	1	...	...	...	1	...	3
Go-cart ...	Aedes argenteus ...	...	...	...	...	...	...	1	2	...	3
Grindstone ...	Aedes argenteus ...	1	...	1	...	...	...	...	...	...	2
Gun ...	Aedes argenteus ...	...	...	1	...	...	...	...	...	...	1
Gutters ...	Aedes argenteus ...	...	...	1	...	...	...	...	1	...	2
Hole in ground ...	Culex nebulosus ...	...	...	...	...	...	...	...	1	...	1
Hopper of Barge ...	An. gambiae ...	...	...	...	...	...	...	...	1	...	1
Ice Chest... ..	Aedes argenteus ...	...	3	...	3	...	...	...	...	...	6
	Culex nebulosus ...	...	1	...	1	...	...	...	...	...	2
Irrigation channel ...	An. gambiae ...	...	...	1	...	...	...	...	...	...	1
Jug ...	Aedes argenteus ...	1	...	1	...	...	1	...	1	1	5
	Culex nebulosus ...	...	1	...	...	...	1	...	...	...	2
Kettle ...	Aedes argenteus ...	...	...	1	3	...	1	2	...	...	7
	Culex nebulosus ...	1	...	...	...	...	...	...	...	...	1
Mortar ...	Aedes argenteus...	...	...	1	...	...	...	...	...	...	1
	Culex nebulosus ...	...	...	1	...	...	...	1	...	...	2

TABLE 15—continued.

Source.	Larvae.	Mar.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Motor ...	Aedes argenteus...	—	1	—	—	—	1	2	1	—	5
	Culex nebulosus	—	—	—	—	—	1	1	—	—	2
Orange Tree ...	Aedes argenteus...	—	—	1	—	—	—	—	—	—	1
Pail ...	Aedes argenteus...	—	—	3	6	2	1	4	2	2	20
	Culex duttoni	—	—	—	—	—	1	—	—	—	1
	Culex nebulosus	1	—	4	1	—	1	2	1	1	11
	Aedes luteocephalus and Culex grahami	—	—	—	—	—	—	1	—	—	1
Pan ...	Aedes argenteus...	1	—	2	3	—	—	2	5	1	14
	Culex fatigans	—	—	—	—	—	—	—	—	1	1
	Culex nebulosus	—	—	1	3	—	—	1	2	—	7
Pawpaw ...	Aedes argenteus...	—	—	—	3	—	—	1	—	—	4
	Aedes luteocephalus	—	—	—	—	—	4	—	—	—	4
	Culex nebulosus	—	2	1	—	—	2	3	—	—	8
Pigeon Cage ...	Aedes argenteus...	—	1	—	—	—	—	—	—	—	1
Plate ...	Aedes argenteus...	—	—	—	1	—	—	—	—	—	1
	Culex nebulosus	—	—	—	1	—	—	—	—	—	1
Pool ...	Aedes argenteus...	—	—	—	1	—	3	—	1	—	5
	An. gambiae	—	—	2	12	—	1	5	1	—	21
	Culex fatigans	—	—	1	—	—	—	—	—	—	1
	Culex nebulosus	—	—	1	2	—	—	—	—	—	3
Pot ..	Aedes argenteus...	37	65	107	102	34	67	74	78	34	598
	An. gambiae	—	—	2	—	—	—	1	—	—	3
	Culex decens	—	—	—	—	—	—	1	—	—	1
	Culex duttoni	—	—	—	—	—	1	2	1	—	4
	Culex fatigans	—	—	—	—	—	1	3	4	—	8
	Culex nebulosus	35	82	72	55	18	78	52	34	22	448
	Eretmopodites quinquevittatus	—	—	—	—	—	—	1	—	—	1
	Aedes argenteus and Culex nebulosus	—	2	1	—	—	1	—	—	—	4
	Aedes argenteus and An. gambiae	—	—	1	—	—	1	—	—	—	2
	Aedes luteocephalus	—	—	—	—	—	—	1	—	—	1
	Culex decens and Culex nebulosus	—	—	—	—	—	—	1	—	—	1
	Aedes argenteus, Culex fatigans and Culex nebulosus	—	—	—	—	1	—	—	—	—	1
		—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—
Powder Keg ..	Culex nebulosus	—	—	1	—	—	—	—	—	—	1
Roof of Stable ...	Culex nebulosus	—	—	—	1	—	—	—	—	—	1
Swamp ...	An. gambiae	—	—	1	1	—	1	1	—	—	4
	An. gambiae and Culex decens var. invidiosus	—	—	2	—	—	—	—	—	—	2
	An. gambiae, Culex decens, var. invidiosus and Aedes irritans	—	—	1	—	—	—	—	—	—	1
Tank ...	Aedes argenteus...	—	—	—	1	—	1	—	—	—	2
	Culex nebulosus	—	—	—	—	—	—	1	—	—	1
Tin ...	An. gambiae	—	—	—	3	—	4	3	—	—	10
	Aedes argenteus...	4	9	24	20	5	23	30	11	3	129
	Culex decens	—	—	—	—	—	—	3	—	—	3
	Culex duttoni	1	—	—	—	1	—	1	—	—	3
	Culex decens var. invidiosus	—	—	—	—	1	—	1	—	—	2
	Culex fatigans	—	—	—	1	—	—	2	1	—	4

TABLE 15—continued.

Source.	Larvae.	Mar.	April.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Tin—contd. ...	Culex nebulosus ...	5	8	21	10	3	21	14	5	3	90
	Aedes argenteus and Culex nebulosus ...	1	...	...	...	1	2	...	1	...	5
	Aedes argenteus and Culex fatigans ...	...	...	...	...	...	1	...	...	...	1
	Aedes argenteus and Aedes luteocephalus ...	..	...	...	...	...	1	...	...	...	1
	An. gambiae and Culex nebulosus ...	...	...	...	...	...	1	...	...	...	1
	Aedes argenteus Culex duttoni and Culex nebulosus ...	...	...	...	...	1	...	...	...	...	1
	Uranotaenia annulata ...	...	...	...	...	...	1	...	...	...	1
	Aedes luteocephalus ...	...	...	...	...	...	...	1	...	...	1
Tree Hole ...	Aedes argenteus ...	...	...	1	2	5	1	...	...	...	9
	Aedes luteocephalus ...	...	1	1	...	...	...	...	...	...	2
	Culex nebulosus ...	1	1	...	...	...	...	1	...	...	3
	Aedes africanus ...	...	...	...	...	...	...	1	...	...	1
	Cyathomyia fusca (Culex horridus) ...	...	...	...	...	...	...	1	...	...	1
Tyre ...	Aedes argenteus ...	1	5	1	2	...	3	4	1	...	17
	Culex fatigans ...	...	...	...	...	2	...	...	...	...	2
	Culex nebulosus ...	1	...	6	2	...	...	2	...	...	11
Vat ...	Culex nebulosus ...	...	...	...	...	...	1	...	...	...	1
Watering Can ...	Aedes argenteus ...	1	...	1	2	...	...	...	...	...	4
Water Valve Case	Aedes gambiae ...	...	...	...	...	...	...	1	...	...	1
Well ...	Aedes argenteus ...	1	1	1	2	...	3	1	2	...	11
	Culex decens ...	...	...	...	...	...	...	1	...	...	1
	Culex fatigans ...	...	...	...	...	...	1	...	...	...	1
	Culex nebulosus ...	...	...	...	1	...	...	...	...	...	1
	Aedes argenteus and Culex fatigans ...	...	...	..	...	1	...	...	...	...	1
Zinc lined Box ...	Aedes argenteus... ..	...	...	...	...	...	...	1	...	...	1
	Culex decens and Lutzia tigripes ...	...	...	...	...	...	...	1	...	...	1
	Totals	119	219	343	344	103	317	322	235	112	2,114

- Survey 22.*—Different part of same swamp. *An. mauritanus* and *An. gambiæ*.
- Survey 23.*—Swamp further east of Ije Village—shaded. *Culex decens*.
- Survey 24.*—Pool in side Ikoyi Cemetery in grass. *An. gambiæ* and *Culex decens* var. *invidiosus*.
- Survey 25.*—Swamp north of cemetery wall thick bush. *Culex quasigelidus*.
- Survey 26.*—From crab trap set in thick bush near bathing beach, Ikoyi. *Culex nebulosus*.
- Survey 27.*—In pool in thick bush east of cemetery wall. *Culex decens*.
- Survey 28.*—In pool south of European R.W.A.F.F. quarters in dense bush. *Culex insignis*.
- Survey 29.*—Obalende swamp—open ditch with duckweed. *Culex decens*.
- Survey 30.*—Same swamp near the barracks. *Culex quasigelidus*.
- Survey 31.*—East of survey 30. *Culex quasigelidus*.
- Survey 32.*—East of survey 31. *Lutzia tigripes*.
- Survey 33.*—East of survey 32. *Culex decens* var. *invidiosus*.
- Survey 34.*—Same swamp at junction of Prison Road, south of Golf Club. *Culex decens* var. *invidiosus*.
- Survey 35.*—Obalende swamp. South of 34 open but weedy. *Culex decens* var. *invidiosus*.
- Survey 36.*—Obalende swamp. West side of Prison Road open grassy. *Culex decens* var. *invidiosus*.
- Survey 37.*—Same swamp near the culvert west side of Prison Road open, slimy. *An. gambiæ*.
- Survey 38.*—Same swamp near the culvert on the east side of Prison Road long grass. *An. gambiæ*.
- Survey 39.*—Same swamp. East side of Prison Road open. *An. gambiæ*.
- Survey 40.*—Swamp near Iddo Station long grass. *Culex thalassius* and *Uranotænia annulata*.

Mosquitoes sent from Medical Officer of Health (Dr. Cauchi), Lagos.

An. gambiæ 7 ♀.
An. umbrosus 2 ♀.
Aedes irritans 2 ♀.
Aedes punctothoracis 1 ♀.
Culex grahami 1 ♀.
Culex nebulosus 20 ♀ 10 ♂.
Aedes nigricephalus 8 ♀ 1 ♂.
Culex decens 4 ♀.
Tæniorhynchus africanus 1 ♀.
Uranotænia annulata 1 ♀.

Mosquitoes collected by Dr. E. C. Smith in the Cameroons.

An. gambiæ 11 ♀ 3 ♂.
Aedes argenteus 3 ♀ 2 ♂.
Aedes longipalpis 1 ♀.
Culex grahami 3 ♀.
Culex nebulosus 5 ♂ 2 ♀.
Eumelanomyia inconspicua 1 ♀ 3 ♂.

The principal work has been the study of the larvæ of the Nigerian mosquitoes. It is hoped later on to publish as complete as possible a description of larvæ and adults of the mosquitoes found in Nigeria, as

a guide to others working in this colony. In the first place all local ponds and swamps were searched for larvae. In the course of the investigation it was found that *Tæniorhynchus* (*mansonioides*) *africanus*, which up till then was thought to breed only where water lettuce (*Pistia stratioides*) was abundant could breed in ponds covered only with Duckweed (*Lemna æquinoctialis*). A note on this was published in the Bulletin Entomological Research, Vol. XIX, Pt. 3, with photographs showing a pupa hanging on to the under surface of the duckweed. This is one of the commonest mosquitoes found in native houses and is a persistent biter. At Jebba Station in August, there were thousands of these mosquitoes and on searching during the next day, a pond covered with duckweed was found, and the larvæ were numerous. It has been interesting to note the cycles of mosquitoes. In April the pond in the grounds of the Institute had larvæ of *Mucidus mucidus*, *Mucidus scotophagoides*, *Mimomyia mimomyiaformis*, *Tæniorhynchus africanus*, *Culex quasigelidus*, *Anopheles gambiæ*, *An. mauritanus*, *An. pharænsis* and also *Corethrine* larvæ. By the end of May there were neither *Mucidus* nor *Tæniorhynchus* larvæ and neither larvæ have appeared in the pond since. In May *Culex annulioris* was found both in the Institute pond and in ponds round about. These were prevalent until June and then they disappeared. From the end of June till the middle of August no collections were made. From August onwards the collections showed *Culex quasigelidus* in great numbers, a few *Mimomyia mimomyiaformis*, *Mimomyia splendens*, *Aedes domesticus*, *Aedes punctothoracis*, *An. gambiæ*, *An. mauritanus* and *An. pharænsis*. It was not only from the Institute pond that *Mucidus*, *Tæniorhynchus* and *Culex annulioris* disappeared, but at the same time, the ponds both north and south of the Institute were also free of these larvæ. From April onwards bamboo traps were put out in the trees in the bush round about. They were left for five days and then examined. *Aedes argenteus* was the commonest larva obtained in this way. Others were *Aedes africanus*, *Aedes apicoannulatus*, *Aedes apicoargenteus*, *Aedes longipalpis*, *Aedes luteocephalus*, *Culex horridus* and the larvæ of *Corethra*. From Ikeja Dr. Walker brought in from bamboo trees, the larvæ of *Aedes argenteopunctatus*, *Aedes argenteo-ventralis*, and *Aedes longipalpis*. Twice collections of larvæ were sent down from Kano from Mr. Crozier, European Sanitary Inspector and on both occasions most of the larvæ were alive. They were the larvæ of *Aedes argenteus*, *Aedes hirsutus*, *Aedes sugens*, *Culex grahami*, and *An. gambiæ*. Dr. MacLaine sent larvæ from trees and pools at Sapele. They also arrived alive and were *Aedes africanus*, *Aedes longipalpis*, *Culex nebulosus* and *Culex horridus* from the trees and *An. gambiæ* from pools. Dr. Braithwaite sent a collection of larvæ of *Aedes argenteus* from Warri.

During July and part of August a very interesting collection of larvæ and adults was made on a trip from Lagos up the Benue and Niger. Pails of water with water lettuce were taken from the creeks and from the back waters of the rivers, and after the lettuce was thoroughly shaken in clean water, many different kinds of larvæ were obtained. So interesting were the results that a steady supply of material was desired after the trip was finished, and through the kindness of the Marine Department this has been obtained by every mail launch from Sapele. The adults bred out were:—*Anopheles gambiæ*, *An. pharænsis*, *Mimomyia hispida*, *Mimomyia mimomyiaformis*, *Mimomyia splendens*, *Ficalbia malfeyti*, *Edomyia africana*, *Tæniorhynchus africanus*, *Tæniorhynchus aurites*, *Microdes inconspicuus*, *Aedes argenteus*, *Culex consimilis*, *Culex quasigelidus* and *Culex nebulosus*. Some of the larvæ have not been very fully described and it is intended to publish a description of these soon. There was also a collection made of the larger biting flies. This included *Tabanus secedens*, *T. socialis*, *T. pluto*, *T. par*, *T. fasciatus*, *T. latipes*, *T. biguttatus* var. *croceus*, *T. taeniola*, *T. diurnus*, *T. rufis*, *T. kingsleyi*, *Glossina caliginea*, *G. palpalis*, *G. morsitans*, *G. tachinoides*, *G. longipalpis*, and *Chrysops versicolor* collected on board ship on Niger and Benue rivers.

The following kindly forwarded specimens:—

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APPENDIX B

REPORT OF TSETSE INVESTIGATION, 1928.

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 TESTS INVESTIGATION 1925

BY

W. B. JOHNSON, M. S. (Land), and L. A. JOHNSON (Land)

AND

LLEWELLYN LLOYD, M. S.

Testes Investigation

TABLE I. SHOWING THE DENSITY OF TSETSE AT VARIOUS FOCI NEAR SHERIFURI IN RELATION TO CLEARING.

	1925.		1926.		1927.		1928.	
	iv-vi	ix-xi	iv-vi	ix-xi	iv-vi	ix-xi	iv-vi	ix-xi
Eastern Pond (Tabkin gabas) cleared III foci 300 yds. .27 other foci 800 yds. .28 other foci 2,500 yds. away.	108	78	20	54	11	68	4	16 ^o
<i>G. morsitans.</i>								
<i>G. tachinoides.</i>	33	100	23	23	scanty	2	2	7
River Pond (Tabkin refe) cleared XII foci 3,000 yds. away : part farmed VI .28.			59	83	131	76	17	1
<i>G. morsitans.</i>								
<i>G. tachinoides.</i>			22	73	71	79	12	9
Round Pond (Tabkin keywaya) cleared XII foci 5,000 yds. away.	18	53	9	41	2	77	scanty	27*
<i>G. morsitans.</i>								
Road Pond (Tabkin hainya) not cleared, fenced to exclude game : .25 other foci 300 yds. .26 other foci 800 yds. .27 other foci 2,500 yds. .28 other foci 3,000 yds. away.	9	26	11	16	4	13	2	6
<i>G. morsitans.</i>								
<i>G. tachinoides.</i>	14	57	5	25	scanty	19	3	46

* Caught in heavy woodland savannah near the old cleared focus.

I.—CLEARING EXPERIMENTS.

Sherifuri.—The experimental clearing at Sherifuri in which the main foci of *G.morsitans* and *G.tachinoides* are being eliminated over a wide area has been continued. The extent of the clearing up to the end of last dry season is shown in Map No. IV. The clearing now extends for nine and half miles along the Katagum River and eight miles along the Kiyawa River. The distance between the ends of the line of clearing to the east is three miles and to the west is eight and half miles, the area being approximately 100 square miles. There are no known primary foci of tsetse to the north or south of this area for a long distance. Within its limits there remains no forest suitable for infestation by the flies in the later part of the dry season with the exception of the fringing forest bordering the pool which was fenced round to exclude game. There are, however, certain stretches of good woodland savannah which it was not intended to cut down and these afford shelter for *G.morsitans* in the earlier part of the dry season till the grass fires destroy the shade, being repopulated during the wet season spread. From these it is possible to some extent to gauge the wet season spread of the bush tsetse.

In the four maps prepared by Captain Thornehill the amount of clearing done in three successive seasons is shown. These should be examined in relation to Table I which shows the densities of the flies in the succeeding years at certain fixed points at two periods of the year, viz., April to June when only primary foci are heavily infested and September to November when secondary foci have their heaviest infestation, density being represented by the average number of flies caught per net per hour.

At the Eastern Pond (Tabkin gabas) an old primary focus cleared in March, 1926, a steady diminution has occurred in successive years as neighbouring primary foci have been cleared back to a distance of 2,500 yards. A few flies are still to be had, the *tachinoides* being caught straggling along the bank and the *morsitans* in heavy woodland savannah backing the old primary focus. In December, 1928, the density of *morsitans* was reduced to the nominal figure of one in the old primary focus and to nine in the woodland backing it. At the Round Pond (Tabkin keway) an old important secondary focus for *G.morsitans*, cleared in December, 1927, and isolated from other foci by 5,000 yards, the wet season spread still brings *morsitans* into an uncleared patch of woodland savannah, the density there in December, 1928, being twenty-one.

At the River Pond (Tabkin refe) an old primary focus, cleared in December-February, 1928, and isolated from other foci by 3,000 yards, a successful farm was established in the following June. *G.morsitans* was not numerous in the rains and almost absent in the present dry season but a few *tachinoides* still straggle along the bank, the regrowth on which has not yet been slashed back.

At the Road Pond (Tabkin hainya) which is not yet cleared but is surrounded by a fence it was evident that the *morsitans* population was dependent on constant invasion from other foci. There has been a steady reduction in *morsitans* as neighbouring foci were pushed back to a distance of 3,000 yards, the figures for four successive wet season spreads being twenty-six (300 yards to next focus), sixteen (800 yards to next focus), thirteen (2,500 yards to next focus) and six (3,000 yards to next focus). *G.tachinoides* is not seriously hampered by absence of game and can multiply about the pool. Enough of these flies have spread over the 3,000 yards of clearing to give it a moderately heavy infestation.

It is thus evident that the wet season spread will carry both these species of tsetse at least three miles into the clearings from which they retire or die out as the dry season advances. Farming reduces greatly the wet season invasion but the portions of the clearings which have

been successfully farmed are of comparatively small extent. A considerable number of farms were started but the people will not as yet sleep on the farms and the consequence is that the crops are exposed to the depredations of monkeys for a number of hours daily. The damage discourages the farmers who are apt to abandon their farms in mid season. Those that have been persisted with have been successful and this fact should help in the next season.

II.—Gombe Division.

The clearing around the Matyoro Lakes in Gombe Division has been continued and the prospect of success is greater than in the Sherifuri area where the streams are so numerous and meandering. Regrowth in the swamps was not excessive except for the *Raphia* palms. A small farm was established and the Emir of Gombe has expressed an intention of making an extensive farm there during the coming season.

II.—FORESTRY OFFICER'S REPORT.

Captain A. S. Thornehill reports as follows:—

The accompanying maps, Nos. I to IV, show the progress of clearing work in the neighbourhood of Sherifuri Camp; the total of the area cleared in 1926 being 990 acres; in 1927, 1,720 acres; and in 1928, 3,402 acres, at the close of the dry season in each case. The grand total actually cleared to date is therefore 5,914 acres.

The policy has been adhered to of not cutting into the general savannah, but confining the clearing to the neighbourhood of pools and streams. Observation shows that the most successful method for heavy thicket and fringing growth has been cutting, stacking and burning; for heavy savannah on the banks of streams and depressions, cutting and burning; and for shallow but well "clothed" riverain depressions, cutting, and where possible, rolling slash into them from above before burning.

The original clearing, with subsequent reslashing and burning shows that after a period of three years a state of exhaustion begins to set in, dense herbaceous creeper growth on stumps and the invasion of long coarse grass being complementary.

The general effects are very much dependent on delayed burning each season. When accidental fires have entered, late burning has been spoilt: such fires having automatically formed fireguards round area then too green to burn. Accordingly, during the present dry season, an attempt is being made to fire-protect the cleared areas east of the main road, and between the two rivers. The two fireguards run from river to river; one along the main road, and the other cut and burnt at the western extremity of the 1928 clearings. The fire-protected area is thus twenty-one square miles in extent. The menace to success is the danger of internal fires.

On the south of the main river and west of the road a modification of clearing is being introduced. It consists of removing only dense thicket and heavy shade; thus constituting a very heavy forestry "thinning". It is anticipated that the High Forest areas concerned will be "led over" to heavy savannah with good timber trees remaining of which there are several species of importance in the locality. If successful, costs will be reduced, rate of work accelerated and the locality improved by avoiding devastation.

In the fenced area experiments are being made to determine whether it is possible to clear by destroying standing trees. Two methods which gave good results in S. Rhodesia are being tried. They are ring-barking and sapping. By the former, a ring of bark about eighteen inches wide is removed all round the tree, care being taken not to cut into the wood. The transpiration current continues its upward flow in the xylem vessels, but its return as converted sap from

the crown in the phloem vessels is stopped at the cut. In course of time, varying with species and locality the whole tree dies, including the roots. The process is slow but sure once the reserve food matter in the roots is exhausted.

By the second method only one ring of cuts is made, which enter the wood and must overlap. An outward twist is given to the axe, and thus a complete "frill" is formed. The transpiration current is completely stopped at the ring, and the crown and the upper part of the bole die. The whole of the food material in the roots now forms regrowth at and below the ring from dormant buds and root-suckers. The result is an appearance as of ordinary coppice regrowth, which must subsequently be re-slashed, as is done after felling. Two plots each one acre were selected; typical heavy savannah with approximately fifty trees over six inches diameter per acre. Six labourers and one headman were employed; the ring-barking occupied fifty minutes and the sapping twenty minutes. In both cases all trees under six inches diameter were felled to provide future burning material. The work was done in March and inspected in November. A longer period is necessary to give the methods a fair trial. In the ring-barked area the crowns are showing the effects of the treatment, demonstrated by stagheadedness, abundant "protective" flowering and general thinness and withering. There is a certain amount of regrowth at the bases; but where excessive, it was usually found to be due to defective treatment of severing wood as well as bark. One or two species provide exceptions "coppicing" freely even when well ring-barked. The reason is that such species are more hardy and difficult to eradicate by any method. In the area treated by sapping results so far conform fairly to expectation. There is more unhealthiness and death in the crowns, and more vigorous regrowth at the bases. Exceptions occur here also, again due to faulty work, as in such cases the cuts have not been made to overlap. Further the higher up the tree-trunk the cuts have been made, the less vigorous is the regrowth. From results to date, the second method is preferable. Ring-barking requires too much care in execution; sapping is simpler, quicker, and less expensive. Experiment should be now made with this method in fringing forest and thicket; and further experience may show that it is sufficient, in some cases, to sever thicket and climbing growth and then sap the supporting tree.

III.—GRASS BURNING EXPERIMENTS.

It has been shown by us that deferred grass burning in Northern Nigeria does little to reduce established thicket though it is undoubtedly of benefit in checking its extension. Late grass burning is also of great value in checking new growth in cleared areas. During last dry season an experiment was carried out in which it was attempted to burn out established thicket by stacking grass around its edge and firing it in the late dry season, a method of control which Swynnerton found possible in Tanganyika Territory. The thicket, varying from a few feet to twenty yards in width, which borders the pool inside the fence was chosen for the experiment. Its whole length of one mile was stacked with grass on both banks. The pile was on the outside of the thicket and varied in height from eight to three feet, the average height being about that of a man. Grass was also thrust into the thicket edge. It was fired at the end of January on a day of strong wind blowing obliquely along the pool. The fire was fierce but failed to penetrate the thicket to any considerable depth. Four photographs are shown (*Figs. 1-4*) taken before and after the fire at the same two spots and will give some idea of the immediate effect of the fire on the thicket. Some regrowth of creepers occurred actually in the ash of the fired portion showing that the fire had been too brief to kill the roots and in the following dry season it was evident that the burning had had no appreciable effect in reducing the thicket.

Fig. 1.



Fig. 2.



Figs. 1 & 3 show grass stacked in thicket edge.
Figs. 2 & 4. Photographs from the same points after burning the grass illustrate the fact that the fire failed to penetrate far into the thicket.



Fig. 3.



Fig. 4.





At the time of the burning the density of *G. tachinoides* was thirty-eight per net-hour. The day after the fire it was fourteen flies per net-hour and six days later twelve flies per net-hour. The day before the fire 154 of the flies were caught and released again after marking them with a spot of paint on the thorax. The day after the fire thirteen (8.4%) of these were recaptured at the pool and in all twenty-four per cent. of those marked were recaptured there in the following six weeks. Subsequent experiments in marking large numbers of the fly at this pool and recatching the day after the marking have shown that about sixteen per cent. are recaptured on that day. It appeared then that the fire had destroyed about one half the tsetse infesting the pool. In the following wet season the focus was thoroughly repopulated the density in October being fifty-three flies per net-hour as against a maximum density of forty-eight per net-hour in the previous year.

This method of dealing with the fringing thicket of forest pools in Nigeria is clearly of no use.

IV.—PRACTICAL APPLICATION OF THE ADHESION PHENOMENON.

Drs. Johnson and Lester have carried through a piece of research on the application of the adhesion phenomenon to routine diagnosis of trypanosomiasis and problems relating to immunity against these diseases. An account of this work has been published in the West African Medical Journal, the following being a summary thereof.

That the test might have such practical application was suggested by Davis and Browne (1). The reaction consists of the adhesion of blood platelets, blood dust, or added foreign particles to the trypanosomes in a saline suspension incubated with the plasma of an animal possessing an acquired resistance to that species of trypanosome. A uniform suspension of trypanosomes in citrated plasma is obtained by slow centrifuging and the citrated plasma of the blood to be tested is obtained by more rapid centrifuging to free it from red cells. Equal quantities of the two are mixed in small agglutination tubes and incubated at 37°C. for half an hour. The examination may be either with the dark ground illumination or with the 4 mm. objective and a high eye-piece. If the equivalent antigenic bodies are present in the blood of the animal tested the trypanosomes have become sticky and small particles adhere to them in proportion to the amount of antigenic bodies present. It was found best to use a trypanosome suspension which gave twenty to thirty organisms per field under the 4 mm. objective. A scanty suspension increases the labour of search and in a swarming one many of the trypanosomes are left free.

II.—Tests with Animals Immunised against known Strains of Trypanosomes.

Animals infected with *T. brucei* and then immunised by treatment with Bayer 205 give a positive reaction to *T. brucei* from five days onwards after treatment. The reaction was obtained with rats, dog and goats. A sufficient number of controls were tested and none of these reacted. Animals immunised against one strain reacted against a different strain but in one case rather less powerfully. Starting strains reacted rather better than relapsing strains.

In the *T. brucei* group the most striking results were obtained with *T. gambiense* infections, using a strain in monkeys and putting it up against cases of human trypanosomiasis treated with Bayer 205 or tryparsamide.

In the *T. congolense* series the results were not so satisfactory owing partly to the use of a non-virulent strain which never showed numerous trypanosomes in the blood and partly to the unsatisfactory action of tarter emetic as an immunising drug.

III.—Tests with Non-Susceptible Bloods.

Thirty-two human sera were tested against *T. brucei* and all gave negative results. Of these one was from a European, five were from Native cases of syphilis and sixteen were from Native cases of sleeping sickness who gave positive reactions against *T. gambiense* by the adhesion test. Human and rat sera tested against *T. congolense* also gave negative results.

IV.—Tests with the Blood of Wild Animals.

Five *erythrocebus* and one *cercopithecus* monkeys caught near Sherifuri were tested against *T. brucei* with negative results. One porcupine, two gazelle, one reedbuck, two warthog and three *erythrocebus* monkeys were tested against *T. gambiense* and gave negative results.

Out of the forty game bloods examined (antelope and warthog) a positive reaction against *T. brucei* was obtained in 37.5% and a doubtful reaction in 7.5%. Out of fourteen game bloods tested against *T. congolense* 21.4% gave a positive reaction and 7.1% gave a weak reaction.

T. brucei is relatively rare in tsetse about Sherifuri while *T. congolense* is very common. A larger proportion of wild ungulates gave a positive reaction to the adhesion test with *T. brucei* than was the case with *T. congolense*. It may be therefore that the former causes more constitutional effects in game than does the latter. There is no evidence that some constitutional effect is not produced in game by trypanosomes and fatal cases may even occur. A wild cat shot at Sherifuri was found to be blind and emaciated and was proved by sub-inoculation to be infected with *T. brucei*. We have shown below that with the human disease the immunity acquired after treatment, as evidenced by the adhesion test, gradually disappears when it appears probable that reinfection may occur. We have in fact seen cases which were almost certainly reinfections. It is possible that the same thing occurs in game but that the trypanosome infection causes less constitutional effect in them than in man owing to their habituation, and that the acquired increased resistance following infection and natural cure, if this can occur, is shorter in duration. Hoare has shown that *T. melophagium* disappears from a flock of sheep when they are disinfected from its carrier, the ked, but that the infection reappears when the sheep are again in contact with infected keds. If this is so with game it would explain the positive reaction found in some and not as one might almost expect, in all the game which live in contact with tsetse. On the other hand the degree of immunity may vary greatly with species or even individuals and this would account for the findings with the adhesion test.

The test should prove of real value in studying the relation of game to the trypanosome infections of domestic stock and of man. It is now being applied to demonstrate the latent infections in domestic stock which are very difficult to locate but which may fulminate when the animals are exposed to adverse conditions.

V.—Diagnosis of Human Trypanosomiasis.

200 cases diagnosed as sleeping sickness have been tested against *T. gambiense* by the adhesion test. As controls three African cases of syphilis and seven normal European bloods have been used, all giving no reaction. The results of the tests are summarised below. They have been grouped in five classes according to the periods before or after treatment for the disease when the test was made. No cases were available for the period between three to four years after treatment so that the last group contains few cases.

('tryp' : means that diagnosis was by the microscope and "clinic" means that trypanosomes could not be found and diagnosis was made on clinical signs, such cases being not certainly sleeping sickness. "S.H." means that the case had a short history).

Group I.—Before treatment, 40 cases.

31 + reactions, of these 27 tryp., 4 clinic.

3 ? reactions, of these 2 tryp., S. H., 1 clinic.

6 - reactions, of these 1 tryp. S.H., 5 clinic.

In proved cases test was positive in 90%, doubtful in 6.7% and negative in 3.3%

Group II.—During Treatment, 44 cases.

39 + reactions, of these 32 tryp., 7 clinic.

2 ? reactions, of these both tryp. S.H.

5 - reactions of these 3 tryp. S.H., 2 clinic.

In proved cases test was positive in 86.5%, doubtful in 5.4% and negative in 8.1%.

Group III.—Within one year after treatment, 60 cases.

51 + reactions, of these 44 tryp., 7 clinic.

2 ? reactions, of these both tryp.

8 - reactions, of these 6 tryp., 2 clinic.

In proved cases test was positive in 84.6%, doubtful in 3.8% and negative in 11.6%.

Group IV.—From one to three years after treatment, 48 cases.

27 + reactions, of these 26 tryp., 1 clinic.

8 ? reactions, of these 7 tryp., 1 clinic.

13 - reactions, of these 12 tryp., 1 clinic.

In proved cases test was positive in 57.8%, doubtful in 15.5% and negative in 26.7%.

Group V.—From three to five years after treatment, 5 cases.

0 + reactions.

1 ? reactions, diag. tryp.

4 - reactions, all tryp.

In proved cases test was positive in none, doubtful in one and negative in four out of five.

It will be seen that before treatment or within one year after treatment a positive result may be expected in about eighty-seven *per cent.* of the cases tested. In the period one to three years after treatment the percentage of positive reactions falls to sixty *per cent.* Beyond this period the percentage of positive reactions falls to a low figure but the number tested is too small for definite conclusions to be drawn.

The intensity of the reaction also tends to diminish as the period following treatment lengthens. This is evident when Brussin's method of recording intensity of reaction by a system of one to five crosses and dashes is used. The importance of this waning intensity of reaction is obvious. The test is an indication of increased antigenic substance in the blood following the destruction of trypanosomes both during the chronic stage of infection and after treatment with a trypanolytic drug. It appears likely that when the reaction is no longer positive the cases may be susceptible to reinfection. Cases treated soon after infection tend to react less strongly during and after treatment than those in which the infection has been long established, and such cases may also be more susceptible to reinfection.

VI.—VALUE OF THE TEST IN DIAGNOSIS AND TREATMENT.

We consider that in African work the test is of real value in diagnosis. It cannot be trusted in early infections but such are rarely seen in Africans. During the second and third periods of the disease the test is positive in a high percentage of cases even before treatment has been given. Such are not always diagnosable by the microscope. A small percentage of cases proved to be trypanosomiasis failed to react to the test and this probably indicates a failure of the individual to react to the infection. Such cases should be given a very thorough course of treatment and be kept under observation. In uncertain cases of the disease when a doubtful reaction is obtained by the test it is advisable to give a short course of treatment by a trypanolytic drug. If the case is one of trypanosomiasis the reaction increases rapidly in intensity after a short course of treatment.

Reference—(1) Davis, L. J. and Browne, H. C. The adhesion phenomenon a specific Serological Reaction Occurring in Trypanosomiasis, Royal Society of Tropical Medicine and Hygiene, Vol. XXI, No. 2.

IV.—FACTORS INFLUENCING THE DEVELOPMENT OF TRYPANOSOMES IN TSETSE FLIES.

Preliminary experiments were made *in vitro* upon suspensions of the developmental forms of *T. congolense* obtained from the midgut of *G. morsitans*. Knowledge was thus gained as to the optimum chemical conditions *in vitro*. The effects of different sera, active or inactivated, and of various toxic agents upon them were studied, and experiments were made in the cultivation of the fly gut forms in artificial media. Attempts were made to apply the knowledge thus gained in experimental infection of *G. tachinoides*.

1.—Chemical Conditions.

It was found that the optimum salt concentration was .85-.9% Sod. Chloride and that the optimum pH ranged between 5.9 and 6.4. Some of the alkalis and acids used proved highly toxic to trypanosomes. The best condition was given in saline solution acidified with NaH_2P_4 to pH 6.2, this being approximately the pH of the midgut of the fly.

2.—Sterility and Cultivation.

Bacterial infection rapidly destroys the developmental forms of *T. congolense* whether *in vitro* or *in vivo*. For the culture of gut forms bacterial sterility is essential and our experiments with laboratory flies have shown that if bacterially infected meals are given through membrane trypanosomes previously acquired fail to develop. A method of sterile dissection of the flies based on the hints given in Wenyon's Protozoology has been adopted. Even so bacterial invasion has in most cases sooner or later vitiated experiments in cultivation owing to the difficulty of doing such work in the open mud-walled laboratory.

Experiments were carried out in moist chambers sealed with sterile paraffin wax, a bubble of air being included. The medium used was a mixture in equal parts of Ponselle's medium and blood serum inactivated at 65°C for 30', the pH being adjusted with acid sodium phosphate buffer solution. Very rapid multiplication was obtained in acid media with *T. congolense* up to the eighth day by subculture and with *T. brucei* up to the fourth day, bacterial infection finally ruining the cultures. In slightly alkaline medium of pH 7.4 multiplication was very much less rapid. Except for the large protoplasmic masses formed by incomplete division of the rapidly multiplying organisms the trypanosomes had much the same form as in the gut of the fly, no crithidia being seen.

3.—Reaction of Trypanosomes to Sera.

Most fresh sera proved to be actively trypanolytic to the developmental forms of *T. congolense*. Fresh sheep serum was the least trypanolytic of those tested. The only antelope serum tested, that of duiker, was actively trypanolytic, as were also sera of rabbit, hare, donkey, man, varanus, fowl. The different sera vary greatly in their agglutinating powers. Experimenting with duiker, human and *varanus* sera it was found that the degree of adhesion and clumping obtained was diminished but not abolished if the sera were inactivated at 70°C instead of at 56°C. Using sera which had been dried on filter paper and stored for over a year the agglutinating power was found to have almost disappeared and all were non-trypanolytic. The experiments with fresh and inactivated sera are summarised in Table II.

It was also found that fresh sera are actively trypanolytic to the developmental forms of *T. vivax* in the proboscis of the fly when put up in moist chamber.

These experiments show that many bloods which form the natural food of the fly are actively trypanolytic and agglutinative to the developmental forms and it was thought that this factor might be of importance in determining the rate of infection in wild flies. It might for instance account for the low rate of infection of *G. tachinoides* as opposed to that of *G. morsitans* in the same locality, the former taking blood from reptiles as well as from ungulates and the latter fly never taking reptile blood. Support to this is given in the following series of experiments in the laboratory infection of *G. tachinoides* with *T. congolense* and *T. brucei*. No *T. congolense* or *T. brucei* was able to develop in flies fed on *varanus* after the infecting feed.

Table III showing the trypanolytic action of *Varanus* Blood in Midgut.

Experimental No.	Infecting feeds.	Subsequent feeds.	No. dissected.	Infection rate.
VII B. ...	Goat infected with <i>T. congolense</i> ...	Clean sheep...	30	6.7%
VII A. ...	" " " " ...	<i>Varanus</i> ...	57	0
XIII B. ...	Dog infected with <i>T. brucei</i> ...	Clean goat ...	40	52.5%
VIII, XIII A.	" " " " ...	<i>Varanus</i> ...	27	0
XIV B. ...	" " " " ...	Clean goat ...	31	29.0%
XIV A. ...	" " " " ...	<i>Varanus</i> ...	21	0

The infecting goat in Experiment VII had *T. vivax* also. The flies fed subsequently on the clean sheep showed infection rate with *T. vivax* of 30.0% whereas those fed on the *varanus* showed infection rate of 10.5%.

An attempt was made to test this theory further by feeding flies on an infected animal and then either on another animal or through a skin on inactivated blood. Many mechanical difficulties have to be overcome and throughout there is the possibility of bacterial infection invading the flies through skin whatever precautions are taken to avoid this. The method adopted is to bleed the animal into an equal volume of 1% Sod. Citrate in normal saline and sediment or centrifuge the mixture. The plasma is pipetted off and inactivated for half hour at 56-65°C in a water bath. The red corpuscles are washed free from citrate and plasma by three washings and centrifuging with normal saline. The washed red cells are then added to the plasma in a sterile beaker which is then covered with fresh vulture skin which has been rapidly washed in ether and allowed to dry. Fed on this, prepared fresh each time that it is required, the flies do tolerably well. Five experiments were carried out with controls using *T. vivax*, *T. congolense* and *T. brucei*. They are summarised below.

TABLE IV.
CONTRASTING THE EFFECT OF ACTIVE AND INACTIVE BLOOD ON
DEVELOPING TRYPANOSOMES IN TSETSE.

Experimental No.	Infecting feeds.			Subsequent feeds.	No. dissected.	Infection rate.
I A.	...	Goat showing <i>T. congolense</i>	...	Clean goat ...	40	5.0%
I B.	...	" " " "	...	Inactivated sheep blood	12	0
II B.	...	" " " and <i>T. vivax</i>	...	Clean sheep...	25	12.0% 16.0%
III	" " " " "	...	Inactivated donkey blood	43	0 46.5%
IV A.	...	Dog " <i>T. brucei</i>	...	Clean donkey	31	16.1%
IV B.	...	" " " "	...	Inactivated donkey blood	28	3.5%
XI B.	...	Goat " <i>T. congolense</i>	...	Man ...	19	10.5%
XI A.	...	" " " "	...	Inactivated human blood	18	0

(Bacterial invasion occurred in Experimental XI A).

It will be seen that the flies subsequently fed on inactivated blood gave, with one exception, a lower rate of infection than those fed upon animals.

It would appear from these experiments that although feeding on an intensely trypanolytic blood may diminish the infection rate in tsetse yet the trypanosomes in the fly gut must have some protection against the trypanolytic action of the fresh blood taken. This protection may be afforded (1) by enzyme action of salivary juice or gut secretion or (2) by mechanical protection of the trypanosomes until the active blood has been altered by digestion. Experiments with salivary and gut extracts failed to show protective action either when the extracts were incubated with the trypanosome suspensions before adding the trypanolytic serum (varanus) or when the extracts were incubated with the serum before adding it to the trypanosomes. In the case of *T. vivax* which develops in the proboscis of the fly contact with fresh blood is made for a short period only, during the act of feeding. In those infections where the preliminary development occurs in the gut of the fly it is possible that the peritrophic membrane is the protecting factor, the trypanosomes lying between this and the gut wall and so not coming into contact with ingested blood until this has become at least partially altered by digestion. Sections made by one of us (A.W.T.) through the proventriculus and midgut of flies infected with *T. congolense* show admirably this position of the trypanosomes.

The peritrophic membrane is a delicate tube secreted by the proventriculus and flowing back along the midgut, intervening like a curtain between the food and the gut wall. It is presumably often broken and capable of repair and it may be this factor which will explain that curious point in connection with trypanosome infections of tsetse that if a group of flies is fed on an animal infected with *T. brucei*, *T. gambiense* or *T. congolense* and all treated in the same way, a small proportion only mature their infections, the gut forms sooner or later dying out in the others. That is, an accident to the peritrophic membrane would allow the developmental forms to come in contact with the unchanged blood so that the trypanolysins would affect them.

4.—Other factors possibly affecting the rate of infection.

No difference in the infection rate has been demonstrable in our experiments when using newly emerged flies as contrasted with mature flies.

TABLE II SHOWING THE EFFECT IN VITRO OF ACTIVE AND INACTIVATED SERA ON DEVELOPMENTAL FORMS OF *T. CONGOLENSIS*, GUT TRYPS.

Animals	...	Fresh Serum	..	...	...	...	...	Serum inactivated at 56 C. for $\frac{1}{2}$ hour.
Rabbit	...	In $\frac{3}{4}$ hour all trypts. disappeared	...	...	...	...	...	Not tested.
Wild Hare	...	In 1 hour all trypts. disappeared	...	...	...	...	...	In 1 hour trypts. active, no clumping; after 19 hours many still active, some sluggish, some dead, slight clumping.
Sheep A	...	In 1 hour trypts. active, some clumped; in 2 hours trypts. clumped but active; in 5 $\frac{1}{2}$ hours no change; in 19 $\frac{1}{2}$ hours still clumped and active; 24 $\frac{1}{2}$ hours still clumped, dead	...	...	...	...	...	Not tested.
Sheep B	...	Behaviour as in Sheep A	...	...	...	...	...	In 1 hour trypts. active, clumping marked but many free; in 2 hours; no change; in 20 hours bacterial invasion killed trypts.
Duiker A	...	In 1 $\frac{1}{2}$ hours all trypts. disappeared	...	...	...	...	...	In 1 $\frac{1}{2}$ hours trypts. living but all clumped, some degenerated; after 19 hours bacterial invasion had killed trypts.
Duiker B	...	Not tested	...	...	...	...	...	In $\frac{1}{2}$ hour trypts. active, some adhesion; in 1 $\frac{1}{2}$ hours no change; in 18 $\frac{1}{2}$ hours bacterial invasion killed trypts. some clumps.
Donkey	...	In 1 $\frac{1}{4}$ hours all trypts. dead, disintegrated	...	...	...	...	...	In 1 $\frac{1}{2}$ hours trypts. living, rather amotile, some adhesion, no clumping.
Man ...	...	In 1 hour most trypts. dead, few still sluggish no clumping	...	...	...	...	...	In 1 hour trypts. still active. clumping marked; in 2 $\frac{1}{2}$ hours trypts. in clumps still active.
Varanus	...	In 1 hour all trypts. dead, some clumped	...	...	...	...	...	In 1 hour trypts. active, clumping marked; in 2 $\frac{1}{2}$ hours trypts. in clumps still active, few free; in 20 hours some trypts. in clumps still living.
Fowl	...	In 1 hour most trypts. dead, few still living showed adhesion; in 2 $\frac{1}{4}$ hours all trypts. dead	...	...	...	...	...	In 1 hour trypts. mostly active, some clumping; in 2 $\frac{1}{4}$ hours no change.

THE SENATE OF THE STATE OF NEW YORK,

JANUARY 1884.

REPORT

OF THE

COMMISSIONERS

OF THE LAND OFFICE,

IN RESPONSE TO A RESOLUTION PASSED BY THE SENATE,

PASSED MAY 18, 1883.

ALBANY:

W. H. BROWN, PRINTERS.

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ALBANY:

Our experiments on the effect of temperature and humidity are incomplete.

We have some evidence that starvation may cause the degeneration of developmental trypanosomes within the flies.

V.—NUMBER OF TRYPANOSOMES INJECTED BY AN INFECTIVE TSETSE FLY.

It is believed that some immunity to trypanosome infection may be induced by certain vaccines. Several workers including ourselves have investigated the matter and it seemed to us that the testing dosage of trypanosomes employed may have been greatly in excess of anything which an animal might encounter in nature. One cubic centimeter of blood from a heavily infected animal may contain many millions of trypanosomes and a dose of several c.c.s. has been employed in some cases. Before going further with the matter we have attempted to discover how many trypanosomes the fly actually injects.

This is difficult with the *T. brucei-gambiense* group. An infective fly was allowed to feed from a very small quantity of fluid and the remainder was then examined: infective *T. brucei* forms were found in it but not in numbers on which any estimate could be based.

Drs. Lloyd and Paisley have succeeded in getting an estimate by direct counts of the living trypanosomes in the hypopharynxes of flies carrying mature infections of *T. vivax* and *T. congolense*. These are the infective and the transitional forms between infective and developmental condition which are also sometimes seen in the hypopharynx. The counts were made with tolerable ease with the $\frac{1}{6}$ objective and a high eyepiece in most cases but occasionally the oil immersion objective had to be used. In only two cases out of 130 infective flies was it impossible to make a tolerably accurate count. In these two the forms were so massed that counting was impossible but comparison with others showed that there were present certainly more than 800 trypanosomes and certainly less than 1,500, the infections, one *T. vivax* and one *T. congolense*, were therefore recorded at the token number of 1,000.

The counts were made from wild flies, one series being from flies in the condition in which they were collected and another series from flies which were gorged on a goat directly before they were dissected. With *T. vivax* in *G. morsitans* freshly caught the average number of hypopharynx forms was 158 in fifty infective flies (max. 1,000, min. 1), directly after feeding it was ninety-three in forty-six flies (max. 609, min. 0). The average number of trypanosomes passed was probably in the neighbourhood of sixty. In fourteen freshly caught *G. tachinoides* with mature infections of *T. vivax* the average number of hypopharynx forms was 145 (max. 467, min. 4). With *T. congolense* in nine infective *G. morsitans* the average number of trypanosomes in the hypopharynx was 268 (max. 604, min. 15) before feeding: directly after feeding in nine *G. morsitans* the average was 256 (max. 1,000, min. 0). This gives for the small number counted an average of twelve infected forms passed out. This number is of course meaningless in itself and unexpected. One would have supposed that the thick flow of salivary secretion down the hypopharynx would dislodge all the trypanosomes therein. Often this flow must be greatly impeded by the trypanosomes and may be almost prevented as in the case of the *T. congolense* infection which was so massive that directly after feeding there were at least three plugs of trypanosomes in the hypopharynx, yet the fly gorged itself. We have shown (Lester & Lloyd, 1928) that injection of salivary secretion into the host is not a necessary preliminary to feeding and that a fly deprived of its salivary glands may live and feed for as long as two months. Such blocking of the hypopharynx of the fly by trypanosomes is therefore not an immediate disaster to the fly and it would appear that relatively seldom is a massive infection dislodged from the hypopharynx when the fly is feeding. This is shown in Table V where the infections are grouped in hundreds. In the case of *T. vivax* before

feeding thirty-six *per cent.* of the infections had from 100-500 hypopharynx forms, after feeding nineteen *per cent.* : above 500, before feeding eight *per cent.*, after feeding six *per cent.* Similarly with *T. congolense* before feeding the number of infections in which there were 100-500 hypopharynx forms was four, and after feeding three : above 500, before feeding two, and after feeding also two. This shows why it is possible to expose a susceptible animal to the bites of a large number of flies in which the rate of infection by *T. vivax* and *T. congolense* is known to be high, as shown by the microscope, and yet obtain no infection in the animal (Lloyd & Johnson, 1924).

As far as the main point of the enquiry is concerned, as to what is a fair dosage of trypanosomes with which to test the resistance in possibly immunised animals it would appear that 1,000 would be somewhat excessive with *T. vivax* or *T. congolense*. It is to be remembered that the bulk of the flow of salivary secretion during feeding does not enter the wound but mixes with the indrawn blood. It remains to discover whether the infective forms in the fly are more, or less virulent than the forms in the blood stream which would normally be used in testing immunity.

Table V.—Grouping of Hypopharynx Trypanosomes in hundreds in *G. morsitans* before and after feeding.

	0	1-100	100-200	200-300	300-400	400-500	500-600	600-700	Above 700
<i>T. vivax</i> in percentages.									
Before feeding ...	0	56	16	10	6	4	2	4	2
After " ...	0	74	11	2	4	2	4	2	0
<i>T. congolense</i> , actual numbers.									
Before feeding ...	0	3	1	1	2	0	1	1	0
After " ...	2	2	2	1	0	0	0	1	1

References.—(1) Lloyd, Ll. and Johnson, W. B. The Trypanosome Infections of Tsetse-Flies in Northern Nigeria.—Bulletin Entomological Research, XII, 1924.

(2) Lester, H. M. O. and Lloyd, Ll. Notes on the process of Digestion in Tsetse-Flies.—Bulletin Entomological Research, XIX, 1928.

VI.—WORK OF THE SLEEPING SICKNESS OFFICERS.

The work of the Sleeping Sickness Officers in the Northern Provinces has discovered a number of centres of sleeping sickness. There is no doubt but that during the last few years the disease has been spreading and increasing to an alarming extent. In particular a great and almost unbroken zone round Kano runs through the following towns starting from the east. Miga, Harbo, Kiyawa, Dutsi, Dingayia, Gwarum, Birnin Kudu, Rano, Tudan Wada, Kiru, Karaye, Barakai (Katsina Division). This area, worked in various parts by Drs. Brander, Chantler, and Hope-Gill yielded 912 cases. In Hadeija Division Dr. Hope-Gill found forty-seven cases scattered. Eighty-eight cases were found by Dr. Brander in Katsina Division near the R.marashi.

472 cases have been treated at Sherifuri and found by touring in Katagum Division.

The western part of the Plateau Province has been toured in succession by Drs. Paisley, Williams and Kane and many cases have been found centred as follows :—Mama country 445, Womba 320, Jemaa-Kagoro (not fully investigated) twenty-one, and Gana Wuri near Kwakwi 707 cases.

This gives a total of 3,012 cases of sleeping sickness treated most of them having received an adequate course of tryparsamide. The appointment of the Sleeping Sickness Officers is thus thoroughly justified by results.

In addition to their work of treatment these Officers have also been able in some cases to supervise protective clearing work. Dr. Brander has done this about Rano, along the Marashi River and at several other points on the Challowa system. Dr. Paisley supervised the clearing of dangerous bush near Gwarum and Dr. Kane did a certain amount in the Mama country as an attempt at protecting new roads.

RESULTS OF FIVE YEARS TREATMENT OF SLEEPING SICKNESS CASES AT SHERIFURI.

A special effort has been made by touring officers to trace as many of the cases of sleeping sickness treated at Sherifuri as possible. Dr. Paisley has summarised the results as follows.

The cases have all been treated by intravenous injection, the early cases mainly with Bayer 205, those treated during the later periods mainly with tryparsamide. When neither of these drugs was available Tartar emetic was used.

We had no means of ensuring that any patient received the full course of treatment, all cases coming as out-patients. They are housed and fed in Sherifuri village but are free to come and go as they please. When they feel better they often return to their homes without waiting for the full course of treatment.

The heavy mortality (sixty-five *per cent.* of those traced) in the early cases was partly due to an epidemic of relapsing fever which occurred in 1924-25 and caused a high death rate with some desertion of villages. The mortality due to this epidemic was estimated by the headmen of the larger permanent villages as from eight to ten *per cent.* of the population.

Out of 975 cases treated during the period, 453 have not been traced. The smaller farming hamlets are often only temporary and may be found deserted when revisited after two or three years, while many villages have been deserted owing to the high mortality due to sleeping sickness. It has not been possible to visit all the villages from which we have had cases as these are scattered over a very large area. It is difficult in any case to trace many patients as they are members of a semi-nomadic community.

The results obtained by the use of the drugs and their combinations are shown in the following Tables. The full course of tryparsamide was 13 grammes, and of Bayer 205 5 grammes, given as described in the 1927 Report. Cases which had relapsed or had not made satisfactory progress after one course were given a second course of treatment.

SERIES I.—CASES TREATED WITH TRYPARSAMIDE ONLY.

Total amount of drugs given in grammes.	Period since treatment.	No. treated.	No. well or reported well.	No. died or reported died.	Not traced.	Percent recoveries in No. traced.
Less than 6	Under 1 year. From 1-3 years.	44 135	19 58	3 32	22 45	86.4 64.4
From 6-10	Under 1 year. From 1-3 years.	20 60	11 37	3 8	6 15	78.9 82.2
From 11-15	Under 1 year. From 1-3 years.	93 231	56 93	4 15	33 123	93.3 86.3
Over 15	Under 1 year. From 1-3 years.	3 16	1 2	0 4	2 10	100 33.3
Total treated with Tryparsamide only	...	603	277	70	256	79.8

One case only was treated with Tryparsamide (5 grms. given) more than 3 years ago and is reported dead.

SERIES II.—CASES TREATED WITH BAYER 205 ONLY.

Total amount of drugs given grammes.	Period since treatment.	No. treated.	No. well or reported well.	No. died or reported died.	Not traced.	Percent recoveries in No. traced.
Less than 3	Under 1 year. From 1-3 years. " 3-5 years.	11 8 22	2 3 4	1 3 10	8 2 8	66.7 50.0 28.6
From 3-5	Under 1 year. From 1-3 years. " 3-5 years.	30 18 80	5 9 16	2 2 26	23 7 38	71.4 81.8 38.1
From 6-10	Under 1 year. From 1-3 years. " 3-5 years.	19 2 23	2 1 3	2 0 11	15 1 9	50.0 100 21.4
Total treated with Bayer only	...	213	45	57	111	44.1

SERIES III.—CASES TREATED WITH TARTAR EMETIC ONLY.

Amount given in grains.	Period since treatment.	Number treated.	No. well or reported well.	No. died or reported died.	Not traced.	Percent recoveries in No. traced.
Less than 15 ...	Under 1 year ... From 3-5 years ...	7 6	1 2	1 1	5 3	50.0 66.7
From 16-30 ...	Under 1 year ... From 3-5 years ...	6 1	5 1	... ...	1 ...	100 100
Total treated with Tartar Emetic ...	...	20	9	2	9	81.2

The number treated in this series is too small to give a reliable index of the efficacy of this drug.

SERIES IV.—CASES TREATED WITH BAYER 205 AND TRYPARSAMIDE

Total amount given in grammes.	Period since treated.	Number treated.	No. well or reported well.	No. died or reported died.	Not traced.	Percent recoveries in No. traced.
Under 10 ...	Under 1 year ... From 1-3 years ... From 3-5 years ...	30 16 4	8 9 2	... 1 2	22 6 ...	100 90 50
Over 10 ...	Under 1 year ... From 1-3 years ... From 3-5 years ...	19 20 4	6 11 2	1 2 1	12 7 1	85.7 84.6 66.7
Total treated with Bayer 205 and tryparsamide		93	38	7	48	84.4

SERIES V.—Cases treated with Bayer 205 and Tartar Emetic, the average treatment being three grammes, Bayer 205 and seven grains Tartar Emetic.

Period since treatment.	Number treated.	Number well or reported well.	Number died or reported died.	Not traced.	Percent recoveries in No. traced.
Under 1 year	18	5	...	13	100
From 3-5 years	7	...	4	3	...
Total treated	25	5	4	16	55.5

SERIES VI.—Cases treated with Tryparsamide and Tartar Emetic, the average treatment being 10 grammes tryparsamide and 14 grains emetic, all except one less than one year ago.

Number treated.	Number well or reported well.	Number died or reported died.	Not traced.	Percent recoveries in No. traced.
21	6	2	13	75.0

SUMMARY OF SERIES I-VI.—All Cases treated.

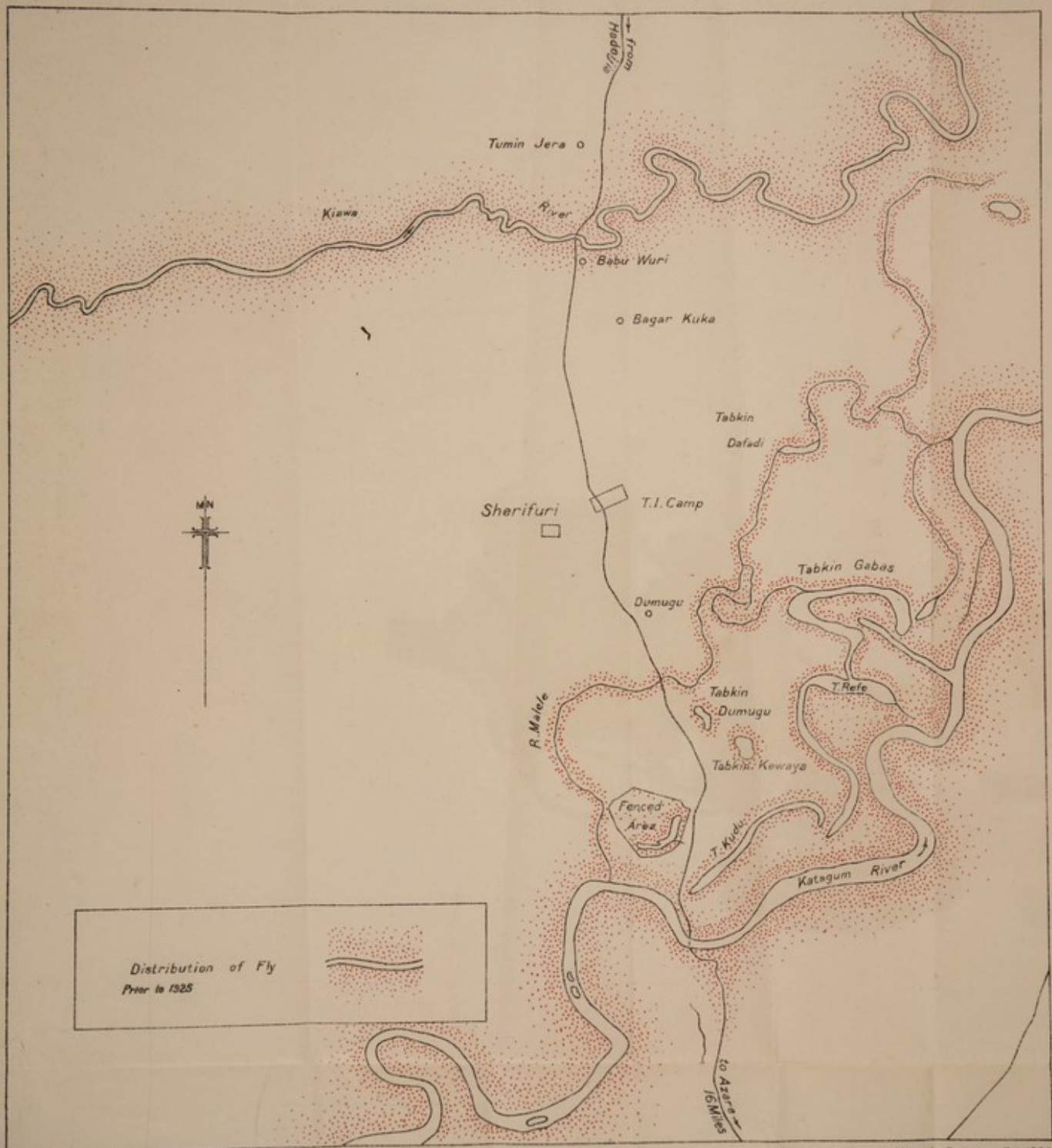
Period since treatment.	Number treated.	Number well.	Number died.	Not traced.	Percent recoveries in No. treated.
Under 1 year	320	127	19	174	86.9
From 1-3 years	507	223	67	217	76.9
From 3-5 years	148	30	56	62	35.0
Total treated	975	380	142	453	72.8

From these figures it will be seen that cases treated with Tryparsamide have given less than half the mortality rate of those treated with Bayer 205, so that after allowing for all extraneous factors Tryparsamide appears to have given considerably better results than Bayer 205. As very few African patients come up for treatment in the first stage of the disease and Tryparsamide is a much the more efficient drug in the late stages it is the best drug available for routine practice.

SHERIFURI AREA

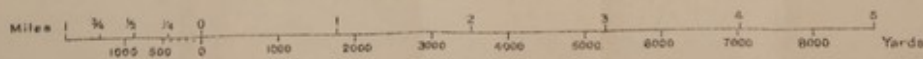
PRIOR TO 1925

Map I



Reproduced by the Nigeria Surveys, Feb. 1929

Scale:— 1:63,360 or inch to 1 mile



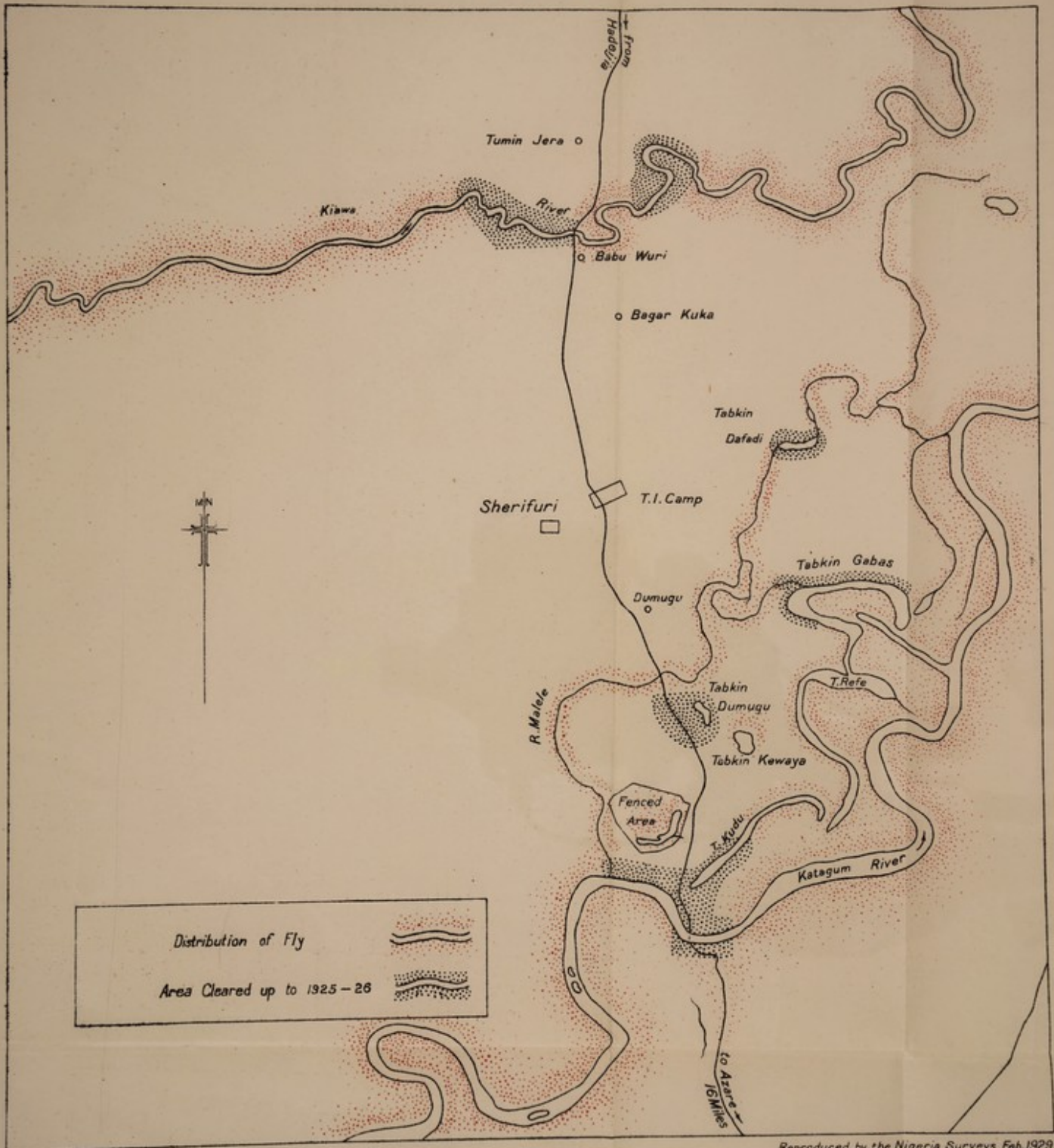
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SHERIFURI AREA

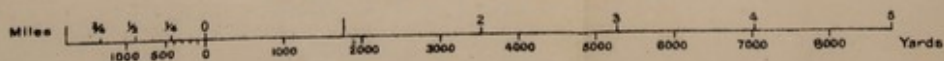
1925 TO 1926

Map II



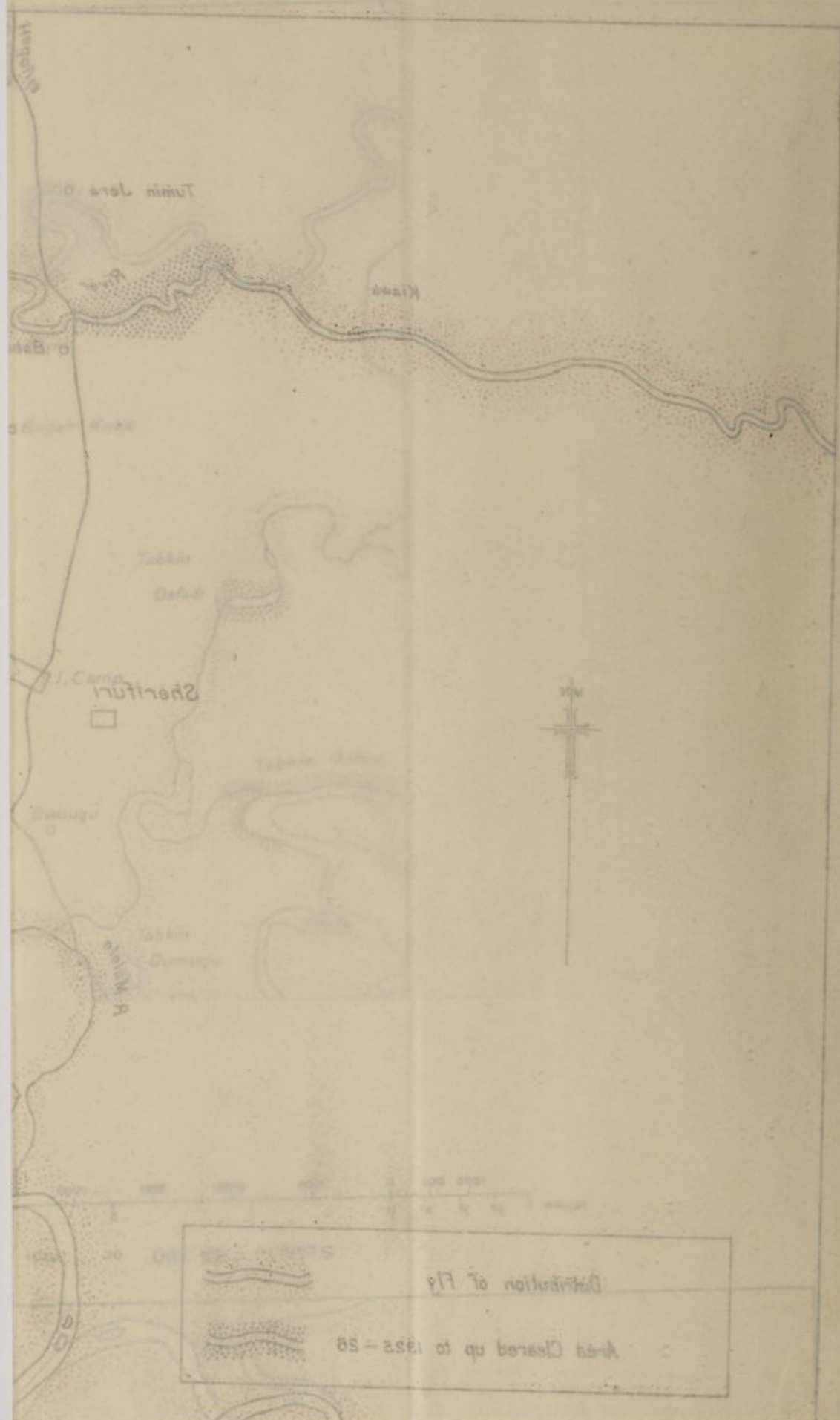
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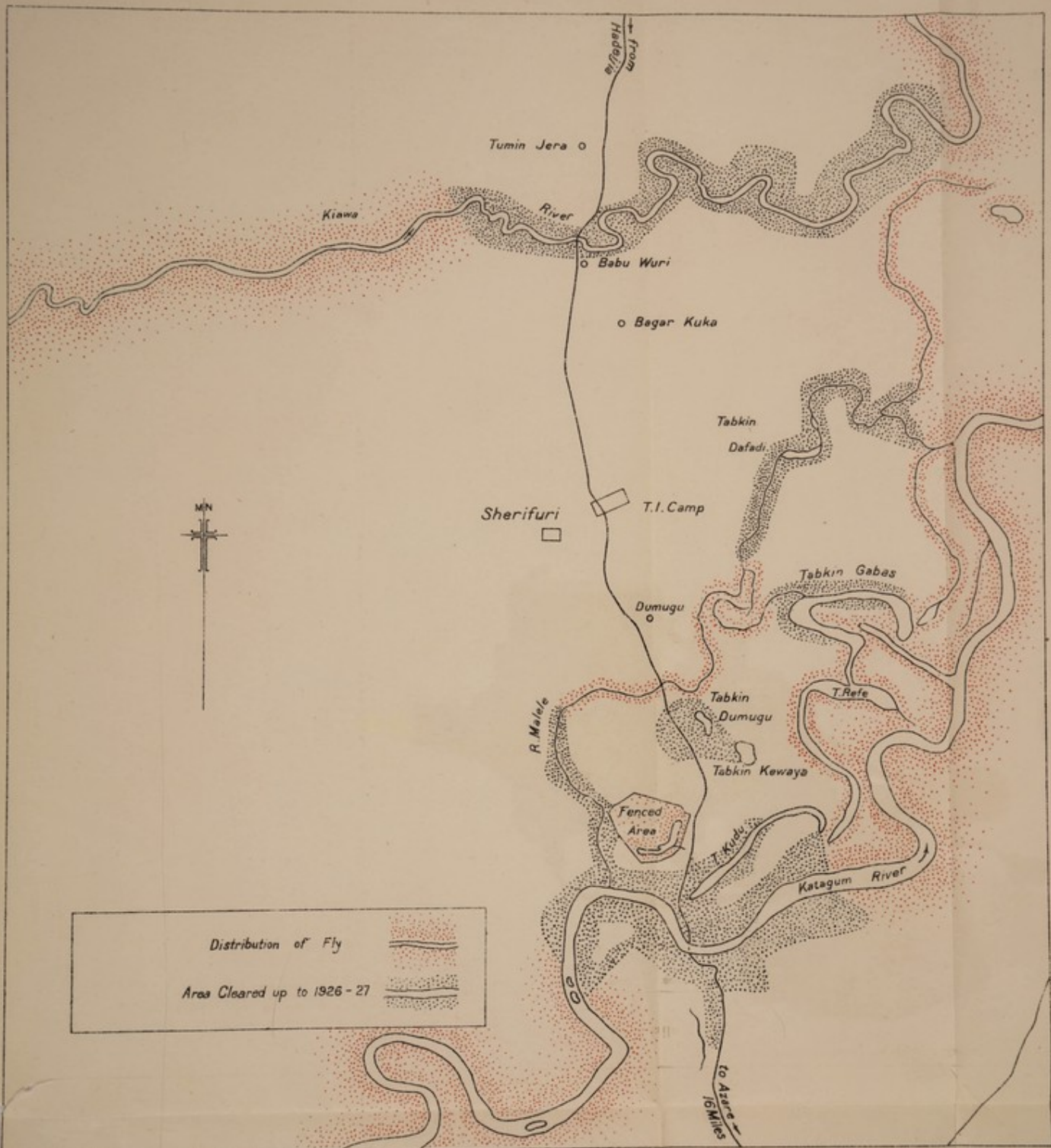
1925 TO 1926



SHERIFURI AREA

1926 TO 1927

Map III

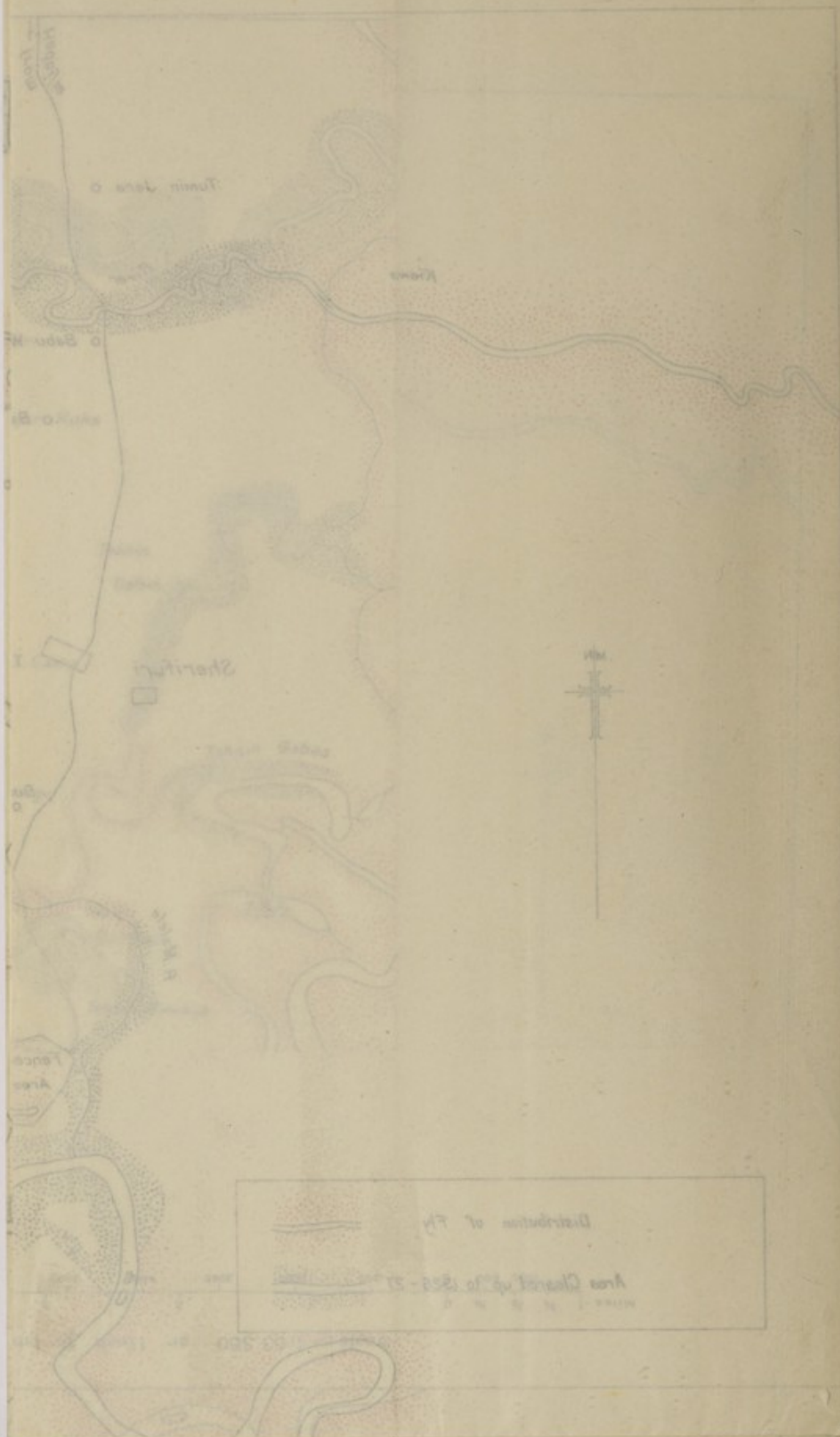


Reproduced by the Nigeria Surveys, Feb. 1929

Scale:— 1:63,360 or 1 inch to 1 mile

Miles 1 1/4 1/2 3/4 0 1000 2000 3000 4000 5000 6000 7000 8000 Yards

1928 TO 1927



APPENDIX C.

ANNUAL REPORT OF THE AFRICAN HOSPITAL LABORATORY, LAGOS, 1928,

BY

G. W. ST. C. RAMSAY, M.D., F.R.F.P.S., Glas., D.T.M., & H.
Pathologist.

APPENDIX C.

ANNUAL REPORT OF THE AMERICAN HOSPITAL
LABORATORY, 1908.

BY

G. W. ST. C. RANNEY, M.D., F.R.C.S. (LOND.), F.R.M. (A.M.),
Pathologist.

ANNUAL REPORT OF THE AFRICAN HOSPITAL LABORATORY, LAGOS, 1928.

There have been no less than three changes in the European Staff during the year. Dr. G. G. Butler was in charge until 16th August when he left to assume the duties of Director of the Medical Research Institute, Gold Coast. He was relieved by Dr. H. Morrison who after two months proceeded on leave, and, who was in turn relieved by Dr. G. W. St. C. Ramsay on 29th October.

The Laboratory itself was moved to new quarters in the administration block in October, and there is no doubt that its present position is a great improvement on the old one. A permanent laboratory is being built in the grounds of the new hospital, and work has progressed on it to quite a considerable extent. The date of completion, however, remains problematical.

It will readily be appreciated that, after all these changes in the course of a year, I must undertake the task of furnishing a report on the activities of the laboratory with some misgivings. It is therefore to be hoped that due allowances will be made if this report compares somewhat unfavourably with the excellent ones which have previously come from Dr. Butler's pen.

AFRICAN STAFF.

At present there are five assistants working in the laboratory. The senior assistant is reliable and has become quite expert in post-mortem technique. It is hoped to obtain, in the first place, three assistants who have been well trained and can be depended upon to do their work conscientiously. To each of these in turn two or three laboratory-attendants-in-training will be "apprenticed". In addition to this practical experience, they will receive lectures explaining the theory of much of the work. It is felt that such a system would give good results, but there remains the initial difficulty of finding three well-trained trustworthy attendants to start the scheme. There is no doubt that it is eminently possible to train Africans to this type of work, but it requires much patience in most instances. Perhaps not the least difficulty to be surmounted lies in the racial dislike which exists between the individuals themselves. Thus a Yoruba may prove lazy and truculent while under the direction of an Efik or a Gold Coastman; and a native of Warri will be intractable in association with an Egba, and so on.

SCOPE OF WORK.

This remains much the same as in previous years. It is believed that all reasonable requests from the clinicians have been carried out as accurately and expeditiously as possible.

The Wasserman reaction is still not done, but the Sachs-Georgi and Kahn tests have been used in the rather small number of cases in which a serological diagnosis of syphilis has been requested. Post-mortem dissections have been undertaken in almost all cases of death in hospital patients, and in addition to this there have been quite a large number of Coroner's cases to examine. Post-mortem work takes up a considerable amount of our time, and is one of the most interesting and instructive branches of our work. Specimens from out-stations in both Northern and Southern Nigeria continue to come in, and are very welcome. It is hoped and confidently expected that this work will increase steadily in quantity; and that we shall be privileged to see and hear more and more of the interesting clinical material which is to be found in such abundance in other parts of the country.

When the new laboratory is completed and we have settled down with a proper sense of permanence, the services of an European technical assistant will become necessary. The routine bacteriological work alone will increase tremendously, and it is felt that it could not be carried out with anything approaching proper efficiency unless such highly trained assistance were forthcoming. Incidentally, part of the technician's duties would be to assist the Pathologist to train the native staff.

It is a pleasure to acknowledge here the assistance given by the Director of the Medical Research Institute, particularly in regard to the supply of culture media and other requisites. Also, to the Director and members of the Rockefeller Yellow Fever Research Commission we desire to express our gratitude for help in many ways.

BLOOD EXAMINATIONS.

1. *Parasites*.—An examination of the blood has been undertaken as a routine measure in all cases admitted to the European and African Hospitals. In addition to these, many specimens have been received from the outpatient departments and from the Massey Street Dispensary. In all, 2,878 films from Africans and 745 from Europeans have been examined.

These figures show a combined increase of 238 over those of last year. Table I indicates the results which were obtained.

TABLE I.

	AFRICAN.		EUROPEAN.	
	Number.	Percent.	Number.	Percent.
Subtertian Malaria ...	635	22.1	114	15.3
Crescents ...	27	0.9	11	1.5
Quartan Malaria ...	52	1.8	2	0.3
Microfilaria (sheathed) ...	40	1.4	1	0.1
Microfilaria (unsheathed) ...	18	0.6	—	—

The great majority of the cases of quartan malaria were in very young children who came to the Massey Street Dispensary. It will be noted that during the year no case of relapsing fever or trypanosomiasis was encountered.

2. *Other Examinations*.—These include actual and differential cell counts along with a few other examinations which are numerically of little importance.

SEROLOGICAL EXAMINATIONS.

1. *Sachs-Georgi and Kahn Tests*.—The Wasserman is, as yet, impossible to undertake, but it is hoped that this may be rectified after we become established in the new laboratory. ...

During the first part of the year the Sachs-Georgi test was used, but latterly it has been replaced by the Kahn test. It is felt that no useful purpose would be served by offering here a resumé of the respective advantages and disadvantages of these two tests. It is sufficient to emphasise that a scrupulous attention to technique is essential to obtain accuracy and consistent results.

In all, 438 examinations were made of which 107 were Europeans. Twenty-seven *per cent.* of the Europeans and fifty-five *per cent.* of the Africans gave a positive result.

2. *Widal Test*.—This test has been done on twenty patients, of whom four gave a positive reaction for *B. typhosus*. One of these was interesting in that the patient was reputed to have been in solitary confinement in the Prison for about four months. He was taken ill with

symptoms clinically identical with typhoid fever, and died during the third week from perforation of the ileum. The diagnosis was confirmed at post-mortem and the organism was recovered in culture from the spleen.

3. *Van den Bergh Test*.—This test was only done twice. In one an immediate direct and in the other a delayed direct reaction was obtained.

STOOL EXAMINATIONS.

An examination of the stool has been made as a routine measure in nearly all cases admitted to the African Hospital, and it is believed that the same applies to the large majority of European inpatients. No concentration technique has been adopted, and reliance has been placed on a single smear examination.

Table II indicates the results obtained from an examination of the stools of 1,337 Africans and 397 Europeans. These figures show a total increase of more than 700 compared with last year.

TABLE II.

	AFRICAN.		EUROPEAN.	
	Number.	Percent.	Number.	Percent.
Ankylostome	367	27.5	6	1.5
Ascaris	620	46.4	3	0.8
Trichuris trichiura	67	5.0	3	0.8
Tænia	9	0.7	—	—
S. mansoni	6	0.5	—	—
Strongyloides stercoralis	19	1.4	—	—
E. histolytica	26	2.0	13	3.3
E. histolytica cysts	17	1.3	18	4.5
Bacillary dysentery	10	0.7	3	0.8

A cultural examination of the fæces during life was made in thirty instances. *B. dysenteriae* Shiga was isolated eleven times; *B. dysenteriae* Flexner-Y twice; and *B. enteritidis* once.

URINE EXAMINATIONS.

538 urines have been examined of which forty-two were from Europeans. Albumen is very commonly found in African cases (36.2 per cent.) and is frequently due to gonorrhoeal infection. At the same time, chronic interstitial changes in the kidneys are anything but rare. Thus, gonorrhoea and chronic nephritis may and do frequently co-exist; making an accurate diagnosis of the latter condition rather a difficult problem in certain cases. Only one example of glycosuria was encountered. Ova of *Schistosoma hæmatobium* were found in sixteen instances or 3.2 per cent. Eleven specimens of urine were examined bacteriologically, and *B. typhosus* was recovered in culture from one.

SPUTUM EXAMINATIONS.

Altogether 618 specimens of sputum have been examined, of which only thirty have been from Europeans. Tubercle bacilli have been found in two European and thirty-nine African cases. An examination of the sputum for the presence of plague bacilli has been considered advisable as something of a routine measure among outpatients who look ill and complain of cough. In this way the danger of admitting a case of pneumonic plague to the wards of the hospital is minimised. *B. pestis* has been found in seven African cases.

MISCELLANEOUS EXAMINATIONS.

This group consists of a varied assortment of examinations, although the majority were smears from various organs and discharges. The total amounts to 163, but it is considered that a detailed classification would be neither interesting nor instructive.

MORBID HISTOLOGY.

During the year 383 specimens have been embedded, sectioned, and examined microscopically. By far the greater part of the material has been derived from our own post-mortem rooms, but there has been an increase in the number of specimens sent in from out-stations. As in previous years, almost every part of the body is represented, but it is the liver which seems to call for examination most consistently. It is a striking, but, I believe, well-established fact, that a "normal" liver, as we understand it in Europe, is scarcely ever seen among the West African natives. Cirrhosis is nearly universally present, and varies in degree from that of only a slight excess of fibrous tissue to almost complete destruction of the liver cells. The origin of this change is, as yet, unknown; although many are inclined to accept the plausible theory that it is in some way due to the excessive quantity of irritating condiments which the native takes with his food. On the other hand, it may be due to the intermittent strain thrown upon the liver by repeated attacks of malaria. Or again, perhaps it is associated with the almost constant presence of intestinal parasites. The cirrhosis is usually of the multilobular type, and it seems to cause very few symptoms, even when far advanced. It would appear not unlikely that the almost universal presence of cirrhotic changes may be responsible for the relatively high proportion of cases of primary cancer of the liver which are encountered. Primary cancer of the liver is very rare in Britain and America, but in Nigeria it is possible that it is the most common type of malignant disease.

There is a large field for research on the whole subject, and it seems to me that it offers quite a reasonable hope of interesting and valuable results, if undertaken by a pathologist and a bio-chemist working in collaboration.

POST-MORTEM EXAMINATIONS AND INTERESTING CASES.

During the year a total of 265 autopsies have been made. They are here divided up under several headings, and certain interesting cases are quoted in their respective group.

1. *Central Nervous System*.—Twenty-seven cases or ten *per cent*. Among this group were four cases of cerebral malaria, two of which were in natives. In the report for 1927, Dr. Butler very strongly urged that this diagnosis should not be returned unless it was satisfactorily established by microscopic examination of the brain. The two cases here quoted were observed by Dr. Butler himself, and were amply confirmed. Both these deaths occurred in August, during which month the incidence of malaria infection was about its maximum.

Case 1.—A male child of six months was brought into hospital dead. The history given was that of a sudden illness which developed the previous day. There was no œdema or jaundice, and the conjunctivæ were very pallid. The heart weighed $1\frac{3}{4}$ oz. and was healthy. The lungs were pale but no bronchitis or pneumonia was present. The bowel contained golden-brown mucoid material and appeared healthy. No helminths were present. The liver weighed $12\frac{1}{2}$ oz. and appeared rather darker than normal. The spleen weighed $2\frac{1}{2}$ oz. It was firm and not slaty but rather chocolate coloured, and contained much malarial pigment. The kidneys together weighed 3 oz., and were apparently healthy. The brain weighed 28 oz., and showed slight œdema or rather wetness beneath the pia-arachnoid, but there was no congestion. The cerebral capillaries were found to be lined with pigmented malarial parasites.

Case 2.—A female child aged fourteen months was admitted to hospital and died about twelve hours later. The body was pallid, but there was no œdema or jaundice. The heart weighed $2\frac{1}{2}$ oz., and, apart from pallor of the muscle, appeared healthy. Posteriorly, the lungs showed a few depressed purplish patches suggestive of collapse. The thymus was very pale and small. The bowel was very pallid and no worms were found. The liver weighed 14 oz. and was slate-coloured. The spleen weighed 4 oz. and was chocolate-coloured. The kidneys together weighed $3\frac{1}{2}$ oz., and were pale but apparently healthy. The brain weighed $29\frac{1}{2}$ oz., and was pale but not congested. There was slight œdema of the pia-arachnoid. On section, the cerebral capillaries were found to be blocked with malarial parasites.

A case of jacksonian epilepsy is of interest, and may be quoted here.

A male, aged twenty-six years was admitted to hospital and died same day. He had been having fits. There were abrasions on the knuckles, chin, and knees. The lungs showed numerous small ecchymoses, but not consolidation. The heart weighed 13 oz. and seemed healthy. But for the presence of ankylostomes and ascaris, the gut was normal. The liver weighed 53 oz. and showed portal cirrhosis. The spleen was apparently healthy and weighed $6\frac{1}{2}$ oz. The kidneys together weighed $9\frac{3}{4}$ oz., and showed some tubular nephritis. The brain weighed 47 oz. Over the upper and posterior aspect of the left occipital lobe there was an area about the size of a florin where the dura matter was adherent to the brain. At this spot the brain showed some softening without, however, much alteration in colour. The calvarium was not involved.

2. *Circulatory System.*—Twenty-one cases or eight *per cent.* In this group there are five examples of aneurism. Three were situated in the first or second part of the aortic arch, and one was present in the descending aorta and was firmly adherent to the posterior aspect of the left lung into which it eventually ruptured. The fifth case was a secondary aneurism of the heart, of which the following are the details.

A male, aged twenty-five to twenty-eight years died suddenly. There was no jaundice or œdema of the body. The heart weighed 18 oz., and the pericardium was firmly adherent. The valves were competent. There was a lesion about the size of a walnut extending from the pars membranacea septi over to the left ventricle. This lesion appeared to be a gumma, the centre of which was necrotic. Death was due to rupture of this secondary aneurism close to one of the coronary arteries. The lungs were congested, but there was no consolidation. About twenty ascaris were present, but otherwise the bowel was healthy. The spleen weighed $12\frac{1}{2}$ oz. and seemed healthy. The liver weighed $64\frac{1}{2}$ oz. and presented no gross abnormality. Microscopically, the heart muscle close to the aneurism presented the characters of a gumma.

Another interesting case may be mentioned here.

A Kroo boy, aged about thirty-five years was admitted to hospital with a prepatellar bursitis. He died of pyæmia. The heart weighed 11 oz. The pericardium was much thickened, and the sac contained about one pint of sero-purulent effusion. On opening the heart, an abscess was found in the interventricular septum which, having ruptured, allowed blood to pass between the two ventricles. An interesting feature of the case was that the medical officer who examined him shortly before death remarked on the extraordinary nature of the heart sounds. They must have been similar to the characteristic sounds heard in congenital heart disease.

3. *Digestive System.*—Forty-five cases or seventeen *per cent.* In this group there were no less than eleven examples of tuberculous peritonitis which represents rather more than four *per cent.* of all deaths. It is suggested that careful meat inspection at the slaughter houses may, to some extent at least, counteract this danger.

Malignant disease accounts for six cases. Five were primary cancers of the liver, and one was a cancer of the pancreas in an European.

Death was due to entamoebic dysentery in five cases, and to bacillary dysentery in seven.

Two deaths from typhoid fever were encountered and are included in this group.

4. *Respiratory System*.—Fifty-three cases or twenty *per cent*. There were fifteen cases of pulmonary tuberculosis. Pneumonic plague was only found in six cases. Two examples of fibrosis of the lungs were seen of which the following details are given.

Case 1.—The body was that of a male aged about forty-six years. There was general anasarca and slight jaundice. The heart weighed $13\frac{1}{4}$ oz. The pericardium was healthy, but the heart muscle was rather speckled. The right ventricle was hypertrophied and dilated. The valves were competent. The lungs were completely adherent to the chest wall and the lobes were fused together. There was no consolidation, but the lungs felt tough and "shotty". On section, there were dense black fibrous strands radiating throughout the lungs. The bronchial glands were enlarged, soft, and black, but showed no evidence of tuberculosis. The liver weighed $45\frac{3}{4}$ oz., was mottled and somewhat cirrhotic. The spleen weighed $7\frac{1}{2}$ oz., and was apparently healthy. The kidneys together weighed 9 oz. and, apart from slightly adherent capsules, showed no gross changes.

Case 2.—A well-developed and well-nourished female aged about sixty years. There was no oedema or jaundice. The heart which weighed $12\frac{1}{2}$ oz. was fat and flabby. The pericardium was healthy and the valves competent. There was considerable atheroma of the coronaries and of the aorta, extending into the common iliac arteries which were calcareous. Both lungs were very black and there was much fibrosis. Chronic bronchitis was present, and the lower lobe of the right lung showed early consolidation. There were adhesions near the liver and there were small ecchymoses at the cardiac end of the stomach which contained a fair quantity of altered blood. Ascaris worms were present, but otherwise the bowel was healthy. The liver weighed $36\frac{1}{2}$ oz., was very fatty, and contained a naevus at the extreme edge of the left lobe. The kidneys together weighed $6\frac{1}{4}$ oz. and were the seat of chronic interstitial changes. There were several small intra-mural fibroid tumours in the uterus. The brain weighed $36\frac{1}{2}$ oz. and showed slight oedema of the pia-arachnoid. There were calcareous plaques in the basilar artery, but there was no evidence of hæmorrhage or thrombosis.

5. *Genito-Urinary System*.—Eighteen cases or about seven *per cent*.

In this group there was one case of cancer of the cervix. There was one ante-partum and one post-partum hæmorrhage. The majority of cases in this group were chronic nephritis and pyelo-nephritis.

6. *Miscellaneous*.—Twenty-five cases or about eight *per cent*. In this group there were all cases of septicæmia, only one of which was due to *B. pestis*. Nine cases of tetanus are included, and of these only one was tetanus neonatorum. The following are the particulars of the cases:—

- (1) Male aged eighteen years. No injury detected. In hospital one day.
- (2) Female aged fifty years. No injury detected. In hospital three days.

- (3) Male aged nineteen years. Wound of foot. In hospital twelve days.
- (4) Female aged eight days. Necrosis at navel. In hospital one day.
- (5) Female aged forty-five years. No injury detected. In hospital seven days.
- (6) Male aged four years. Splinter in knee. In hospital two days.
- (7) Male aged forty-seven years. No injury detected. In hospital two days.
- (8) Male aged seven years. Multiple injuries. In hospital one day.
- (9) Male aged fourteen years. No injury detected. In hospital three days.

It will be observed that in five of these cases no injury was seen.

One case of lymphatic leukæmia is worth recording.

The patient was a male, aged fifteen years. A blood examination during life gave a count of 160,000 white cells of which nearly ninety-nine *per cent.* were lymphocytes. The conjunctivæ had a pale lemon yellow tint, but there was no jaundice or œdema. No palpable glandular enlargement was detected. The brain weighed 45 oz. and was pale but otherwise healthy. There were a few petechiæ on the visceral pericardium, but the heart, which weighed 9 oz., although pale was apparently healthy. The lungs were pale, and there was an area of consolidation about the root of the right upper lobe. The thymus and bronchial glands were not enlarged. The tonsils were hyperplastic and dark-red on section. The large bowel was thickened and showed a fair amount of recent ulceration, especially in the sigmoid colon. No worms were present. The liver was enlarged, weighed 63 oz., and was pale ochre in colour. The spleen weighed 13 oz., was red in colour, and the malpighian bodies were not noticeably prominent. The kidneys together weighed $9\frac{3}{4}$ oz. and were apparently healthy. Except for the glands draining the ulcerated large intestine, the lymphatic nodes appeared of normal size.

7. *Un-Natural Causes.*—Seventy-six or about twenty-eight. *per cent.*

For convenience, this group has been sub-divided as follows:—

(1) *Injuries.*—Twenty-eight cases.

One of these was almost unique and is worth describing.

A male aged about forty years was alleged to have been caught between the buffers of two railway wagons during shunting operations. He died about forty-eight hours after admission to hospital. There was much bruising of the lower part of the anterior abdominal wall, and around the left elbow joint. There was a small wound in the left antecubital fossa, but no fracture was present. There was no evidence of traumatic asphyxia. The heart and lungs were apparently healthy, but there were a few old adhesions of the right pleura. There was much bruising of the tissues around the bladder which, however, was not ruptured. There was no fracture of the pelvis. The liver weighed 55 oz. and seemed normal. The spleen weighed $18\frac{3}{4}$ oz., was malarial, and there was a good deal of the perisplenitis. The peritoneum contained a small quantity of bowel contents, and it was discovered that the ileum was completely torn across at a point about three and a half feet below the pylorus. The two ends with their ragged edges were found some distance from one another in the peritoneal cavity.

Partial rupture of the bowel following an injury of this kind is not uncommon, but a complete section of the gut must be very rare indeed. It is also remarkable that the blow which caused this injury did not at the same time produce a rupture of the enlarged malarial spleen.

(2) *Burns*.—Thirteen cases.

(3) *Poisoning*.—Five cases. Two were due to chloroform; one being a death on the operating table, and the other case of delayed chloroform poisoning. Two deaths were due to poisoning by kerosene; and one was caused by carbolic acid.

(4) *Drowning*.—Thirteen cases.

(5) *Lightning*.—Four cases.

These cases occurred together among the occupants of a canoe which was struck by lightning in the lagoon. Three were males, and their ages were twenty-eight, forty-five and twenty years respectively. One was a female aged seventeen years. In each case the features were noted as being placid, and the size of the pupils was within normal limits. In all the conjunctivæ were much suffused, and the limbs were in the position of spasm. The *arbor vitæ* was not observed. In two there was epistaxis, and in two there was bleeding from the ears. In three there was no external injury, but in one there were burns over the right costal margin, in both groins, and on the left forearm. In one the trachea was injected and contained a quantity of blood stained froth. In no instance did the heart show any hæmorrhages, but in all the left ventricle was contracted and the right ventricle collapsed on itself. The condition of the heart muscle was normal and the valves were competent. In two cases the lungs were deeply congested and were the seat of hæmorrhages; and in two there was no abnormality. The liver and kidneys were intensely congested in all, and this was also observed in the spleen of three cases. In each there was considerable congestion of the cerebral meninges, with ecchymosis in one case. No laceration or hæmorrhage into the substance of the brain was observed. In one of the cases in which there was epistaxis, the congestion was limited to the neighbourhood of the cribriform plate of the ethmoid.

(6) *Strangulation*.—One case.

(7) *Starvation*.—One case.

(8) Unknown, including "found in the sea". Eleven cases.

G. W. ST. C. RAMSAY.

ANNUAL REPORT ON THE PATHOLOGICAL LABORATORY
KADUNA, 1928

The Pathological Laboratory was established in 1924 and has since that time been engaged in the study of the diseases of the human body. The laboratory is situated in the Kaduna Hospital and is under the supervision of the Medical Officer of Health. The laboratory is equipped with the necessary apparatus and materials for the examination of specimens of human tissue and fluids.

The laboratory is open to all persons who wish to have their specimens examined. The charges for examination are as follows:—
For each specimen of human tissue or fluid, 1/6d.
For each specimen of human blood, 1/6d.
For each specimen of human urine, 1/6d.

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APPENDIX D.

ANNUAL REPORT ON THE
PATHOLOGICAL LABORATORY KADUNA, 1928

RESULTS OF EXAMINATIONS			
Specimen	Examination	Result	Remarks
1	Examination of human blood	Normal	
2	Examination of human urine	Normal	
3	Examination of human tissue	Normal	
4	Examination of human blood	Normal	
5	Examination of human urine	Normal	
6	Examination of human tissue	Normal	
7	Examination of human blood	Normal	
8	Examination of human urine	Normal	
9	Examination of human tissue	Normal	
10	Examination of human blood	Normal	

RESULTS OF EXAMINATIONS			
Specimen	Examination	Result	Remarks
11	Examination of human blood	Normal	
12	Examination of human urine	Normal	
13	Examination of human tissue	Normal	
14	Examination of human blood	Normal	
15	Examination of human urine	Normal	
16	Examination of human tissue	Normal	
17	Examination of human blood	Normal	
18	Examination of human urine	Normal	
19	Examination of human tissue	Normal	
20	Examination of human blood	Normal	

The laboratory is open to all persons who wish to have their specimens examined. The charges for examination are as follows:—
For each specimen of human tissue or fluid, 1/6d.
For each specimen of human blood, 1/6d.
For each specimen of human urine, 1/6d.

It is a pleasure to have the opportunity to discuss the results of the work done in the laboratory of the Department of Pathology, University of Toronto, during the past year.

The work has been carried out in the laboratory of the Department of Pathology, University of Toronto, during the past year. The results of the work are presented in the following report.

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APPENDIX D.

ANNUAL REPORT ON THE
PATHOLOGICAL LABORATORY, KADUNA, NIGERIA

The work has been carried out in the laboratory of the Department of Pathology, University of Toronto, during the past year. The results of the work are presented in the following report.

YAKUBU D. D.

ANNUAL REPORT ON THE PATHOLOGICAL LABORATORY, KADUNA, 1928.

STAFF.

Dr. H. Morrison, Pathologist, was in charge of the Laboratory from January 1st until August 7th. On that date he was transferred to Lagos and for the remainder of the year the laboratory was supervised by the various Medical Officers in the African Hospital during such spare time as was at their disposal.

The African Staff consists of one Second-class Laboratory Attendant and one Third-class Attendant.

BUILDINGS, ETC.

The separate room for the Pathologist mentioned in the report for 1927 has not yet been constructed.

The system of surface drainage mentioned in that report is now being installed.

WORK.

In addition to special examinations required, the blood of every out-patient at the African Hospital is examined for malaria parasites, and the blood and stools of every in-patient are examined. As far as possible, a Kahn test is performed on the blood of every in-patient. In addition, the blood and stool of every prisoner admitted to the Kaduna Prison are examined.

Very little material has been received from out-stations.

TOTAL EXAMINATIONS OF BLOOD.					TOTAL EXAMINATIONS: 4,676.					
Examination performed.					Total found.	% age positive.	Euro-peans.	% age positive.	Africans.	% age positive.
P. vivax	...	...	...	...	Nil	—	—	—	—	—
P. malarie	...	...	...	...	18	0.4	4	2.3	14	0.3
P. falciparum	...	...	...	...	779	16.7	24	14.2	755	16.3
Crescents	...	..	...	...	20	0.4	2	1.1	18	0.4
S. recurrentis	...	...	...	...	1	0.3	—	—	1	—
Trypanosomes	...	...	...	...	15	0.2	2	—	15	—
Micro-filarie	...	...	...	...	10	—	—	—	8	—
Hæmoglobin estimation	...	...	...	...	1,081	—	5	—	1,076	—
Differential white cell count	...	...	...	...	42	—	29	—	13	—
Total white cell count	...	...	...	...	7	—	4	—	3	—
Red cell count	...	...	...	...	5	—	2	—	3	—
Colour index	...	...	...	...	1	—	1	—	—	—

Of the total cases examined, 4,676 :

176 were Europeans,

4,500 were Africans.

SACHS-GEORGI REACTIONS.

	Number performed.	Number positive.	Percentage positive.
Europeans	9	1	11 %
Africans	341	211	62 %
Total	350	212	61 %

Sachs-Georgi reactions were only performed from January 1st till June 30th. After that date, the Kahn Test was substituted.

KAHN TEST. FROM JUNE 21ST TO DECEMBER 31ST.

	Number performed.	Number positive.	Percentage positive.
Europeans ...	4	1	25 %
Africans ...	336	83	25 %
Total ...	340	84	25 %

It will be noticed that the number of positive results obtained with the Kahn reaction is less than half the figure for the Sachs-Georgi test, for approximately the same number of cases.

WIDAL TEST.

Total examined = 33. Europeans = 29. Africans = 4.

Total positive = 5. All Europeans.

Percentage positive (of total) = 15 %.

Examination of Stools. Total number of stools examined :—

Europeans ...	48
Africans ...	1,756
	<hr/> 1,804

Examination.	EUROPEAN.		AFRICANS.		TOTAL.	
	Number positive.	Percentage of E. stools positive.	Number positive.	Percentage of A. stools positive.	Number positive.	Percentage of total positive.
E. histolytica ...	3	6.25	78	4.4	81	4.3
E. histolytica Cysts ...	1	2.1	40	2.3	41	2.2
Ankylostome ova ...	nil	—	429	—	429	23.8
A. lumbricoides ova ...	"	—	212	—	212	11.8
T. saginata ova ...	"	—	86	—	86	4.7
T. dispar ova ...	"	—	30	—	30	1.65
S. mansoni ova ...	"	—	42	—	42	2.3
Blood ...	11	—	171	—	182	10
Mucus ...	4	—	144	—	148	

It will be noticed that the infection with hookworms is very high, being nearly twenty-five *per cent.* The infection with round worms is probably a good deal higher than the above figures represent, as it is found in practice that of the patients whose stools exhibit no ova, when given a dose of anthelmintic, do actually pass round worms. Doubtless if more stools were examined from these patients, ova would eventually be found.

EXAMINATION OF URINE.

Number examined :—Europeans ...	41
Africans ...	1,320
Total ...	1,361

Number positive.

Examination.	Europeans.	Africans.	Total.
Albumen ...	15	291	306 (22.5%)
Casts ...	3	7	10
Bile ...	Nil	6	6
Sugar ...	1	3	4
Blood ...	5	124	129
Pus ...	7	120	127
Ova of S. hæmatobium ...	Nil	10	10 (0.7)

Examination Sputa.

			Number examined.	B. Tuberculosis found.	Bronchial Spirochaetes found.
Europeans	...	...	14	1	4
Africans	...	...	111	11	7
Total	...	...	125	12	11
Percentage of total positive	...	...	...	10%	9%

Miscellaneous Examinations.

Total number = 199.

Examination.	Number.	Finding.	Number.
Urethral smear ...	48	Gonococcus present in ...	25
Vaginal smear ...	32	Gonococcus ...	5
		B. coli ...	1
Urinary deposit ...	36	Gonococcus ...	6
		B. coli ...	5
Conjunctival pus ...	7	Gonococcus ...	6
Pus from abscess ...	10	Staphylococcus ...	3
		S. pallida ...	1
Ulcer scraping ...	7	S. pallida ...	2
Cultures ...	113	Staphylococcus ...	5
		Streptococcus ...	3
		B. coli ...	6
Gland puncture ...	12	Trypanosomes ..	5
Cerebro-spinal fl. ...	6	Cell count ...	2
		Organisms ...	0
Hydrocele fluid ...	5	Micro-filariae ...	1
Skin scraping ...	3	Microsporon furfur ...	2
Post-mortem smear ...	4	Pneumococcus ...	1
		B. tuberculosis ...	2
		Koch-Weeks bacillus ...	1

The following negative examinations were made :—

Throat smear, two; nasal smear, one; knee joint fluid, two; vomit, one; skin clip for leprosy, four; smear from ear, one; ascitic fluid, one.

POST-MORTEM EXAMINATIONS.

The total number of post-mortem examinations made was forty. The causes of death as given in the post-mortem register were as follows :—

Cardiac failure	...	...	...	...	...	2
Tuberculous peritonitis and pleurisy	...	...	...	...	...	1
Pyæmia	...	...	...	...	...	1
Thrombosis of portal vein	...	...	...	...	...	1
Injuries (railway accident)	...	...	...	...	...	3
Hæmorrhage following injury	...	...	...	...	...	1
Lobar pneumonia	...	...	...	...	...	3
Fracture of spine	...	...	...	...	...	1
Ankylostomiasis (anæmia and œdema)	...	...	...	...	...	1
Meningeal hæmorrhage	...	...	...	...	...	1

Tuberculous peritonitis and chronic nephritis	1
Pulmonary tuberculosis	3
Emphysema and bronchitis	2
Sarcoma of orbit	1
Cerebral hæmorrhage	2
Aneurysm of aorta	1
Subacute nephritis	1
Bacillary dysentery	1
Gas gangrene of leg	1
Chronic nephritis and pericarditis	1
Exhaustion following ulceration of bowel	1
Acute nephritis	1
Perisplenitis and pyrexia	1
Cirrhosis of liver	2
Miliary tuberculosis	1
No cause given	1
Natural causes (ages, thirty-six and twenty-nine years)	2
Acute hæmorrhagic pancreatitis	1

The last case was a Hausa man aged thirty-six who exhibited acute pancreatitis. Fat necrosis of the omentum was very marked. The under surface of the liver was a dull scarlet colour. The pancreas was dried up, of a deep purplish colour in patches and showed coagulative necrosis.

EXAMINATION OF TISSUES.

Eighty-eight sections of tissues were cut and examined during the year. One case of myeloid leukæmia was found. Three of the tumours showed malignant changes: sarcoma of orbit, scirrhous carcinoma of breast and duct carcinoma of breast.

LABORATORY, CALABAR, 1928.

G. W. ST. C. RAMSAY, M.D., F.R.F.P.S. Glas., D.T.M. & H.,

Pathologist.

APPENDIX B

ANNUAL REPORT OF THE ARIZONA HOSPITAL

LABORATORY, CALIFORNIA 1902

W. S. G. RAMSAY, M.D., CLINICAL DIRECTOR

PHOTOGRAPH

ANNUAL REPORT OF THE AFRICAN HOSPITAL LABORATORY, CALABAR, 1928.

INTRODUCTION.

At the end of October I was transferred to Lagos and, in view of the fact that there was no relief to take my place, this report only gives an account of the activities of the Laboratory attached to the African Hospital, Calabar, for the period 1st January to 13th October, 1928.

It must be noted that it is only a little more than a year ago that a Pathologist was appointed to Calabar for the first time. The above remarks, therefore, have only been made with the object of indicating the conditions under which we have been working. Funds for a new Laboratory have been applied for, and it is hoped that an allocation will be made. The opportunities for research work at Calabar are almost endless, and it seems a pity that they should be wasted for the want of a small capital outlay. A glance at the subsequent figures indicating the work done during the last nine and a half months amply demonstrates the amount of clinical material referred to the Laboratory from the wards and out-patient department.

STAFF.

The staff consists of a Pathologist, one Second-class Laboratory Assistant, one Third-class Laboratory Assistant, and one Nurse-in-training. Immediately prior to my departure a Charge Nurse reputed to have had a good training in laboratory work was seconded for duty.

The assistants have all worked reasonably well, and I have done my best to teach them the rudiments of laboratory technique. Patience and a careful study of their individual temperaments are essential in order to get the best work out of them; but once their confidence has been gained they seem to be quite reliable. They can very rapidly be trained to remove blood from one of the veins of the forearm, and it is really surprising how seldom they fail to obtain it at the first puncture. They can also make excellent thin blood films, and their results with Leishman's, Ziehl-Neelsen's, and Gram's stains leave little to be desired. Further, I am now satisfied that the more work they are given to do, the better and more conscientiously do they do it.

SCOPE OF WORK.

This, I regret to report has left something to be desired. We have been unable to undertake any morbid histology because no suitable paraffin oven existed. The one for which we indented was unfortunately lost at sea when the s.s. *Palma* became a total wreck, and there has been the inevitable delay while awaiting the arrival of the repeat order. I have to express my thanks to the Director, Medical Research Institute, Yaba, for sectioning the material which I sent. The electric plant of the Hospital has not been completed and, therefore, I have not yet indented for a dark-ground illumination apparatus. This would be valuable in clinching the diagnosis of chancres and some cases of yaws. The staining of smears from such lesions by Fontana's method is far from satisfactory, and I have given it up almost entirely. There is no available space in which to keep animals, and consequently no Wasserman reactions have been done. We have used the Sachs-Georgi test in its place.

The blood of all in-patients has been examined for parasites and the serum submitted to the Sachs-Georgi test as a routine measure.

The blood of all in-patients has been examined for parasites and the serum submitted to the Sachs-Georgi test as a routine measure. Similarly, all stools were reported on for ova and pathogenic parasites, and were subsequently re-examined at intervals after treatment until a negative result was obtained or the patient was discharged.

During the year 442 apparently healthy school children between the ages of four and eighteen years have been examined in an endeavour to ascertain some standard by which to judge the general community. The blood and stools were examined for the presence of parasites and the Sachs-Georgi test was done. The results of this work should prove very interesting, and I hope to be allowed to return to this station next tour and to be able to draw my conclusions from some 4,000 children. At present, it is obvious that the series is too small to justify one in giving any figures.

A considerable amount of interest has been taken in leprosy. Some experiments have been made with protein shock on a very small series of lepers who were in the Infectious Diseases Hospital, Calabar. A few notes on this subject are appended. In April I went to the Itu Leper Colony for seven weeks. I took with me the senior laboratory assistant and sufficient apparatus to enable me to carry out a general examination of the patients at the colony. It is a pleasure to acknowledge my gratitude to the United Free Church Mission, and especially to their medical officers who gave me every facility to study the cases under their charge.

An account of the observations made at Itu will be found at the end of this report.

BLOOD EXAMINATIONS.

1. *Parasites*.—A total of 3,112 slides were examined for blood parasites, and these represented 1,563 individual patients. Of these 587 or 38.4 *per cent.* harboured some parasite and 3.7 *per cent.* had more than one kind. In the above figures are included the results obtained from an examination of 442 school children. The age incidence of malarial and filarial infection is being worked out, but at present the series is too small for comment. The following table indicates the relative proportions in which the various parasites were encountered.

TABLE I.

Parasite.	Actual Number.	Percentage.
Subtertian malaria	167	10.7
Quartan malaria	16	1.2
Benign tertian malaria	2	0.1
<i>M. perstans</i>	384	24.6
<i>M. loa</i>	80	5.1
<i>M. bancrofti</i>	7	0.4

The small unsheathed microfilariæ which are referred to above as *M. perstans* undoubtedly contain at least two different varieties. I intend to have these properly separated and identified later. I also hope to try some 'concentration' methods for the detection of microfilaria, because it is certain that the proportion of individuals harbouring these parasites is much higher than is indicated by the above figures.

2. *Actual and Differential Cell Counts*.—105 red blood cell counts, 107 white blood cell counts, and 373 differential cell counts were done. No examples of Addisonian anæmia or leukæmia were encountered. Two cases of von Jaksch's anæmia (anæmia pseudo-leukæmica infantum) were seen, and it seems not improbable that this condition may be rather more common in West Africa than in Britain.

SERUM EXAMINATIONS.

1. *Sachs-Georgi Reaction*.—The sera of all in-patients were examined as a routine, and a considerable number were done from among those attending the out-patient department. In addition, almost all the school children alluded to above were submitted to this test. In all 2,531 sera were examined, of which 1,426 or 56.5 *per cent.* gave a positive reaction. This figure represents the combined syphilis and yaws rate,

and it is unfortunate that, as yet, there is no satisfactory serological method of differentiating the two diseases. In a series of 600 hospital in-patients who were over eighteen years of age no less than sixty-five *per cent.* had a positive Sachs-Georgi reaction. I hope to be able to undertake further studies on this subject next year.

2. *Widal Reaction*.—This test was only done once and was negative for the typhoid and para-typhoid group of organisms.

3. *Van den Bergh Reaction*.—This test was done on twenty patients. In eleven the result was negative, six gave an immediate direct reaction, one a biphasic, and two a positive indirect reaction.

4. *Precipitin Test*.—A pair of blood stained khaki shorts were sent to the Laboratory for examination from the Police at Enugu. We were able to state that the stains were made by human blood.

FAECES EXAMINATIONS.

The stools of 1,583 patients were examined for ova and pathogenic parasites. The following table indicates the proportions in which the various parasites were present.

TABLE II.

Parasite.	Number.	Percentage.
Negative	126	7.9
Ankylostome	983	62.1
Ascaris	973	61.5
Trichuris trichiura	403	25.5
Strongyloides	102	6.4
Tænia solium	4	0.2
E. histolytica	56	3.5

The stools of all in-patients were re-examined weekly until a negative result was obtained, or until the patient was discharged from hospital. The number of re-examinations was 1,042, thus making a grand total of 2,625 stool examinations.

SMEAR EXAMINATIONS.

250 smears from various sources were examined with the following results:—negative, 190; tubercle bacillus, 12; bacillus lepræ, 11; gonococcus, 27; other organisms, 14. In addition to these 438 peritoneal and splenic smears were examined from a series of rodents trapped by the Sanitary authorities. All were negative for bacillus pestis.

URINE EXAMINATIONS.

165 specimens of urine were referred to the Laboratory for report. Thirteen examples of urinary schistosomiasis were encountered. All the victims were Hausa men. At present there is no evidence that schistosomiasis can be communicated from man to man in Calabar because the intermediate host has not been encountered. Also, I am informed that all cases which have been seen in recent years have been imported from the North or the Cameroons.

CULTURE EXAMINATIONS.

Culture examinations have been few with only twenty-nine. Many of these have been specimens of synovial fluid from cases of gonorrhœal arthritis, but in no instance have we been able to culture this organism from the material submitted. Several stools have been examined for bacillary dysentery with negative results.

POST-MORTEM EXAMINATIONS.

Owing to the natural prejudices of the people the amount of post-mortem work is far smaller than it should be in a hospital of this capacity. The native, when he is told that the white man can do nothing further for his relative or friend, at once removes the patient from hospital and takes him home to be submitted to treatment by one of the local "juju" doctors. This practice is not limited to the poor and illiterate class, but is also common among the more educated natives.

During the period of this report forty-nine autopsies have been done. The following is a summary of the causes of death:—

Amoebic dysentery	2
Aneurism (ruptured aortic)	1
Aortitis	2
Burns	1
Chronic nephritis	3
Cerebral abscess	1
Drowning	6
Gunshot wounds	2
Gastro-enteritis	1
Intestinal obstruction	2
Pericarditis	1
Peritonitis	1
Pneumonia (lobar)	2
Pneumonia (lobular)	1
Poisoning by Calabar bean	7
Poisoning by alcohol	1
Poisoning by opium	1
Poisoning by unknown agent	4
Post-operative shock	1
Pulmonary tuberculosis	2
Retro-peritoneal sarcoma	1
Sagittal sinus thrombosis	1
Secondary anæmia	1
Starvation	2
Stillborn	1
Strangulation	1

Owing to our lack of a paraffin oven for embedding pieces of tissue it was impossible to do the routine morbid histology associated with a thorough post-mortem examination.

Probably the major proportion of these autopsies were done on a Coroner's Warrant. Many of the bodies were in an advanced state of decomposition; particularly when they had been brought by launch from outlying districts.

LEPROSY.

NON-SPECIFIC PROTEIN THERAPY IN LEPROSY.

Some months ago an attempt to try out the effects of "protein shock" was made upon a series of lepers in the Isolation Hospital, Calabar. There were only nine patients available, and it is impossible to draw satisfactory conclusions from so small a number. This subject, however, may be of interest to some members of the staff and, therefore, these few notes may not be out of place.

Non-specific protein therapy has had a vogue in Europe which is only now assuming reasonable dimensions. It was hailed as a possible remedy for many diseases of which neither the cause nor the cure was known. The pendulum is swinging back, and now it is not being much used, except in certain intractable cases of arthritis; as an adjuvant to anti-syphilitic measures in general paralysis of the insane; and in the so-called "climatic bubo". In the latter disease it apparently gives remarkable results.

Broadly speaking, the rationale of this method of treatment lies in the observation that while the body is producing anti-bodies to the particular protein which is being used, it is also stimulated to produce anti-bodies to organisms which may be causing disease.

While experiments were going on in Calabar, Dyce Sharp (1928) published a short article on the subject and quoted some really remarkable results in a small series of cases.

TECHNIQUE.

Almost any sterile material containing protein may be used in suitable dilutions. Perhaps the cheapest and most easily obtained protein is a vaccine prepared from a killed culture of some organism. In our work we used a vaccine of *B. typhosus* which was prepared in the Laboratory and put up in 5 and 10 c.cm bottles. Old insulin ampoules were found ideal for the purpose. Such a vaccine can easily be obtained in Nigeria from the nearest Laboratory, and it keeps very well without being put on ice. The strength of the vaccine was 500,000 per c. cm. The required amount was withdrawn by plunging the needle attached to the syringe through the rubber cap of the ampoule which is held inverted. The needle must, of course, be sterilised by boiling before being inserted into the ampoule. For use, an initial dose of 1 c.cm was given *intravenously* and increased every five days according to the results obtained. One aimed to get a sudden rise of temperature to between 101-102° F. within about two hours. At first the dyspnoea, coughing, itching of the skin, tachycardia, and rigor may seem alarming, but these symptoms are really of no import. The temperature should fall to normal within thirty-six hours. It seems unnecessary to give more than eight doses, because after this number the patient has developed a high degree of immunity to the organism, and consequently the reaction is small.

RESULTS.

The following is a brief summary of each case showing the extent of treatment and the results obtained :—

Case 1.—Nodular leprosy in male aged fifteen years. Lepa bacilli in nasal smear. Sachs-Goerg reaction positive. Had four doses of vaccine, after which he had typical leprotic fever for eight weeks. Felt much better in spite of fever. Later had seven doses N.A.B. No improvement noted.

Case 2.—Mixed leprosy in male aged thirty-five years. Nodules on face and perforating ulcer left foot. *B. lepræ* in nasal smear. Sachs-Goerg reaction positive. Had eight doses of vaccine. Felt better and ulcer healed in seven weeks. Otherwise no change.

Case 3.—Nerve leprosy in male aged thirty-five years. Perforating ulcer right foot, ulcer left great toe, thickening left ulnar nerve, maculo-anæsthetic patches on body. Nasal smear negative. Sachs-Georgi reaction positive. Had three doses of vaccine and five of N.A.B. Felt better, but no obvious improvement.

Case 4.—Nerve leprosy in male aged thirty-eight years. Perforating ulcer left foot, maculo-anæsthetic patches on body. Nasal smear positive. Sachs-Georgi reaction positive. Had six doses of N.A.B. and five of vaccine. Ulcer healed in six weeks and patches improved slightly. Nasal smear became negative in eleven weeks.

Case 5.—Nerve leprosy in male aged forty years. Perforating ulcer left foot with ulceration of first and second finger tips left hand. Nasal smear negative. Sachs-Georgi reaction positive. Had eight doses N.A.B. and eight of vaccine. All ulcers healed in eleven weeks.

Case 6.—Mixed leprosy in male aged forty-six years. Nodules on body and face with perforating ulcer left heel. Nasal smear positive. Sachs-Georgi reaction negative. Had twelve doses N.A.B. and eight of vaccine without obvious improvement. Stated he felt much better.

Case 7.—Nerve leprosy in male aged thirty-five years. Perforating ulcer right foot with maculo-anæsthetic patches on body. Nasal smear negative. Sachs-Georgi positive. Sachs-Georgi became negative after fourteen doses N.A.B. and six of vaccine. Felt better, but otherwise no change.

Case 8.—Nodular leprosy in male aged eighteen years. Nasal smear positive. Sachs-Georgi positive. Had nine doses N.A.B. and six of vaccine. Felt better, but showed no improvement.

Case 9.—Nodular leprosy in male aged fifty years. Nasal smear positive. Sachs-Georgi positive. Had six doses of vaccine, but no N.A.B. Stated he felt much improved but seemed the same as before treatment.

DISCUSSION.

The first and most important feature to note is that in no case was there any ill effect which could be attributed to the protein therapy, and I am firmly convinced that it is a perfectly safe measure, provided, of course, that the vaccine has been properly sterilised in the Laboratory before it is issued, and that it remains sterile after several doses have been removed from the ampoule. Some patients react more than others, and therefore the initial dose should not be too great.

All the patients in this small series stated that they felt better and had less pain after treatment. This observation must be considered with caution, because among West African natives the mere fact that a remedy is administered by the needle has a profound psychological effect. Almost without exception they prefer this method of treatment to that of taking a drug by the mouth. Perhaps, therefore, the euphoria which is induced may not be entirely the result of the remedy, but may be due, at least in part, to the mode of its administration.

It will be noted that the Sachs-Georgi reaction was positive in these cases with only one exception. This will not be surprising when it is observed that sixty-five *per cent.* of all individuals over eighteen years of age who attend the Calabar Hospital have a positive reaction.

In one case a leprotic ulcer on the nasal mucous membrane must have healed, because after eleven weeks *B. lepræ* was no longer to be discovered on smear examination. This is indeed a most encouraging result, but it requires to be confirmed in many cases before it can be regarded as anything but a transitory and exceptional occurrence.

In six cases there was no obvious improvement. On the other hand, all of Dyce Sharp's seemed to derive benefit from treatment. The author must have been most fortunate in the selection of his cases, and it is felt that a conscientious observer such as he will be the first to admit this. Whatever remedy may come to be tried in leprosy must of necessity have quite a large proportion of apparent failures, because of the highly resistant fatty envelope possessed by the *lepra* bacillus, and the deep-seated nature of many of the lesions it produces.

In three cases deep chronic ulcers on the soles of the feet healed in a few weeks. It is in lesions of this type that I believe non-specific protein therapy to be of the most service. Many factors acting together enter into the etiology of these ulcers, and they are notoriously difficult to heal by dressings and antiseptics, because they become callous almost from the outset. The mechanism by which protein therapy acts in these cases is obscure but, whatever it may be, there is little doubt that has a profound beneficial influence of its own, and that it is a still more potent adjuvant to a drug such as N.A.B. which exerts both a specific and a general tonic action on the organism.

Finally, a suggestion to anyone who cares to experiment along these lines. Let him carefully balance his failures against his successes, and thus arrive at a considered judgment. Many more observations are required on this subject, and the experiences of various workers will be valuable. Meantime, it is worth while following the advice of the celebrated old Edinburgh Surgeon who was wont to remark of any new form of treatment, "Use the remedy while it is curing people".

REFERENCE.

Dyce Sharp. N.A., Trans. Roy. Soc. Trop. Med. & Hyg., 1928. XXXI. 4, p. 305.

A STUDY OF LEPROSY IN SOUTHERN NIGERIA.

ACKNOWLEDGMENTS.

The work here described was done during a brief visit to the Leper colony at Itu. Itu is a small trading station situated some ninety miles up the Cross River in the south-eastern part of Nigeria. The Leper colony is managed entirely by the United Free Church Mission, and it is a pleasure to acknowledge all the help which I received from Dr. Macdonald and his successor Dr. Martin. Every facility was given me for examining the patients, and a portion of the new treatment centre was set aside for my laboratory.

INTRODUCTION.

It has repeatedly been observed by medical and political officers that leprosy is a very common disease in the Southern Provinces of Nigeria. No accurate figures have been obtained but some observers have estimated that in certain districts there is an incidence of more than thirty lepers *per mile*. The parts of the country in which the disease is most prevalent are very densely populated, and the actual number of cases must therefore be enormous. In the Northern Provinces the natives live in towns and walled cities, and the number of lepers can be fairly accurately assessed. This is not so in the Southern Provinces where the people exist on countless small farms. These farms are sometimes grouped together and constitute a village, but generally they are scattered throughout almost impenetrable bush. It is therefore obvious that we cannot form any accurate idea of the number of lepers in these parts. Whether leprosy is more common in the north than in the south is a question open to dispute, but the salient fact remains, that leprosy is rife throughout Nigeria and constitutes a serious menace to the native population of some eighteen million persons.

For a number of years the problem of how to deal with scourge has exercised the mind of the Nigerian Government, but until recently no reasonable solution has been found. Legislation with the object of enforcing the segregation of all lepers has been considered impracticable because it would entail an enormous expenditure and might defeat its own object by making lepers hide themselves, rather than be taken forcibly from their families and virtually imprisoned for an indefinite period.

The natives are able to recognise leprosy very early in its course, and they fully appreciate its infectious nature. They are also very ashamed of the disease and do not like to admit that their parents have been lepers. But in spite of this, generally speaking, they seem to do little or nothing to prevent its spread among their families and the community at large. They live a very communal existence in small one-roomed mud huts with the minimum of fresh air. Lepers and non-lepers frequently share the same sleeping couch, the same pipe, the same eating utensils, and even the same loin cloths.

In certain districts, however, the natives have a real dread of leprosy, and the unfortunate victims are driven out of their villages and farms and compelled to live a precarious existence in the swamps and bush. It has even been suspected that occasionally lepers are taken from their homes and secretly murdered. In 1927 it became absolutely necessary to deal with a steadily increasing number of such leper outcasts who were temporarily encamped upon the sand-banks in the middle of the Cross River at Itu. During the rainy season these sands become submerged and the poor wretches were forced to live as best they could in a state of partial starvation among the swamps along the river banks. At first a small number of these patients used to avail themselves of the privilege of being treated as out-patients at the Mission Hospital. Later, inspired by the general sense of well-being and sometimes by the visible improvement in their lesions which followed treatment, the number of attendances became greater and greater.

The problem of these exiles was solved and a new experiment was begun in this part of Nigeria when the Government leased some thirty acres of excellent land at Itu and gave the lepers permission to settle down on it under the direction of Dr. Macdonald who has been the founder of the present colony. All the patients are, of course, voluntary settlers. There is no restriction whatever on their movements, and they are allowed to leave the camp and to return at will. The land is being cleared by the lepers and small farms are being planted all over the ground. During the farming season many return to their own villages to work as labourers. They receive their wages either in money or in kind, and they are thus able to keep themselves in food for several months after they return to the colony.

Paupers who have no means of support are fed out of a Government grant given for the purpose. The chief articles of diet are yam, cassava, plantain, rice, palm oil and kernels, stockfish, and sugar cane.

Since its opening, the colony has been generously supported and encouraged by the Government and the British Empire Leprosy Relief Association. It has prospered; its numbers have increased; and its population is now over 600.

The patients are drawn to the colony from a very wide area of the Southern Provinces, but most of them come from farms and villages situated close to the Cross River and in the basin of the Enyong Creek. The land is now lying and largely composed of dense mangrove forest or oil palms. The annual rainfall is usually more than ninety inches and during the wet season much of the country becomes a swamp owing to the rising of the river. This description is typical of the whole coastal belt of Nigeria, and it is the writer's opinion that the present series of 616 cases is representative of leprosy as it occurs throughout the Southern Provinces.

SEX AND AGE INCIDENCE.

In this series there were 421 males and 195 females. This accords with the general observations from other parts of the world that leprosy is more common among men than women. The ages of the patients varied from eight years to approximately sixty years. Very few could tell their ages, and in consequence it was necessary to rely on assessments made by two or three intelligent native teachers. The average age was 32.1 years.

The duration of the disease prior to treatment in 554 of this series varied between two months and about thirty years. The average was 6.1 years. Twenty patients who could give no more accurate statement than that the disease began in childhood are not included in the above.

The onset of leprosy should seldom be overlooked because most of the natives are half naked and, if they cannot see the initial lesion themselves, it should be noticed by their relatives and friends. In fact, they

are generally on the look out for lepers, and it is for this reason, that many of the victims in the early stages endeavour to conceal their affliction. In 554 patients the age at the onset of the disease could be calculated, and the following table shows the result arranged in quinquennial periods.

TABLE I.

Ages.	No. of cases.	Percentage.	Ages.	No. of cases.	Percentage.
	2	0.4	26-30	134	24.2
6-10	34	6.1	31-35	106	19.1
11-15	35	6.3	36-40	38	6.9
16-20	59	10.6	41-45	13	2.3
21-25	127	22.7	46-50	6	1.1

On studying the above figures, it seems that the disease most commonly manifests itself between the ages of sixteen and thirty-five years; 76.6 per cent. of these cases having begun within this period.

The average age at onset was 25.7 years.

These results correspond very closely with observations made in other parts of the globe where leprosy is common.

CLINICAL FORMS.

Following Rogers (1925) it is now customary to divide the clinical forms of leprosy into three main groups, *viz.* :—(1) the *skin type* in which the lesions contain numerous bacilli but have little or no impairment of sensation; (2) the *nervous type* in which there are sensory changes but few bacilli; and (3) the *mixed type* in which both the previous forms are present.

Such a classification is ideal and, if properly carried out in the examination of every case, it affords data by which any subsequent changes can be accurately noted. Unfortunately, in the limited time at our disposal it was quite impossible to examine all the skin lesions for the presence of bacilli and sensory defects, but it was observed that the large majority had some degree of anæsthesia. We have, therefore, been forced to resort to the older but less scientific method of classifying the cases under the headings of *Nodular* and *Maculo-anæsthetic* leprosy. Table II indicates the proportions in which these forms were present.

TABLE II.

Type.	Number.	Percentage.
Nodular	27	4.4
Maculo-anæsthetic	496	80.5
Mixed	93	15.1

It will be observed that the maculo-anæsthetic is by far the most common variety, and that the nodular and mixed forms together account for less than one-fifth of the cases.

Nodular Type.—Twenty-three were males and four were females. As is usual, the nodules almost always occurred in the nose, ears, or lips. In one case the nodules were as small and close together on the abdomen that they were overlooked until the skin was pinched. The appearance of the skin in this region was almost identical with that of a well-marked case of *fibrositis*. The patient was a woman aged forty and she had had leprosy for four years. There were scars of yaws on her body and she had mitral stenosis with early failure of compensation. The liver and spleen were not enlarged. Leprosy bacilli were present in large numbers in the nasal secretion, and the Sachs-Georgi reaction was positive.

It is interesting to note that in none of these cases was there any leprotic disease of the eye; and, indeed, this observation includes the whole series. Only six patients showed eye lesions, and it is almost certain that none were due to leprosy because they had been present long before the onset of the disease.

The case in this group were regarded as highly infectious and leprosy bacilli were recovered from the nose in twenty-three instances or 85.2 per cent.

Maculo-anæsthetic Type.—Of this large group 339 were males and 157 females. The lesions in most instances were quite typical, although it was noted that only a very small proportion showed marked erythema around the central area of depigmentation. The symmetrical arrangement of the patches was a striking feature. It has been repeatedly pointed out that leprotic lesions most commonly occur on those parts of the body which are most exposed to pressure and injury. This observation was amply demonstrated in our series. The patches were found on the cheeks, upper part of the back, shoulders, chest, buttocks, extensor aspects of the thighs, and feet.

Many of the patients before coming to the colony submit themselves to various forms of native treatment. In some cases the patches are thoroughly scrapped and gunpowder is rubbed into the raw surface. Others resort to the application of vegetable dyes with the object of concealing their affliction; and others, again, partake of various secret remedies. Dr. Martin, who is at present in charge of the settlement, hopes to make a study of the native methods of treatment. Keloid scars were found in ten cases and it is believed that this condition is especially liable to appear after the so-called 'gunpowder' treatment.

In a number of cases the patches were altered beyond recognition by the application of strong red iodide of mercury ointment. This produces blistering with subsequent ulceration, and it is said that pigment returns to the area after healing is complete.

One case was very interesting. A woman aged thirty years had had leprosy for five years, and on examination was found to have maculo-anæsthetic patches on both arms, chest, abdomen and on the extensor aspect of the right thigh. On her face she had the typical 'butterfly' scar of *lupus erythematosus* from which she had suffered as a child, but which had healed about nine years ago. She had submitted to native treatment for her leprosy, and she had extensive keloid on the chest right arm, and back. She had scabies. The liver and spleen were not enlarged, and no parasites were found in her blood. A nasal smear was negative for leprosy bacilli, and the Sachs-Georgi reaction was positive.

Fibrotic changes in the palmar connective tissue with contraction of one or more fingers was observed in 106 cases. The contraction was very rarely complete, and was suggestive of an occupational lesion. It was nine times more common in men than in women, and in almost all the cases it was limited to the little fingers. The fingers were involved in the following order, viz.:—right, 5th finger alone, 64; left, 5th finger alone, 10; both 5th fingers, 28. In only thirty-four of the cases were any of the other fingers contracted. A control examination of 486 male prisoners (non-lepers) was made, and 130 of them were found to have similar contractions. It is suggested that the constant handling of a matchet is the factor responsible for the production of this condition which, in many cases, is identical with a Dupuytren's contracture. There is no evidence that it is a fibrosis occurring secondary to a leprotic infiltration of the palms.

Mixed Type.—In this group there is little to note. Fifty-five were males and thirty-four were females. A nasal smear was positive for leprosy bacilli in 66.7 per cent. A good example of *Goundou* was observed in one case. The patient was a woman aged forty years who

had had leprosy for about twenty years. She had nodules in the ears and generalised maculo-anæsthetic patches. The swelling of the nasal bones was typically bilateral and symmetrical. Leprosy bacilli were present in a nasal smear, and the Sachs-Georgi reaction was positive. Goundou is almost certainly a tertiary manifestation of yaws, but this had been denied by some observers. The writer has seen three cases during the last few months, and in each the Sachs-Georgi reaction was positive.

Nerve Lesions and Deformities.—Palpable thickening of subcutaneous nerves was observed in eighty-five cases; in 141 there were trophic ulcers; and in 145 there were deformities such as paralysis, contractures, or gross loss of tissue.

In the whole series it is worthy of note that, although there was a deformity rate of 23.5 *per cent.*, there was not one instance of a patient being unable to move about the camp. Several had lost all fingers and toes, and in a small number the bones of the feet were involved to quite a considerable extent; but even these were able to walk slowly for short distances with the aid of sticks. The colony is very fortunate indeed in having such a relatively small number of 'burned out' cases of leprosy for whom so little can be done. Such patients are almost always non-infectious, and they take up space and time which could be much more advantageously used for the care and treatment of early cases. The great majority of the individuals at the Itu Leper Camp are pursuing a very chronic course with little disfigurement, and it has been shown that the average duration of the disease prior to their coming under treatment is only about six years. It is, therefore, reasonable to expect that excellent results should be obtained, provided the present lines of treatment come up to what is so hopefully anticipated.

Craw-craw.—Blacklock (1924) seems to have proved that the disease which masquerades under the name of 'craw-craw' all over the West Coast of Africa is none other than scabies. He has further shown that the casual agent of the disease is identical with *Acarus scabiei*. On the black skin the parasite is usually hard to find.

Among all the lepers in this series no less than thirty-two *per cent.* were found to be afflicted with scabies.

TABLE III.

	Number.	No. cases.	Percentage.
Men	397	140	35.3
Women	173	28	16.2
Children (under 14 years)	46	30	65.2
Total	616	198	32.2

The above table shows the high proportion of young children who were infected. In many cases the skin was badly ulcerated, and scabies was by far the commonest cause of enlarged groin glands. There can be no doubt that numerous small lesions of this nature, scattered almost all over the body, afford every opportunity for the entrance of leprosy bacilli. It is not surprising, therefore, that many regard scabies as an important factor in the ætiology of leprosy. The writer understands that measures will shortly be taken to stamp out this disease from the camp in the same way as it has been done in the lazarets in India.

Enlarged Spleen and Liver.—The spleen was palpably enlarged in thirty cases, and in eight the liver was enlarged. Enlargement of both liver and spleen occurred in three instances.

TABLE IV.

		Enlarged Spleen %	Enlarged Liver %
Men	... ..	2.5	0.5
Women	... ..	7.6	1.8
Children (under 14 years)	... ..	13.5	5.8

The above figures indicate that both splenomegaly and hepatic enlargement are commonest among women and in childhood. The number of children (46) is not large enough to warrant the conclusion that the 'spleen rate' is 13.5 per cent.

No cause could be definitely assigned for the hepatic enlargement in any of the cases. In no instance was jaundice present. In more than half of them the Sachs-Georgi reaction was negative and, therefore, it could not be assumed that syphilis was the cause. All these patients had the maculo-anæsthetic form of leprosy, and there was nothing to suggest that the enlargement was due to leprotic disease of the liver.

MICROFILARIA.

In every one of the series a thick blood film was taken and examined for the presence of microfilaria. The blood was obtained from a prick in the finger. The film was allowed to dry in the air, and, without previous fixation, was stained in dilute Giemsa's solution. The patients were examined between the hours of 8 a.m. and 12 noon, and it was observed that *M. loa* occurred more frequently among those who were examined towards the end of the morning. It is not suggested that the results obtained in any way represent the real proportion of individuals harbouring microfilaria. A single examination of a drop of blood gives a very low indication of the numbers infected; and in order to obtain reasonably accurate figures, repeated examinations at different times of the day are necessary. With this proviso, however, it is believed that the following figures may be of some interest.

TABLE V.

	Number.	Percentage.
<i>M. perstans</i>	103	16.7
<i>M. loa</i>	65	11.1
<i>M. bancrofti</i>	2	0.3

Among all the patients there were nine cases of elephantiasis, but no other form of filariasis was observed. The two individuals in whom *M. bancrofti* was discovered had no symptoms.

The common biting flies at Itu are species of chrysops, simulium, tabanus, glossina, and various culicines. Dyce Sharp (1928) has recently shown that species of the night flying culicoides are efficient vectors of *Filaria perstans*.

STOOL EXAMINATIONS.

The stools of 540 patients were examined for ova and pathogenic protozoa. Time permitted of only a single examination, and no concentration technique was attempted. The following figures, therefore, are almost certainly too low.

TABLE VI.

Parasite.	Percentage.
Negative	14.1
Ankylostome	47.4
Ascaris	51.7
Trichuris trichiura	31.1
Strongyloides	4.1
Tape worm	—
<i>E. histolytica</i>	2.6

It would seem that such a high rate of parasitic infestation of the alimentary canal must be a powerful predisposing factor in the production of much ill health and disease. On the other hand, there is no doubt that the West African natives have some degree of immunity to the effects of these helminths. In fact Gordon (1925) has pointed out that the average infection with these worms has little or no effect on the individual's energy, mentality, general health, or on the percentage of hæmoglobin in his red cells. The average infection with ankylostomes is probably about 150 per person. Ankylostomiasis *per se* undoubtedly does occur in some parts of the Southern Provinces of Nigeria, but it must be rare because no typical example of the disease has been seen at the Calabar Hospital for several years. It is an open question, therefore, whether the not inconsiderable expense involved in the mass treatment of hookworm and ascaris infection among the natives in the bush would be justified. The people are in many ways very primitive and the very fact that they walk barefoot on the warm damp soil which is highly contaminated with hookworm larvæ means that, within a few weeks of being freed from those parasites, they will have re-infected themselves almost as badly as before.

NASAL SMEARS.

One of the principal objects of this survey was to ascertain the proportion of individuals who were actively infectious. In so far as general sanitation is concerned, the camp is in a state of rapid evolution and the primitive condition of affairs which was only natural at its inception is disappearing as the colony is being remodelled. Proper lines are now in the process of erection, and it is intended to isolate the actively infectious cases as far as possible. Total isolation of such cases is at present out of the question because whole families are patients in the camp, and individually they would not submit to complete separation from their relatives. Probably the best that can be hoped for is to ensure that the infectious cases sleep apart from the others.

The chief focus from which the leprosy bacilli are disseminated is the nose, and an enormous number of bacilli may be discharged in this way from a small ulcer on the septum or inferior turbinal. In every case a smear from the nose was taken and examined for the presence of *B. lepræ*. The smear was made by inserting into the nostril a small cotton wool swab on the end of a probe, and then firmly rubbing the mucous membrane. The swab was then smeared on a clean glass slide and fixed by heat. The specimen was stained by Ziehl-Neelsen's method, and decolorised with fifteen *per cent.* sulphuric acid. In no case was the nasal mucosa scraped with a knife or sharp spoon, because our only object in this examination was to find out those cases who were actively discharging leprosy bacilli from ulcers in the nose and who were, therefore, a constant source of infection. The following table shows the results obtained.

TABLE VII.

Type.	No. examined.	No. positive.	Percentage.
Nodular	27	23	85.2
Maculo-anæsthetic ...	496	48	9.7
Mixed	93	62	66.7
Total	616	133	21.6

The salient fact which emerges from the above observations is that less than a tenth of the maculo-anæsthetic cases are infectious, whereas the other varieties are highly infectious, and, therefore, constitutes a serious menace to the general community. The real significance of this lies in the fact that, at present, there is no restriction on the movements of the patients, and almost every day they are to be found in fair numbers buying and selling in the market places around Itu. It is admitted that the disease is unlikely to be contracted apart from close contact with

a leper, but there is every opportunity for such to occur when these individuals return to their villages during the farming season.

SACHS-GEORGI REACTION.

This test was done in every one of the series. The Sachs-Georgi test is admittedly less satisfactory than the Wasserman, but the latter was impossible to carry out because of the conditions under which the work was being done. However, it seems to be generally admitted that, if the Sachs-Georgi test is carried out with careful attention to every little detail, it is very reliable. It is said that a positive Wasserman reaction is apt to occur in leprosy when there is no possibility of syphilis or yaws; and this observation seems to be satisfactorily established; more particularly in the nodular type of the disease. Although observations have hitherto been made on the Sachs-Georgi reaction in small numbers of lepers, the writer is not aware of any having been made before on a large and comprehensive series.

Technique.—In all cases 3.5 c.c. of blood is withdrawn from one of the veins of the forearm into a test tube. The serum is allowed to separate and is then pipetted off into another test tube, after which it is inactivated in a water bath an hour at 56°C. For the test proper four small Wasserman tubes are used for each reaction. Into the first is put 1.6 c.c. of normal (0.89%) saline, and 1.0 c.c. into each of the others. To the first tube is added 0.4 c.c. of the patient's serum and the contents mixed. 1.0 c.c. of this dilution is carried over into the next tube and so on. The resulting dilutions are 1/5, 1/10, 1/20, 1/40. The antigen used is that put up by Burroughs Wellcome & Co., in 1.0 c.c. ampoules. For use the antigen is diluted to a strength of 1/20 by slowly adding normal saline in a test tube or measuring glass. 0.5 c.c. of diluted antigen is added to each dilution of the patient's serum. The tubes are then placed in a water bath at 37°C; the water reaching halfway up the contents of the tubes. They are left in the water bath over night, and next morning the readings are taken. Precipitation of the colloid antigen in any of the dilutions is read as a positive reaction. Precipitation occasionally fails to occur in the lower dilutions, but takes place in the higher ones (1/20, 1/40). This is a common observation when dealing with colloids and is known as the 'Zone Phenomenon'. It does not invalidate the test in any way.

There are one or two points which require attention if the test is to be reliable. The serum must be very free from organisms or a pseudo-positive reaction will occur. The blood should, therefore, be taken into a sterile test tube and the test should be done within twenty-four hours. This is sometimes very hard to carry out in the tropics where specimens may take three and four weeks to reach the laboratory. Butler (1926) reports that a very small quantity of boracic acid prevents serious contamination if added to the serum when it has separated, and that it does not interfere with the reaction. It is also important that the antigen should be diluted very slowly and gently shaken while this is being done. Properly prepared antigen has a peculiar fluorescence due to the cholesterol in the extract, and if this is not present a pseudo-positive reaction may occur. The Wasserman tubes in which the actual test is done must be absolutely clean. Although in a strongly positive serum precipitation may be observed very soon, readings should not be taken for at least twelve hours.

The following table indicates the results which were obtained in this series.

TABLE VIII.

Type.					Positive.		Negative.
Nodular	...	...	...	...	40.7	...	59.3
Maculo-anæsthetic			...	...	42.5	...	57.5
Mixed	...	...	...	...	44.1	...	55.9
Total	...	...	...	...	42.7	...	57.3

It will be observed that there is no marked difference in the results obtained in the three varieties of leprosy. The figures are high, but it must be remembered that they represent the combined syphilis and yaws rate. The percentage of lepers quoted above who have a positive Sachs-Georgi reaction is considerably lower than that observed among the general community who attend the African Hospital at Calabar. Of 1,500 patients examined by the writer as a routine at this hospital 53.7 *per cent.* gave a positive reaction.

The Wasserman and Sachs-Georgi reactions are both positive in yaws, but Moss (1926) has shown that quite a large number of cases become negative after about 1.8 grammes of novarsenobillon. When the patient has syphilis, however, a negative reaction after so little treatment is a very exceptional occurrence. All medical officers working in Southern Nigeria apparently agree that syphilis is rife among the native population, but, from what has been said above, it is only by re-testing the serum in every case after three or four doses of organic arsenic that it is possible to assess the syphilis rate of a given community with any degree of accuracy.

It would seem that in the Sachs-Georgi there is a quite reliable test for the presence of spirochætal disease. Lloyd, Muir and Mitra (1927) in India have emphasised that antisymphilitic treatment is a necessary adjunct to the treatment of leprosy; and they have stated that a proportion of lepers have a complete remission of their symptoms as a result of anti-symphilitic measures alone. It is suggested that in a properly equipped centre for the treatment of lepers all the sera should be examined, and the patients who have a positive reaction should be given a preliminary course of anti-symphilitic treatment. If the reaction should become negative after three or four doses of organic arsenic (preferably administered intravenously) it would be assumed that yaws alone present, and anti-leprosy medication at once instituted.

SUMMARY AND CONCLUSIONS.

1. A series of 616 voluntarily segregated lepers at the United Free Church Mission Leper Colony, Itu, has been examined. It is considered that these cases are in every way representative of the disease as it occurs in Southern Nigeria.

2. The age of election for the appearance of leprosy seemed to be about twenty-six years; and in more than three quarters of the cases it began between the ages of sixteen and thirty-five years.

3. The clinical forms of leprosy which were encountered are briefly considered, and it is shown that more than eighty *per cent.* of the cases belonged, to the maculo-anæsthetic variety. A peculiar contracture, chiefly affecting the right little finger, is described. This contracture was common, but was not leprotic in origin. It is suggested that the constant handling of a machet is the factor responsible for the condition.

4. Taken as a whole the cases were of recent origin. The average duration of the disease prior to treatment was six years. It is indicated that, if the new lines of treatment fulfil all anticipations, excellent results should be obtained.

5. Scabies was found to occur in thirty-two *per cent.* of the cases, and was particularly common among children. It is suggested that, by providing foci by which leprosy bacilli may easily gain entrance to the body, scabies must be an important factor in the etiology of the disease.

6. The results of an examination of the blood for the presence of microfilaria are noted, and it is emphasised that the figures are necessarily low because only a single examination was made. The embryos encountered were *M. perstans*, *M. loa*, and *M. bancrofti*.

7. The results are given of a single examination of the stools in 540 cases, and it is shown that hookworms, ascarids, and whipworms were present in a large proportion of cases. It is suggested that the value of mass treatment for hookworm in the bush is open to question, because of the relative immunity to the effects of these parasites which the natives possess, and the certainty that they will at once become re-infected.

8. A nasal smear was taken in all cases and it is shown that, whereas the nodular and mixed varieties of leprosy had a very high infectivity rate, less than ten *per cent.* of the maculo-anæsthetic cases were actively infectious.

9. A Sachs-Georgi test was done in each of the series. The technique is described and the value of the test is discussed. 42·7 *per cent.* of the lepers were found to give a positive reaction, and it is shown that this figure represents the combined syphilis and yaws rate. Antispirochætal treatment is urged in every case of leprosy which gives a positive Sachs-Georgi reaction.

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G. W. St. C. RAMSAY.

REPORT ON PLAGUE IN NIGERIA FOR THE YEAR ENDING 31st DECEMBER 1928

Printed by the Government Printer, Lagos.

There have been 215 cases of plague in Lagos during the year of which 100 died and the total number of cases throughout the year was 215.

The figures for Lagos for the year 1928 are as follows:

Table I.

Year	Number of Cases	Number of Deaths	Number of Recoveries
1928	215	100	115
1927	180	80	100
1926	150	60	90
1925	120	40	80

The following table shows the number of cases of plague in the different parts of Lagos during the year 1928.

APPENDIX F.

ANNUAL REPORT ON PLAGUE IN NIGERIA, 1928,

BY

MAJOR W. J. BELL, D.S.O., R.A.M.C.

Senior Sanitary Officer

in charge of Plague

Lagos.

January
February
March
April
May
June
July
August
September
October
November
December

Total

There has been a very marked increase in the mortality rate of plague in Lagos during the year.

The mortality rate for the year 1928 is the highest since 1925.

In comparison with 1925, the year had a plague year, the year had been more peaceful, but in 1925 instead of in the middle of June and the first of August, 1925, did not occur till a plague year in 1925. The year 1925 was a year of peace and quiet with the outbreak of plague in Lagos during the year.

Table II shows a distribution of the cases throughout the year and shows the number of cases throughout the year.

APPENDIX F

ANNUAL REPORT ON PLANTS IN NIGERIA 1922

MAJOR W. J. BELL, F.R.S.

OF THE ROYAL HORTICULTURAL SOCIETY

AND OF THE ROYAL BOTANICAL SOCIETY

LONDON

REPORT ON PLAGUE IN NIGERIA FOR THE YEAR ENDING 31st DECEMBER, 1928.

PLAGUE INCIDENCE IN LAGOS.

There have been 519 cases of plague in Lagos during the year of which 509 died and ten recovered giving a case mortality of 98.0 *per cent*.

The figures for Lagos for the last five years are as follows :—

TABLE I.

Year.	No. of Cases.	No. of Deaths.	Case Mortality.
1924	414	349	84.3%
1925	104	88	84.6%
1926	497	476	95.8%
1927	155	151	97.4%
1928	519	509	98.0%

It is probable that the rise in the case mortality is due in a measure to the concealment of mild cases in order to avoid the discomfort and disturbance associated with the consequent anti-plague measures consisting as they do of deratting, disinfection and, in the case of every insanitary premises, partial or total demolition.

The following table shows the monthly incidence in Lagos during the year.

TABLE II.

	Cases.	Deaths.	Recoveries.
January	12	12	—
February	11	11	—
March	6	6	—
April	18	17	1
May	27	27	—
June	46	45	1
July	62	62	—
August	53	53	—
September	78	77	1
October	97	95	2
November	80	76	4
December	29	28	1
Total	519	509	10

Chart No. 1 shows the comparison between the monthly incidence of human and rodent plague in Lagos during the year.

As in previous years October is the highest month.

In comparison with 1926, the last bad plague year, the rise has been more gradual, starting in April instead of in the middle of June and the big drop in November, 1926, did not occur till a month later in 1928. This will be referred to again in section dealing with the meteorological conditions in Lagos during the year.

Table III shows a distribution of the cases throughout the area embraced by Lagos Township.

TABLE III.

	Lagos Island.	Iddo Island.	Ebute-Metta.	Unknown.
January	12	—	—	—
February	11	—	—	—
March	6	—	—	—
April	18	—	—	—
May	27	—	—	—
June	45	—	—	1
July	59	—	3	—
August	51	1	1	—
September	75	—	3	—
October	96	—	—	1
November	77	—	1	2
December	29	—	—	—

No cases occurred in Apapa.

Early in the year cases began to appear in the area which had been dealt with by the gangs, the first outbreak being in a congested group of buildings, in Epetedo District, known as Inasa Court. This court had been deratted and disinfected as part of the general scheme in March, 1927, and several dilapidated shacks had been removed. A number of Hausa beggars who lived in this vicinity undoubtedly helped to disseminate the infection. This localised outbreak which really began in December, 1927, was not arrested until the end of March, 1928, and only after several buildings had been pulled down and rebuilt.

Another outbreak occurred during May among some brothels in Porto Novo Market Street, Ereko District. A difficulty experienced was that it seems to be a fairly common occurrence for people occupying temporary lodgings to be turned out when they become sick so that it happens that in many cases the house where the death occurs may not be the house where infection was contracted.

It has been suggested that more success would have been attained if the measures had been carried out more rapidly and the whole of the ground covered in from twelve to eighteen months. In taking this view, I think that the difficulties of the situation were not quite realised.

For instance, the large number of double partitioned walls in Lagos was not foreseen. This was found to be one of the favourite harbourages for nesting rats and all these spaces had to be thoroughly explored and treated.

As the gangs advanced the percentage of cases occurring in the area already dealt with naturally increased. The monthly figures are given in following table.

TABLE IV.

	Forward area.	Rear area.
January	7	5
February	3	8
March	3	3
April	6	12
May	6	21
June	7	39
July	17	45
August	10	43
September	16	62
October	4	93
November	5	75
December	0	29
Total	84	435

Note :—By the "forward area" is meant the area which had not been dealt with by the gangs at the time the case was discovered.

In all these premises in the rear area, re-infestation was found to have occurred and they had to be gone over again, in some cases more than once.

The attached Map No. 1 shows the distribution of the cases in Lagos Island. The greatest number occurred, as before, in the insanitary and congested areas round Idumagbo Lagoon and in the districts of Epetedo, Okepopo and Isalegangan in the north central part of the town where similar conditions prevail.

The area south of Broad Street, Bamgbose Street and Igbosere Road, where better conditions are met with, escaped very lightly.

RAT INFECTION IN LAGOS.

As in former years, all rats caught in Lagos were examined, by the naked eye and microscopically, at Ereko Dispensary under the supervision of the Director of Medical Research who has kindly checked these figures.

69,215 black rats were examined with 1,176 positives and 3,376 brown rats with 38 positives giving a total of 72,591 rats examined with 1,214 positives.

The source of the positives rats was as follows :—

TABLE V.

			Total.	Purchased from the public.	FOUND IN PREMISES.	
					Forward Area.	Rear Area.
January	...	...	68	61	5	2
February	...	...	49	43	1	5
March	...	...	56	50	2	4
April	...	...	25	19	2	4
May	...	...	85	62	7	16
June	...	...	76	48	6	22
July	...	...	124	104	5	15
August	...	...	108	60	7	41
September	...	...	158	125	19	14
October	...	...	234	195	9	30
November	...	...	162	118	20	24
December	...	...	69	57	3	9
			<hr/>	<hr/>	<hr/>	<hr/>
Total	...		1,214	942	86	186

Note.—By the "forward area" is meant the area which had not been systematically dealt with by the deratting gangs at the time the infection was discovered.

Ninety-two of these positive rats were caught by the gangs, 171 by the rat-catchers and nine, which are included in the "forward area" came through the Port Health Office.

The percentage of infected rats to rats examined works out at 1.6 for the year as is also shown in the following table which gives the monthly figures compared with the two preceding years.

TABLE VI.

			1928.	1927.	1926.
January	...	...	1.23	1.70	2.0
February	...	...	0.90	0.85	2.25
March	...	...	0.95	0.81	1.80
April	...	...	0.39	0.66	0.65
May	...	...	1.22	0.18	0.66
June	...	...	1.04	0.02	1.75
July	...	...	1.57	0.17	1.55
August	...	...	1.88	0.62	2.15
September	...	...	2.29	1.41	3.65
October	...	...	4.01	3.27	6.10
November	...	...	3.30	2.02	2.45
December	...	...	1.58	1.11	2.50
Average	...	...	1.69	1.07	2.29

2,153 swamp rats and 3,022 shrews were not included in reckoning the percentage rats as they are always found to be negative. Mice are not included for the same reason.

The above table when compared with the monthly incidence of human plague (Table II) shows the relation between the human and rodent infection.

852 live black rats and forty-two live brown rats were also examined during the year, none being positive.

Flea counts gave the following results:—

Out of 894 live rats:—

X. cheopis ... 2,074

X. brasiliensis ... 1,412

Out of 72,591 dead rats:—

X. cheopis ... 4,235

X. brasiliensis .. 2,034

The average flea count for all live rats was 3.89 per rat of which 2.308 were *X.cheopis* and 1.579 *X.brasiliensis*.

Map No. 2 shows the distribution of the positive rats caught by the deratting gangs and rat-catchers on Lagos Island.

ANTI-PLAGUE ORGANISATION IN LAGOS.

The beginning of the year found the gangs operating on a line stretching across the island from the east shore of Idumagbo Lagoon on the north to Porto Novo Market Street on the south, *i.e.*, just entering the congested and overcrowded districts of Idumagbo, Oko Awo and Ereko where plague was first discovered in 1924. The procedure laid down in Sir Edward Thornton's report has been continued throughout the year.

It has been found possible in a large number of cases to convert double partitioned walls into single partitions. Where the remaining partition is sound a coat of paint or distemper is all that is required. In other cases the palm poles forming one partition are cut into small length and laid crossways thus doing away with the spaces which are the commonest form of rat harbourage in the town.

Where it is possible to do away with the double partitions in the above manner the space is filled up with broken glass after thorough fumigation and spraying with an acid solution of perchloride of mercury (1 in 1,000).

Double walls, ceilings, floors, etc., have been dealt with in this manner in 863 premises during the year.

Lagos is disfigured by a number of insanitary markets consisting of sheds covered by sheets of old galvanised iron usually thrown on anyhow. In one instance the removal of these sheets lead to the destruction of over eighty full grown rats in one morning and another thirty were destroyed in removing the accumulated jumble beneath them.

Rats are also found in large numbers amongst the sacks of *gari*, etc., exposed for sale in the markets.

The largest number of rats removed from one house was 118 most of which were found in the space between the ceiling and the roof.

Owing to the gross overcrowding in most of the compounds in Lagos there is a constant accumulation of refuse and useless material in houses and yards which the people are either unable or unwilling to remove to the public refuse bins. Certain gangs have therefore been allotted for scavenging work in the areas which have already been subjected to deratting as experience in other parts of the world has shown that little reward can be expected for expenditure on rat-proofing dwellings until scavenging and cleaning out of the improved dwellings is undertaken by the authorities as a routine practice at regular intervals.

It soon became obvious that there was an extensive infestation and infection of rodents widely scattered throughout the area dealt with by the gangs. This had the effect of retarding the work as in every case where human or rodent plague is found the premises are of course treated by the Thornton method irrespective of whether they have been dealt with before or not.

In order to speed things up therefore a large accession of labour was taken on in the month of August and the island of Lagos was finally completed at the end of November almost exactly two years from the time of the commencement of the scheme.

The deratting of Iddo island was completed and that of Ebute Metta begun in the month of December.

The following table shows the work carried out in Lagos during the year by the deratting and disinfecting gangs.

TABLE VII.

Houses deratted and disinfected	...	5,965
Rooms deratted and disinfected	...	39 746
Rats trapped	... ..	20,574
Rats found dead	... ..	551
Mice trapped	... ..	24,570
Mice found dead	... ..	59
Live rats caught	... ..	5,932
Live mice caught	... ..	3,451
Rat holes treated	... ..	68,955

55,137 rodents were therefore accounted for by the deratting gangs during the year.

In addition 111,238 were trapped by the African Rat Catchers and 93,210 were purchased from the public bringing the total number of rodents accounted for in Lagos during the year to 259,585.

The monthly totals of rodents caught in Lagos were as follows :—

TABLE VIII.

January	...	...	28,957
February	...	...	32,644
March	...	...	35,344
April	...	...	21,910
May	...	...	19,479
June	...	...	19,935
July	...	...	22,425
August	...	...	16,571
September	...	...	16,941
October	...	...	14,730
November	...	...	15,753
December	...	...	14,896
Total	...	...	259,585

It will be seen that there has been a fairly uniform decrease since the beginning of the year.

This may be evidence of an actual decrease in the rodent population and it is permissible to hope that the combination of the high mortality from plague and the rat destruction measures has had this effect.

As in previous years any condition requiring demolition or structural alterations beyond the scope of the deratting gangs is reported to the Medical Officer of Health for action in co-operation with the Town Engineer.

The following improvements have been carried out during the year under this heading.

TABLE IX.

Demolitions carried out by the Medical Officer of Health	...	...	...	5
Demolitions carried out by the Town Engineer	...	...	...	72
Partial demolitions carried out by the Medical Officer of Health	...	...	...	312
Partial demolitions carried out by the Town Engineer	...	...	...	39
Thatched roofs removed	...	...	...	16
Number of premises where better ventilation has been installed	...	...	...	1,576
Number of rooms where concrete floors have been laid down	...	...	...	975

RAT-PROOFING OF STORES IN LAGOS.

The scheme for the rat-proofing of commercial stores started in December, 1927, and mentioned in the Annual Report on Plague in Nigeria for 1927 has been continued throughout this year. A European Sanitary Inspector has been specially detailed for this work with the object of advising and instructing the various firms on the measures which are considered necessary.

No use so far has been made of the legal powers of compulsion in this matter under Rule 22 of Rules No. 2, Public Health Ordinance, 1917, as it is our endeavour to persuade the firms concerned to act on our recommendations in their own interest and that of the community.

A certain amount of success has been attained as shown in the following:—

TABLE X.

Number of premises recommended for rat-proofing in 1928	123
Total number of premises recommended for rat-proofing up to the end of the year ...	146
Number of premises completed in 1928	59
Total number of premises completed up to the end of the year	59
Number of premises uncompleted at the end of the year	87

INSPECTION OF TRAFFIC IN LAGOS.

The following Canoe Control Posts were maintained throughout the year.

TABLE XI.

Name of Post.	Average number of canoes inspected weekly.	Average number of passengers inspected weekly.
Epetedo	250	1,500
Moloney Bridge Street ...	200	900
Idumagbo	350	5,850
Carter Bridge	300	2,850
Alakoro	250	1,350
Marina	150	650

The duties of the inspectors consist of issuing permits to canoe-men, examining all persons arriving at or leaving Lagos, detaining any one showing any signs of sickness and spraying canoes, dirty clothing etc., with kerosine emulsion.

The routine of canoe inspection is now well understood by the canoe-men and the public, consequently the number of prosecutions for contravention of the Quarantine Regulations under this heading was small during the year.

Three sick people detained at these stations were found to be suffering from plague.

The large number of passengers at Idumagbo is accounted for by the fact that seven motor launches use this station.

The Road Post at Denton Bridge was also maintained day and night throughout the year. The duties of the inspectors at this post are identical with those laid down for the canoe inspectors with the exception of the issue of permits.

Several sick persons were detained and sent to hospital.

In one instance an attempt to smuggle the corpse of a plague case out of Lagos in a lorry was frustrated.

An average of 600 lorries with 6,500 passengers cross the bridge out of Lagos every week.

Inspection posts are established at the following railway stations.

TABLE XII.

Name of Railway Stations.	Average number of passengers inspected weekly.	Average number of packages examined weekly.
Iddo	9,000	600
Ebute Metta	5,000	700
Ebute Metta Junction ...	3,000	400

All persons leaving Lagos from these three stations are examined. Merchandise in the goods sheds is inspected with a view to preventing rat harbourage and goods trains left in sidings are also inspected. Both sheds and trains are trapped nightly.

Several positive rats have been caught during the year by this means.

INOCULATIONS IN LAGOS.

2,225 inoculations were carried out in Lagos during the year by the Plague Staff.

As recommended by Sir Edward Thornton, only contacts of human or rodent plague were inoculated but towards the end of the year vaccine was supplied to the African Medical Practitioners at their own request in order that more generalised inoculation might be carried out.

METEOROLOGICAL CONDITIONS IN LAGOS.

The optimum meteorological conditions for the spread of plague infection by means of rat fleas, *i.e.*, a mean temperature of just under 80° Fahr. and a saturation deficiency figures of under 0.3 inches vapour pressure appears to exist in Lagos from about June to November.

In November or December the cold dry harmattan usually begins to blow intermittently in Lagos and it is during these months that the big drop in the incidence occurs.

The months of January to April are usually dry and hot with a comparatively high saturation deficiency so that, as might be expected, the incidence usually reaches its minimum during this period.

The following table gives the average figures for the mean temperature, relative humidity, rainfall and saturation deficiency for the last three years:—

TABLE XIII.

	Mean Temperature.	Relative Humidity	Rainfall.	Saturation Deficiency.
1926	81°·0 Fahr	79·8%	75·97 ins.	0·189 ins. of mercury.
1927	80°·3 "	78·6%	55·00 "	0·218 "
1928	80°·2 "	79·5%	79·05 "	0·199 "

These figures tend to show that the driest years are the healthiest as regards plague in Nigeria.

Chart No. 2 shows the relation of plague in Lagos to the mean temperature and saturation deficiency.

The following report has been contributed by Dr. H. P. Fowler, Plague Medical Officer in Lagos.

REPORT OF AUTOPSIES ON CASES OF PLAGUE.

Until 7th July, 1928, autopsies were performed on all persons dying in Lagos, unless certified by a registered Medical Practitioner.

Owing to the representation made by the Moslems it was decided to modify the procedure, and the following plan was adopted.

All bodies after the above date were visited in the houses where death had occurred. In all cases where an examination without section failed to furnish a diagnosis, the body was removed to the Public Mortuary for autopsy. Cases giving a history of acute respiratory disease were invariably removed. This procedure embraced also the cases in which a Medical Practitioner had certified as to the cause of deaths.

The plan was extended to include Ebute Metta as one had reason to believe that cases were being removed there to avoid investigation.

During the year 509 deaths from plague were investigated, 240 of which were diagnosed post-mortem at autopsy.

TABLE XIII.A.

Type of Cases.

Type.	No. of Cases.	Incidence.
Bubonic ...	349	67.2%
Septicæmic ...	105	20.2%
Pneumonic ...	65	12.5%

(a) Bubonic Type.

The analysis of 270 cases recorded in detail gives the following results:—

Femoral glands infected in	68%	of bubonic cases.
Inguinal " " "	8.15%	" "
Axillary " " "	14.2%	" "
Cervical " " "	9.9%	" "

Two types of bubonic cases were encountered. The first which I term the "acute" type was characterised by a brief duration of illness rarely exceeding five days before a fatal termination ensued. The glands in these cases were found to be slightly enlarged but discrete, with little or no periglandular infiltration. On section they showed a hæmorrhagic peripheral zone and a pale but firm central area. A smear prepared from these glands demonstrated the presence of *P. pestis* in enormous numbers.

The second or "subacute" type usually gave a history of an illness of six days or longer, with or less sudden onset.

In these cases a typical bubo was apparent at sight. On section all the characteristic of a plague bubo were present—marked hæmorrhagic periglandular infiltration in which was embedded intensely hæmorrhagic glands with soft necrotic centres. It was not uncommon for *P. pestis* to be demonstrated only in scanty number and then by choosing suitable area in the mass.

The first type was practically the only variety met with during the months of September, October and early November, when plague incidence was at its highest.

During the last few weeks of the year, when the incidence of plague rapidly dropped, this type completely disappeared and gave place to the "subacute" variety.

Presumably the first type is due to a virulent strain of the organism, causing little or no tissue reaction and rapidly developing into a septicæmia.

Towards the end of the year it is conceivable that the strain became more or less attenuated, being less capable of infecting, and also of permitting a more resistant barrier to be developed.

The following observations in the bubonic cases are of some interest.

Two cases were associated with jaundice.

The appearance of the organs in these two cases presented a picture which very much resembled yellow fever.

In another case in which the femoral glands were affected, a small blister the size of a lentil was observed in the skin over the tibia of the leg. Upon examining the fluid from it, microscopically, of *P. pestis* was seen, as if in pure culture.

Unusual sites for the bubo was occasionally noted. In one case a large hæmorrhagic mass of infected glands was situated at the bifurcation of the aorta. No other glands were found to be infected in the same case.

(b) *Septicæmic Type.*

Regarding septicæmic plague as a condition in which no bubos are present, and yet in which the organism can be recovered from the spleen, heart blood, etc., then it is not very commonly met with.

It is very rare that one met with a bubonic case that did not show evidence of a septicæmia.

In the true primary septicæmic cases encountered, there was marked congestion and engorgement of all the organs especially liver and spleen. The lungs were congested and rather œdematous, but in only one case was actual consolidation or infarction noted. *P. pestis* could be demonstrated in most of the lung smears.

(c) *Pneumonic Type.*

Two distinct types of primary pneumonic plague were encountered. The first type showed patchy consolidation of both lungs, the areas of consolidation varying from the size of a cricket ball to the size of a pea. Many showed typical infarct formation, the base of the wedge being situated on the pleura.

A pleurisy was invariably present. Occasionally an effusion of sero-sanguinous fluid, but more usually are found recent plastic adhesions.

In the second type consolidation was only found in one lung, and its distribution was strictly lobar.

With both types, apart from the consolidation there was a good deal of frothy œdema.

In all the primary pneumonic cases, *P. pestis* was strictly confined to the lungs, and could not be recovered from the spleen, etc.

Five cases reported as pneumonic plague, in which organism morphologically indistinguishable from *P. pestis* were obtained from the sputum, recovered.

One of these cases is worthy of further comment.

It occurred in a contact under observation, of a case which had been diagnosed post-mortem at the Public Mortuary. A fellow contact of the same case developed the disease and died within twenty-four hours.

In all plague cases diagnosis was established by taking smears from the various organs and staining with carbol thionin blue. In most cases there was no difficulty in recognising the organism by its morphologically indistinguishable from *P. pestis* were obtained from the when decomposition had set in, most of the bacilli lost their properties of bi-polar staining, and also exhibited marked pleomorphism. Generally speaking thirty-six hours after death is about the limit at which diagnosis microscopically can be made with any certainty.

The following report has been furnished by Dr. I. L. Oluwole, Medical Officer in charge of the Infectious Diseases Hospital.

Sixty-four cases of plague were admitted to the Infectious Diseases Hospital, Ikoyi, in 1928.

The following table shows the type.

TABLE XIIIb.

Types of Cases.

Type.	Number of Cases.	Recoveries.	Deaths.
Bubonic ...	25	5	20
Pneumonic ...	19	5	14
Septicæmic ...	20	—	20

(a) Bubonic Type.

Condition of patients on admission.—Only five were admitted in a full conscious state, and of these one died, the case later on becoming septicæmic in type.

Diagnosis.—Of the twenty-five cases of this type eighteen were diagnosed from gland punctures, and seven at autopsy.

Site of the buboes.—The femoral glands were infected in eleven cases, the axillary in six, the inguinal in two and the cervical in one. Of the remaining four cases more than one group of glands was infected in each.

Treatment.—Mercurochrome was given intravenously to nine of the cases—10 c.c. of a one per cent. solution—and two recovered. To nine other, in addition to the intravenous injection of mercurochrome an injection of thymol-camphor-iodine into each bubo was also administered.

Three of the cases recovered under this combined treatment with mercurochrome and thymol compound; in each the direct injection of the latter into the bubo had the effect of lowering the patient's temperature, within twelve hours, by about one degree lower than that effected by the intravenous injection of mercurochrome alone.

(b) Septicæmic Type.

Condition of patients on admission.—Most of all the cases were admitted in a condition of extreme prostration or unconsciousness, and the few who were fairly conscious on admission soon became delirious, and remained so until death occurred.

Diagnosis.—In one case only was there no post-mortem examination held as the diagnosis had been made from one of the minute blisters of the limbs.

Treatment.—Mercurochrome was given intravenously and camphor in oil subcutaneously. All the twenty cases of this type of plague died, the majority of them within twenty-four hours, and a few others within five days. Only one case survived till the fifteenth day.

(c) Pneumonic Type.

Condition of patients on admission.—Most of the cases were admitted with high fever, rapid pulse, pain at the sides and cough with little or no expectoration; some of them were in a state of unconsciousness, and only one was admitted with an almost a-febrile temperature (99.6°F).

In almost all the sputa examined, the bacillus pestis, or at least micro-organisms bearing a most striking morphological resemblance to it, was found in enormous numbers and in almost pure culture.

Treatment.—All the cases were treated with the intravenous injection of mercurochrome and the oral administration of a mixture containing creosote and potassium iodide. Five of the cases diagnosed at the onset of the illness as pneumonic plague recovered under this treatment. It is usually stated that no authentic case of pulmonary plague has been known to survive, but reasons will be given for believing that the recoveries here recorded were definite cases of primary pneumonic plague.

Of the five cases of recovery, the first was the private patient of an African Medical Practitioner who had sent the sputum to Dr. Henry Morrison, Pathologist, for diagnosis, the Pathologist's report was *P. pestis* and it was on this that the patient was isolated. The highest temperature was 104.4°F. When the case showed improvement in the general condition by the fourth day, another specimen of sputum was sent to the same Pathologist who reported *P. pestis* not seen.

The Medical Officer of Health in charge of Plague later stated that he had performed a post-mortem examination on a close contact of this case—the contact escaped when the members of the household were being removed for isolation—and that he diagnosed it as primary pneumonic plague.

The second case was sent to the Infectious Diseases Hospital by the Medical Officer in care of the Police; the temperature on admission being 105°F. The sputum was diagnosed by the Pathologist.

The third case was most remarkable and was diagnosed by Dr. Ramsay, Pathologist, as pneumonic plague before the patient was sent to the Infectious Diseases Hospital. The patient, a Nurse-in-training at the African Hospital, requested treatment for a certain ear condition, and it was a surprise when, in the course of routine examination, his sputum was found to contain micro-organisms morphologically identical with *P. pestis*, especially as his temperature did not reach 100°F.

The fourth case was a girl of thirteen who with her maternal uncle, had been isolated on the 13th day of November because her mother's death was certified, after a post-mortem examination by Dr. H. P. Fowler, as due to primary pneumonic plague. On the 16th day of November both of them developed a high temperature, the man's was 102.6°F at 6 p.m. and 104.4°F at 10 p.m. the girl's was 102.2°F at 6 p.m. and 103.4°F at 10 p.m.

On the 17th day of November the man died, and was diagnosed at autopsy—at which the Medical Officer in charge of Plague was present—as primary pneumonic plague. I took the slides to the Pathologist personally, and he confirmed the diagnosis. The sputum of the girl was examined and confirmed as containing *P. pestis*.

The fifth case was diagnosed and treated while I was temporary away from the Infectious Diseases Hospital; the Medical Officer of Health was then in charge.

525 contacts of pneumonic plague were isolated during the year of which seven contracted the disease with six deaths and one recovery.

PORT HEALTH ORGANISATION.

One deratting gang under a European Rodent Inspector is attached to the Port Health Officer who has kindly furnished me with materials for this report. The following rodents were destroyed during the year.

TABLE XIV.

Trapped in ships	628
Recovered from ships after fumigation	523
Trapped in the foreshore ...	6,669
Total	7,820

Out of this total nine rats were found to be infected with plague.

They were distributed as follows:—

P.W.D. Compound, Ijora ...	3
s.s. <i>Hoggar</i>	3
Woermann Line Wharf, Marina ...	2
Itolo Foreshore	1

The s.s. *Hoggar*, a French coasting steamer, left Marseilles on the 12th of May and arrived in Lagos on the 9th of June having called at ten ports in the interval.

Twenty-four rats were recovered in the course of routine deratting on the day of arrival of which one was found to be infected with plague.

The ship was cleared at once and fumigated with zyhlon "B" on the following day and a further 163 rats were recovered of which two were found to be infected.

It seems to be fairly certain that the infection was not introduced from Lagos.

Provisions under regulations made under the Quarantine Ordinance, 1926, regarding rat-guards, etc., were rigidly enforced.

The rat-catching gang operated on all ships from plague infected ports and all rats caught were examined at Ereko Dispensary.

The European Rodent Inspector supervised the discharge of all cargo likely to be infested with rodents and systematically trapped all ships remaining more than two days in the port.

All African and Syrian passengers are required to report at the Customs Disinfecting Station on the day of sailing when medical inspection, disinfestation of persons and clothing fumigation of baggage and, in some cases, inoculation against plague, have been carried out.

Further preventive measures included the fumigation of harbour crafts, regular trapping of rodents on the foreshore and the supervision of canoe traffic.

The following particulars have been furnished by the Senior Sanitary Officer in charge of Plague, Mainland, (Major R. B. Price, D.S.O. R.A.M.C.).

It will be seen that a large measure of success has attained the anti-plague campaign on the mainland.

Table XV shows the number of cases, deaths, inoculations, rodents caught, rats examined and percentage of infected rats during 1928 for the three main divisions of the area on the mainland in which the work is being carried out.

TABLE XV.

1928.

Places.	Cases.	Deaths.	Inoculations.	Rodents caught.	Rats examined.	Infected Rats.
Ijebu Ode	1	1	2,328	191,740	135,943	18 (0.01%)
Abeokuta	11	11	70	124,011	113,091	9 (0.008%)
Ibadan	3	3	Nil.	39,201	32,458	2 (0.006%)

TOTALS:—

Cases 15
Deaths 15

The following table gives the cases on the mainland by months for 1927 and 1928.

TABLE XVI.

			1928.	1927.
January	...	...	4	14
February	...	...	8	2
March	...	...	2	21
April	...	...	—	91
May	...	...	—	88
June	...	...	—	12
July	...	...	—	4
August	...	...	—	—
September	...	...	—	1
October	...	...	—	3
November	...	...	—	3
December	...	...	1	3
Total	...	...	15	242

The figures for the first three months of 1928 represent a small local outbreak in the Ifo District half way between Lagos and Abeokuta.

The figures for March to July, 1927 represent the Ogere outbreak mentioned in the Report for 1927.

The percentage of infected rats to rats examined for the year on the mainland works out at 0.01 for 1928 in contrast to 1.05 for 1927.

The following are the monthly figures:—

TABLE XVII.

			1928.	1927.
January	...	...	0.07	5.00
February	...	...	0.02	3.10
March	...	...	0.009	0.34
April	...	...	0.02	1.61
May	...	...	0.000	0.82
June	...	...	0.005	0.76
July	...	...	0.01	0.29
August	...	...	0.000	0.17
September	...	...	0.000	0.13
October	...	...	0.000	0.20
November	...	...	0.000	0.14
December	...	...	0.000	0.07
Average	...	...	0.01	1.05

PLAGUE INCIDENCE.

The small local outbreak of bubonic plague in the Ifo District (half way between Lagos and Abeokuta) which was discovered in October, 1927, continued into the first three months of 1928. Eleven fatal cases occurred this year in the village of Ejio. No cases have occurred in this district since March, 1928.

In February, 1928, three fatal cases of bubonic plague occurred at Fiditi (ten miles south of Oyo).

All these persons had contracted the disease in Lagos whence they had travelled up during the incubation period. There were no further cases, and no evidence of rat infection has been found in the Fiditi area.

In December, 1928, one fatal case of bubonic plague occurred in Shagamu (Ijebu-Remo District). Here too the infection was proved to have been contracted in Lagos. There is apparently no rat infection in Shagamu.

Since March, 1928, therefore the mainland area may be said to have been free from locally contracted plague.

The total number of cases of plague found on the mainland in 1928 is fifteen. They were bubonic in type. All ended fatally.

TABLE XVIII.

		Abeokuto Province.	Ijebu ode Province.	Oyo Province.
January ...	...	4	—	—
February ...	...	5	—	3*
March ...	...	2	—	—
April ...	...	—	—	—
May ...	...	—	—	—
June ...	...	—	—	—
July ...	...	—	—	—
August ...	...	—	—	—
September ...	...	—	—	—
October ...	...	—	—	—
November ...	...	—	—	—
December ...	...	—	1*	—

*Plague contracted in Lagos.

RODENT INFECTION.

A very large number of rodents has been caught and destroyed during the year from an area bounded roughly on the west and north by the Lagos-Ibadan Railway, on the south by the Lagoon, and on the east by the Oshun River.

The examination of the majority of these rodents has revealed the virtual disappearance of the epizootic throughout the whole of this area. The numbers examined have been large enough, and the source of the rodents wide enough to make these observations reliable. They are confirmed by the absence of any considerable human epidemic later than that in Ogere in the spring of 1927, and are of the happiest augury for the future.

This state of things is remarkable in view of the intensity of the Lagos epizootic during 1928.

Figures are appended showing the actual numbers of rodents destroyed in each district, and the number found infected.

TABLE XIX.

	Rodents caught.	Rodents examined.	Rodents infected.
Abeokuta Province ...	124,011	13,091	9
Ibadan District ...	39,201	32,458	2
Ijebu Province ...	191,740	85,943	18
Total ...	354,952	81,492	29

The following table shows the dates of the discovery of infected rats in each district. There has been none found anywhere since July, 1928.

TABLE XX.

INFECTED RATS.

		Abeokuta Province.	Ijebu Ode Province.	Oyo Province.
January	...	6	1	2
February	...	1	2	—
March	...	—	2	—
April	...	—	3	—
May	...	—	—	—
June	...	—	10	—
July	...	—	—	2
August	...	—	—	—
September	...	—	—	—
October	...	—	—	—
November	...	—	—	—
December	...	—	—	—

Total infected rats 29.

DERATTING OPERATIONS.

During January, February and March, 1928, plague gangs under Rodent Inspectors were engaged in deratting the villages in the Ifo District, the scene of a small localised plague outbreak since October, 1927. These operations were concluded in March, 1928, and the gangs were withdrawn, the district being left under the sanitary supervision of a Rodent Inspector at Papalanto.

In March, 1928, the systematic deratting of Abeokuta town was begun, and has been continued ever since. By the end of the year about half the town has been completed.

In February, 1928, on the death of three persons from plague (immigrants from Lagos) in Fiditi, this village was systematically deratted. Rat-catchers have remained there since, engaged on obtaining rats for microscopic examination.

A few subsidiary deratting operations were carried out in Ijebu-Ode Province as required. Twice during the year deratting gangs made their way along the Lagos-Ibadan Railway, thoroughly cleaning up and deratting each station on the line.

The tables appended show the number of houses dealt with during the twelve months.

In addition to these specific deratting operations, the destruction of rodents over the whole mainland area has been organised on an extensive scale, both by the employment of rat-catchers paid by results, and the purchase of rats from the public.

TRAFFIC CONTROL POSTS.

Traffic control posts have been maintained throughout the year on the Lagos-Abeokuta Road at Papalanto, and on the Ejinrin-Ibadan Road at Aba (earlier at Oni-Gambari). The site of these posts is chosen near the residence of the Rodent Inspector i/c district on each road, to ensure some European supervision.

All passengers at these posts are examined for obvious signs of sickness, and suspects are sent in to be medically examined, and if necessary detained at Abeokuta or Ijebu-Ode. Their loads are also inspected, and sprayed with insecticide solution.

The number of persons passed through these barriers is shown in the table attached.

TABLE XXI.
ROAD BARRIER RETURNS FOR THE YEAR 1928.

Districts.	Number of Lorries.	Number of Passengers.	Number of Pedestrians.	Total Persons.
PAPALANTO	13,413	95,594	36,674	132,268
SHAGAMU (Closed February, 1928)	692	6,739	658	7,397
GAMBARRI (Removed to Aha July, 1928)	3,527	47,136	4,828	51,964
AHA	2,581	30,075	1,486	31,561
Totals	20,213	179,544	43,646	223,190

GENERAL SANITATION.

Over the whole of the area outlined in paragraph 2 the pre-existing sanitary organisation has been expanded so as to provide for frequent and regular sanitary inspection of compounds in all villages with a population of 2,000 or over. For this purpose six rodent and sanitary Inspectors with motor bicycle transport have been stationed at the six chief centres of population, each in sanitary charge of a district.

They are posted as follows:—

	Head Quarters.	District.
ABEOKUTA PROVINCE.	Abeokuta	Abeokuta Town.
	Papalanto	Ifo District.
IJEBU-ODE PROVINCE.	Ijebu-Ode	Ijebu-Ode Town and Central District.
	Oru	Ijebu-Igbo District.
	Shagamu	Ijebu-Remo District.
OYO PROVINCE.	Ibadan	Ibadan.

Under these European Inspectors work the regular African Sanitary Inspectors, the Ward Heads, and a number of specially enlisted unqualified inspectors, who have been rapidly trained by the plague staff.

This organisation ensures the compliance of the inhabitants of all the towns and larger villages with the local sanitary regulations laid down by the Native Administrations, based on the provisions of the Public Health Ordinance. Regular weekly or fortnightly inspection of premises takes place, abatement notices are served on offenders against the sanitary code, and persistent infringement is punished in the Native Courts.

Towns and villages have been well provided with incinerators with paid attendants, and each district has its scavenging gangs.

With especial reference to plague prevention particular attention is paid to the incinerators of refuse, the covering of food, the cutting of bush well back from dwellings, the proper storage of material likely to give cover to rodents, the sealing of crevices in house walls and floors, and the proper conduct and cleanliness of slaughter houses.

But no sanitary measure conducive to the health and well-being of the inhabitants is neglected.

Tables are appended showing the number of inspections carried out during the year.

As the result of these measures the general sanitary standard of the area has been very noticeably improved. The sanitary organisation is now on a semi-permanent basis, largely paid for by the Native Administrations concerned, but it depends for its success on the efficiency of the European supervision. Provision has been made in the Sanitary Estimates for 1929-30 for an increase in the number of European Sanitary Inspectors which will enable the present number of six to be maintained in charge of districts in the plague threatened area of the mainland after the departure of the present Rodent Inspectors. With this provision it should be possible to maintain the present improvement of the sanitary habits of the inhabitants.

Housing conditions everywhere are good; there is no overcrowding, and with the present cleanliness of the villages, and the extensive destruction of rodents which is continually proceeding there is every reason to hope for the permanent eradication of plague from the mainland.

The country now presents a very different picture from the serious state of affairs when Sir Edward Thornton wrote his report, and it is remarkable that human and rodent plague should have apparently disappeared from the mainland at a time when this area has been constantly exposed to human and rodent infection from one of the worst years of epidemic in Lagos.

W. J. BELL,

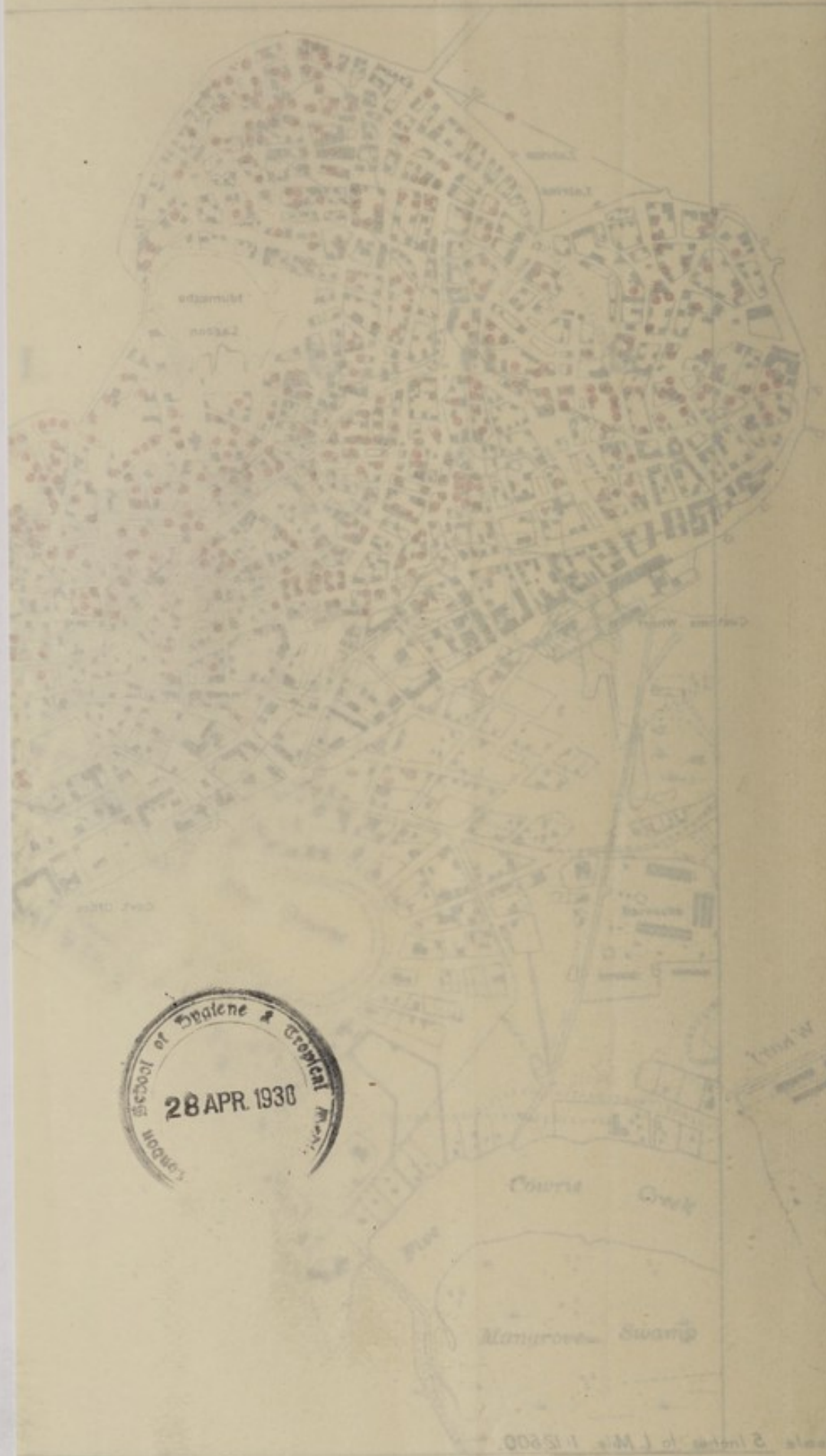
*Senior Sanitary Officer in charge,
Anti Plague Operations (Nigeria).*

PLAGUE IN LAGOS

1928

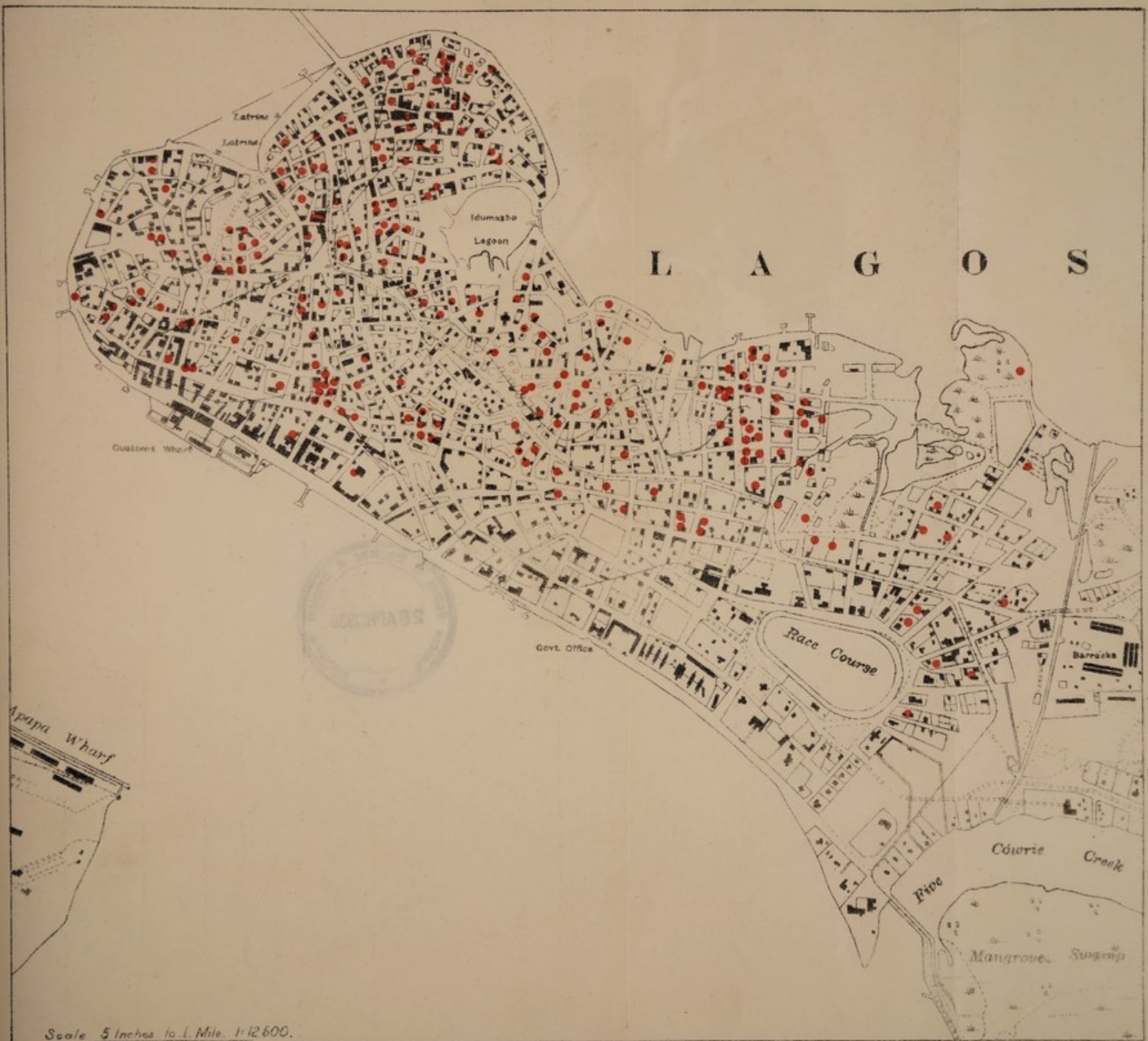
Map I





POSITIVE RATS IN LAGOS
1928

Map II



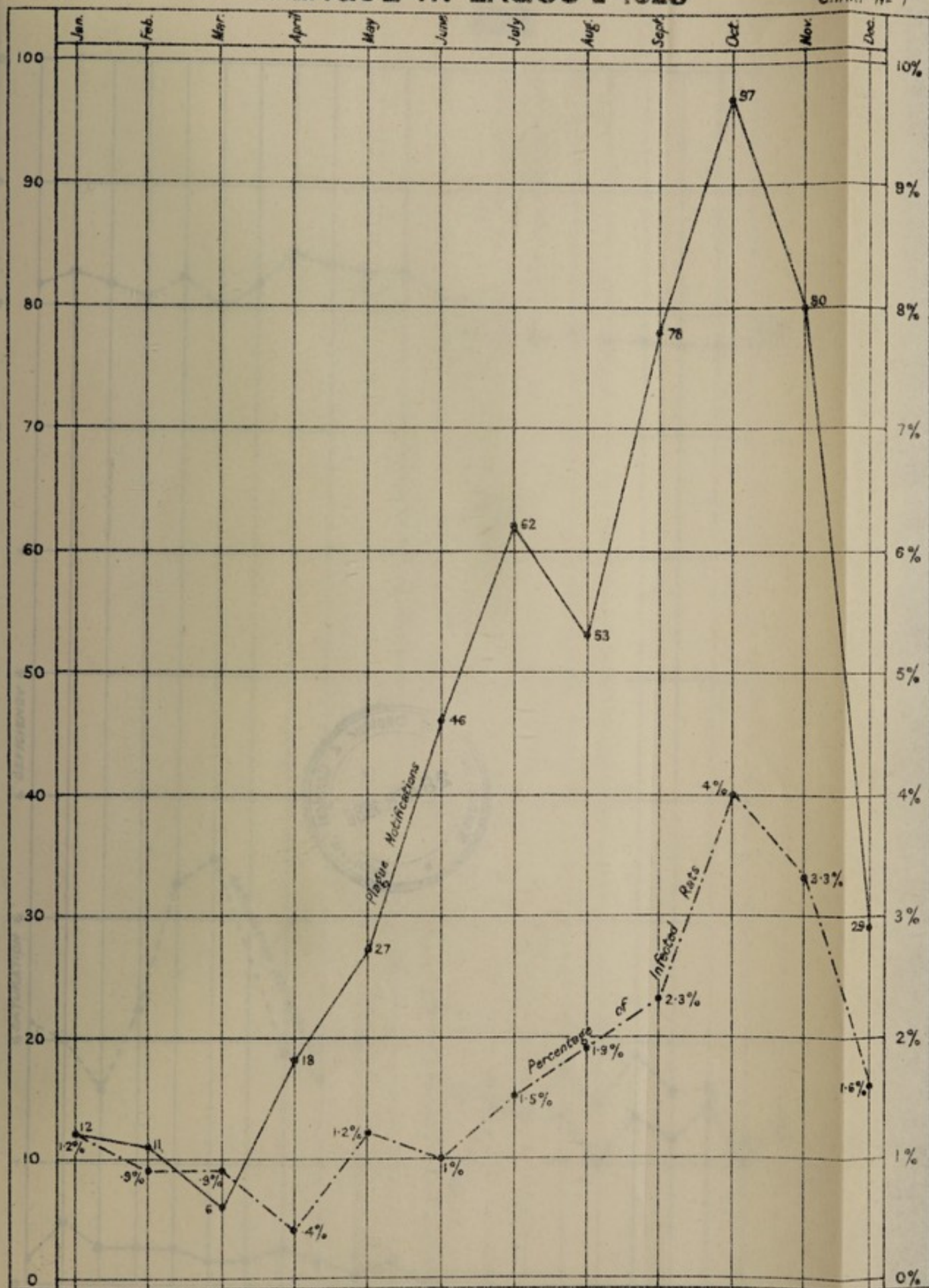
LAGOS

L A G



PLAGUE IN LAGOS - 1928

CHART No 1



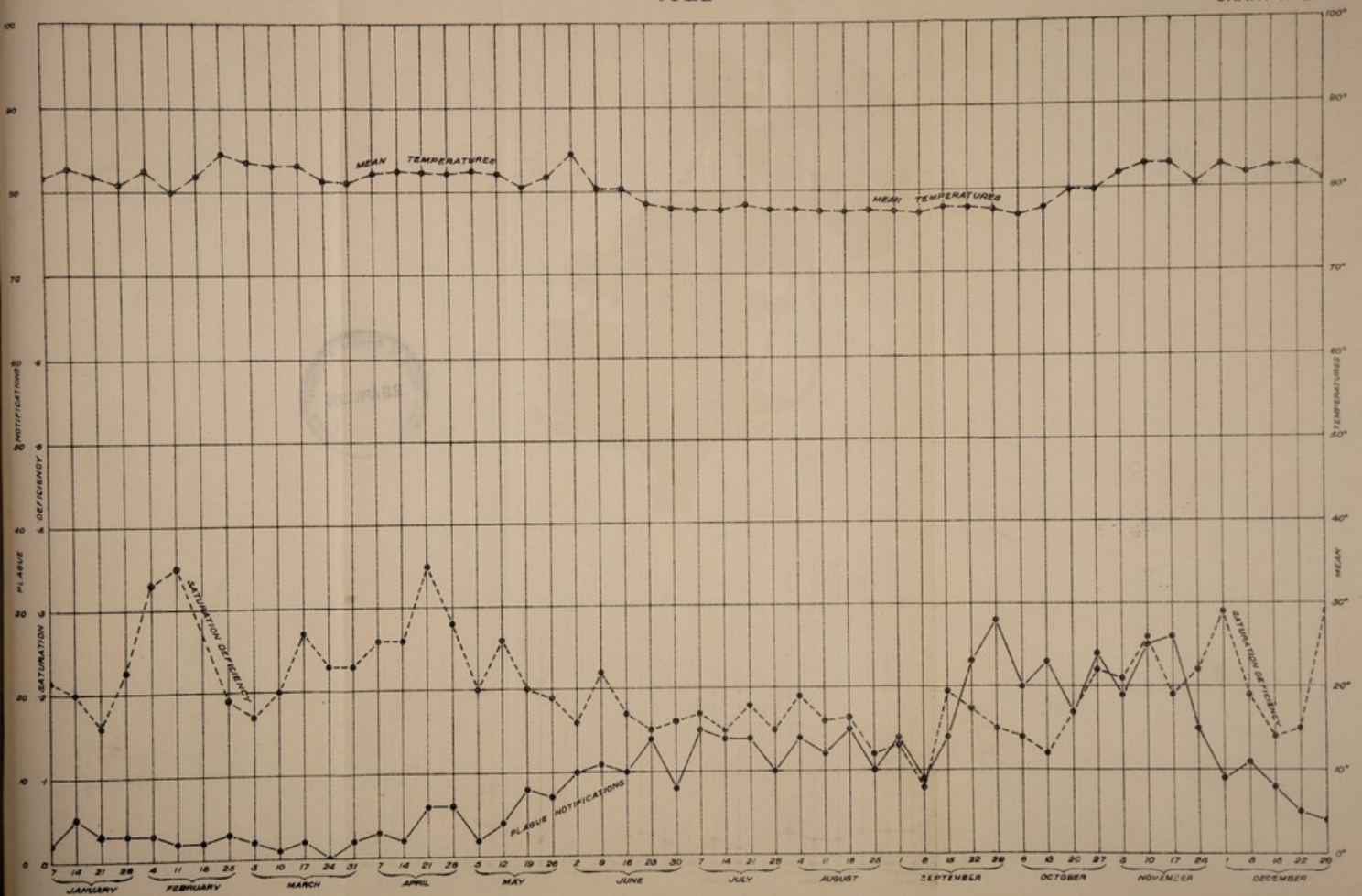
Drawn and Reproduced by Nigeria Surveys, Lagos, 1929.

PLAQUE IN LAGOS - 1928



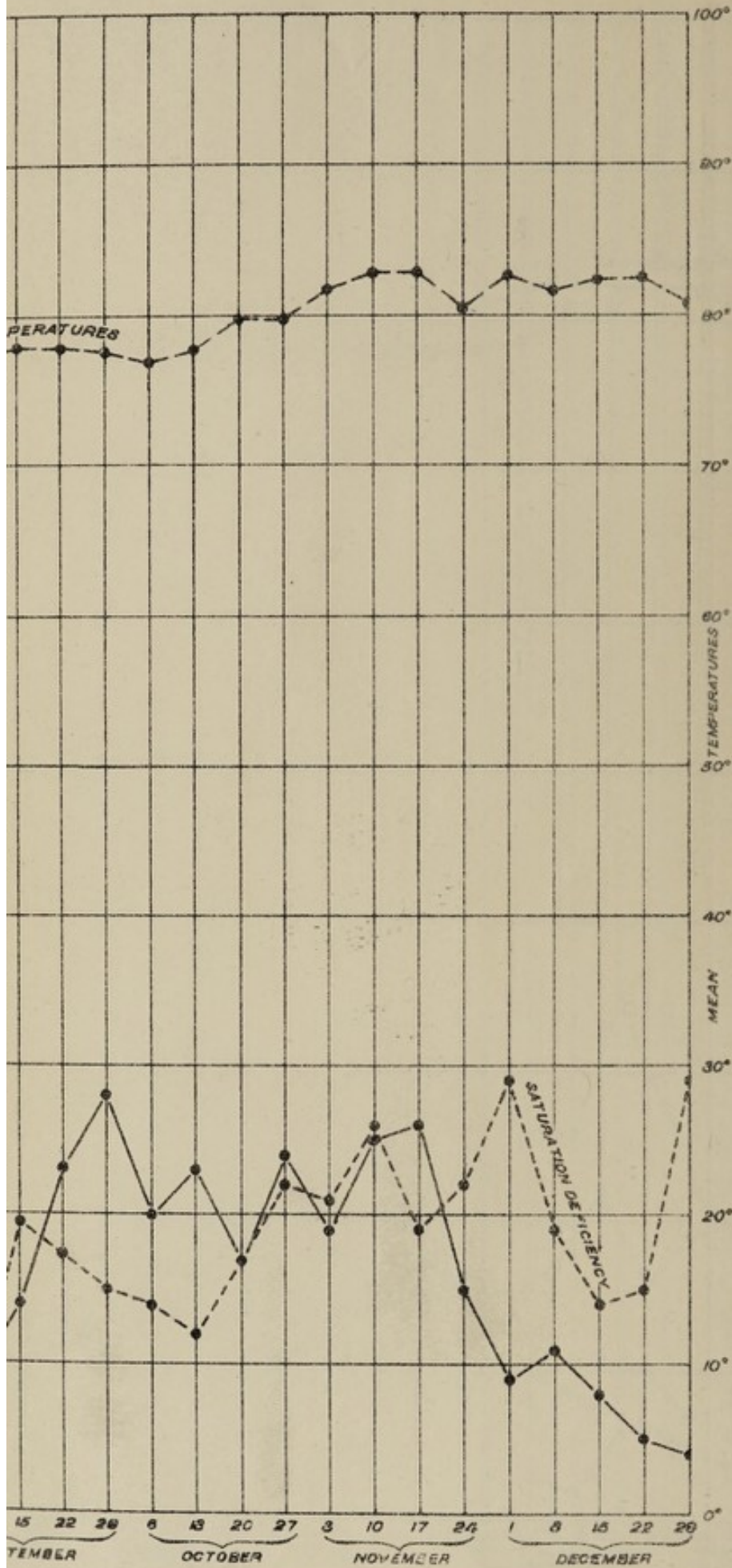
PLAGUE IN LAGOS 1928

CHART No 2



Drawn and Reproduced by Nigeria Surveys, Lagos, 1929.

CHART No 2



H. H. STEWART, M.B., CH.B. (EDIN.)

Specialist.

APPENDIX G

ANNUAL REPORT ON THE X-RAY DEPARTMENT

MARCH 1922

BY

H. J. STEWART, M.D.

Physician

X-RAY DEPARTMENT, LAGOS HOSPITAL.
ANNUAL REPORT, 1928.

The work of the current year has been carried out under the same conditions as formerly, the new hospital not yet being in a condition for occupation. The number of cases treated have increased in proportion to the number of beds available. The temporary nature of the wards and the demand for bed accommodation has resulted in some instances in cases of interest having to be discharged before treatment was completed. It is unsatisfactory treating certain cases as outpatients for the diseases are generally chronic and progress naturally slow. The patients themselves see little change in their condition and after a few attendances cease to appear for treatment.

2. No attempt to train an African staff on the lines of the laboratory attendants has yet been made. This matter will however have to be considered, but it is a difficult one in view of the admitted dangers of X-Ray and Electro-Therapeutics both to the operator himself and to the patient.

A very high standard of education would be required and possibly more pressing needs in other directions should be met first. The establishment of a teaching centre for the subordinate medical service would however point to a possible solution of the difficulty.

3. The total number of X-Ray examinations for the year is 629 which shows an increase on last year.

It is significant of the growth of motor transport in Lagos that the number of fractures of the limbs was 182.

Hardly a day passes but an accident case is brought to the hospital, sometimes trivial, but often severe.

It is difficult to classify the X-ray examinations made on account of the widely varying nature of the work, and the table appended makes no pretence to scientific accuracy but is given in order that some idea may be formed of the scope of the work of this Department.

Examination.	Number.
Barium meal-Abdomen	27
Bladder	3
Chest	35
Dislocations	8
Foreign bodies	16
Gall bladder	6
Head	9
Jaws	24
Joints	52
Kidney	12
Limbs upper—fractures	107
Limbs lower—fractures	75
Necrosis bone	22
Osteomyelitis	28
Periostitis	17
Spine	24
Not classified	164
Total	629

As regards Electro-Therapeutics the same apparatus as in previous years has been in use and has given every satisfaction. The ultra violet rays have been used very extensively and with excellent results in many cases, notably in tuberculous glands, parasite skins diseases, and arthritis. In some skin diseases it would appear the equal of, if not superior to, X-ray treatment and the technique is far more simple and is much cheaper. The full value of the present equipment cannot at present be utilised, owing to the inadequate accommodation, and the total number of treatments carried out, namely, 1,435 represents the maximum that can be done single handed with efficiency.

Disease	Treatments.
Alopœcia	47
Arthritis	163
Boils	8
Coccydynia	3
Debility	4
Fibrositis	172
Impetigo	24
Joints tubercular	23
Local injuries	30
Lumbago	70
Leukæmia, splenic	3
Neuritis	64
Neuralgia	3
Osteomyelitis	11
Paralysis	86
Psoriasis	8
Rheumatism	5
Rodent ulcer	5
Ring worm	126
Sciatica	54
Synovitis	22
Skin diseases unclassified	172
Torticollis	2
Tubercular glands	254
Ulcers	48
Warts	18
Total	1,435

H. STEWART,
Specialist.

1st February, 1929.

A CASE OF MALIGNANT TUMOR OF THE LEFT INDEX FINGER

The patient, a male, aged about fifty years, presented himself for treatment at the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He stated that he had noticed a small, hard, painless swelling on the dorsal surface of the proximal phalanx of the left index finger about six months before he came to the hospital.

The growth increased in size gradually, and by the time he came to the hospital it had reached the size of a walnut. It was hard, painless, and did not interfere with the use of the finger. The patient had no other symptoms.

The tumor was removed by the following method:

On August 10, 1910, the patient was brought to the operating room. The finger was placed in a tourniquet. The skin over the tumor was incised in a semicircular fashion, and the tumor was removed. The wound was closed with sutures. The patient was discharged on August 12, 1910.

The patient returned to the hospital on August 15, 1910, for treatment of the wound. The wound was closed with sutures. The patient was discharged on August 17, 1910.

The patient returned to the hospital on August 20, 1910, for treatment of the wound. The wound was closed with sutures. The patient was discharged on August 22, 1910.

The patient returned to the hospital on August 25, 1910, for treatment of the wound. The wound was closed with sutures. The patient was discharged on August 27, 1910.

APPENDIX H.

REPORTS ON INTERESTING CASES BY MEDICAL OFFICERS.

The following reports were received from the Medical Officers of the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910.

The first report was from the Medical Officer of the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He reported a case of malignant tumor of the left index finger.

The second report was from the Medical Officer of the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He reported a case of malignant tumor of the left index finger.

The third report was from the Medical Officer of the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He reported a case of malignant tumor of the left index finger.

The fourth report was from the Medical Officer of the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He reported a case of malignant tumor of the left index finger.

The fifth report was from the Medical Officer of the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He reported a case of malignant tumor of the left index finger.

A CASE OF MALIGNANT TUMOR OF THE PAROTID GLAND

The patient, a male, aged about fifty years, presented himself for treatment at the Department of Plastic Surgery, St. Mary's Hospital, New York, on August 10, 1910. He stated that he had noticed a small, hard, painless swelling on the left side of his neck about six months before he came to the hospital.

The growth increased in size gradually, and by the time he came to the hospital it had reached the size of a walnut. It was hard, painless, and did not interfere with the use of the neck. The patient had no other symptoms.

The tumor was removed by the following method:

A CASE OF SQUAMOUS EPITHELIOMA OF THE LEFT INDEX FINGER.

The patient, a Sobo woman aged about forty years, presented herself for treatment at outpatient department of Warri hospitals a few months ago on account of the condition of her left index finger.

She gave a history of an ulcer of four years' duration. Six months ago the ulcer began to increase in size and she noticed a lump developing in her left axilla which has gradually got bigger.

She has lost some weight and strength recently.

On examination there was an extensive crateriform ulcer which had destroyed the greater part of the finger with hard and everted edges. New growth was in excess of destruction. Two enlarged hard epitrochlear lymphatic glands were palpable and the lymphatic glands along the left axillary vein were enlarged and hard. No œdema of the arm present.

Treatment consisted of amputation of the finger at the metacarpophalangeal joint with excision of the enlarged epitrochlear and enlarged axillary glands.

The wounds healed well and up to the present there has been no recurrence local or glandular.

E. C. BRAITHWAITE,
Specialist, Warri.
25-10-28.

A CASE OF CICATRICAL ADHESION DUE TO BURN.

The patient, a Jekri man aged about twenty-five years, presented himself at Warri Hospital.

His right arm and forearm were firmly bound together with scar tissue.

He gave a history of having sustained a severe burn about fifteen years ago which involved the front and inner side of the lower part of the right arm, the front of the elbow and the front of the forearm.

Healing was extremely slow and during this process his elbow gradually became fixed in a position of full flexion.

The bones of the arm and forearm were under-developed particularly the radius and ulna.

The wrist was fixed in a position of hyperextension and he had quite a good grasp with the fingers.

E. C. BRAITHWAITE,
Specialist, Warri.
25.10.28.

A CASE OF MALIGNANT TUMOUR OF THE PAROTID GLAND.

The patient, a Sobo woman about forty years of age, presented herself at the outpatient department of Warri hospitals a few months ago.

She gave a history of a tumour in the region of the left parotid gland which she first noticed many years ago. It gradually increased to the size of a hen's egg, causing no pain or disability of any kind.

About eighteen months ago it began to increase in size rapidly and gave rise to much pain, and difficulty in swallowing. She had lost flesh recently.

On examination there was hard nodular craggy tumour the size of a goose's egg behind the left angle of the lower jaw and extending on to the face and also behind the ear. It was firmly fixed to the deeper tissues of the neck and greatly interfered with swallowing.

The lymphatic glands in the left posterior triangle were much enlarged, hard, and matted together.

Removal by operation was not attempted on account of the extensive nature of the growth, the fixity and the lymphatic involvement.

The patient would not permit a lymphatic gland to be excised for microscopic section.

The diagnosis was endothelioma of the parotid gland which had taken on malignant characters.

E. C. BRAITHWAITE,
Specialist, Warri.
25.10.28.

A CASE OF CICATRICIAL ADHESION DUE TO CHRONIC ULCERATION.

The patient, a Sobo man aged about thirty-five years, presented himself at Warri Hospital.

His right leg was attached to the back of his right thigh by firm scar tissue and the knee was fixed at an angle of 150 degrees of flexion.

The scar tissue extended from the back of the knee joint down the leg for two-thirds of its length. There was still considerable ulceration over the tendo achillis.

He gave a history of ulceration of the leg for so long as he could remember beginning when quite a small boy.

E. C. BRAITHWAITE,
Specialist, Warri.
25.10.28.

A CASE OF MELANOTIC SARCOMA.

An elderly Sobo man was admitted into Warri African Hospital on the 3rd December, 1928—Case No. 790/28—complaining of a bad toe. He gave a history of a small nodule developing in the right little toe about twelve months before admission which gradually increased in size, then broke down and ulcerated. Increase in size continued but no pain was caused only discomfort and disability. Three months before admission he noticed a lump gradually forming in the upper part of the right thigh just below the groin. This also has steadily got bigger.

On examination there was a fungating tumour with growth in excess of destruction involving the greater part of the toe. The femoral glands on the same side were enlarged, discrete, hard but not tender. No secondary deposits were felt in the popliteal region, the iliac fossa, the abdomen, the liver or in the base of either posterior triangle of the neck. There was no appreciable loss of flesh or strength.

The diagnosis made was epithelioma, and the toe was amputated at the metatarso-phalangeal joint (the patient would allow no more extensive removal) and the enlarged femoral glands were dissected away.

Both wounds healed per primam and the patient left hospital on the 3rd January.

A portion of the growth and a gland were sent to the Director of Medical Research Institute, Yaba who was kind enough to report as follows:—

“ Specimen A is a melanotic sarcoma. The gland shows extensive infiltration with melanotic sarcomatous cells ”.

A CASE OF SARCOMA OF THE PAROTID GLAND.

A young Ijaw man aged about twenty-two years was admitted into Warri African Hospital—Case No. 794/28 on December 5th with a tumour in the right parotid area.

He gave a history of having noticed the tumour for about three years. It had gradually increased in size and recently there had been difficulty in opening the mouth and pain.

On examination there was a hard immovable tumour the size of a duck's egg behind and below the angle of the lower jaw on the right side, firmly fixed to the deeper structures of the neck. The tumour prevented full opening of the mouth. There was some loss of flesh but no secondary enlargement of the lymphatic glands in the neck or of secondary deposits elsewhere.

The diagnosis was endothelioma of the parotid.

The tumour was removed with difficulty next day under chloroform and the patient left hospital on the 27th December with the wound soundly healed.

A small portion was sent to the Director of Medical Research Institute, Yaba, who was kind enough to report as follows:—

“ The tumour is a sarcoma, as it possesses several unusual features it would be interesting to watch for metastases ”.

CASE OF CARCINOMA OF CERVIX UTERI.

The patient, by name Aragho, a native of the Sapele District, reported sick at Warri on the 5th of April, 1928.

She was thirty-four years of age, married, and had borne two children, one of whom died in infancy and the other when twelve years of age.

She was apparently in good health until about six months ago when she began to have metrorrhagia at irregular intervals. At the same time she began to lose flesh and strength.

Two months ago the discharge became foul-smelling and pain set in which has persisted.

Frequency of micturition began about a month ago.

On examination the woman was greatly emaciated. There was a foul-smelling vaginal discharge present. The whole of the cervix uteri was involved and replaced by a fungating growth which bleed freely on manipulation. The growth was adherent to the base of the bladder and to the rectum.

The fundus of the uterus was felt on a level with the top of the symphysis pubis. It was hard, nodular but not tender.

No secondary deposits were palpable in the pelvic or abdominal glands nor was the liver enlarged or nodular.

Radical operation was negatived by the fixity of the growth and poor general condition of the patient.

A small portion of the growth was excised and forwarded to the Director of Medical Research Institute, Yaba, who was kind enough to report as follows:—

“ (Specimen cervix—number 354—very malignant) ”.

A CASE OF LARVA MIGRANS IN A EUROPEAN OFFICIAL.

The following account is submitted in the patient's own words:—

" I submit the following account of an insect bite on the left foot, received in a bush house, at Ikoyi, Lagos—

- (1) Born in Cape Colony, South Africa;
- (2) Left Cape Town, South Africa, 9th December, 1927;
- (3) Arrived England, 26th December, 1927;
- (4) Departed England, 18th January, 1928;
- (5) Arrived Lagos, Nigeria, 2nd February, 1928.

First noticed what appeared to be a mosquito bite at the base of the third toe of the left foot on about the 25th February, which then started a small track, passing between the third and fourth toes to the ball of the foot and at the same time setting up considerable irritation.

After two days the irritation under the foot ceased and the track appeared on the top of the foot.

On the 7th March, I reported to the Medical Officer, European Hospital, Lagos, and on the 8th proceeded on transfer to Warri, when the track continued to travel over the top of the foot leaving a blister in its wake from which there was a certain amount of discharge for about two days, which later healed. The time at which there appeared to be the most activity was in the afternoon, during which period the track would on occasions extend one and a quarter inches.

On about the 17th March I reported at the European Hospital, Warri, where I received treatment, there being no further activity after the middle of April "

The condition of the foot when first seen was exactly similar to the photo on page 587 of the eighth edition of Manson's Tropical Diseases.

Treatment consisted of excision of the portion of the advancing burrow and the rubbing in of pure carbolic which proved successful eventually.

OTHER INTERESTING CASES ARE :

1. A small tumour removed from the bottom of the scrotum of an adult male proved to be a myoma. The Director of Medical Research Institute, reported on this case as follows:—

" The piece of tumour from the scrotum proves to be a myoma. The situation of the tumour is of unusual interest as the usual sites are the uterus and the gastro-intestinal tract "

2. An ulcerating growth removed from the parotid area of an adult female proved on section to be a squamous carcinoma. The Director of Medical Research Institute reported as follows:—

" This appears to be a squamous carcinoma "

3. A soft painless fluctuating tumour the size of a duck's egg in the right side of the neck between the thyroid cartilage and the right sterno-mastoid muscle extending under that muscle and displacing it forwards proved to be a branchial cyst in whose fluid contents were fatty granules and cholesterin plates.

Operation with excision of the sac cured the condition.

E. C. BRAITHWAITE,
Specialist, Warri.
16.1.29.



SQUAMOUS EPITHELIOMA OF LEFT
INDEX FINGER.





CICATRICAL ADHESION DUE TO BURN.





MALIGNANT TUMOUR OF PAROTID GLAND—
PROBABLY ENDOTHELIOMA.





CICATRICAL ADHESION DUE TO CHRONIC
ULCERATION.



REPORT ON A CASE OF SCHISTOSOMIASIS IN A EUROPEAN, MARCH, 1928.

The patient, a male, aged thirty-one years, has been in Nigeria since 1921. This is his fourth tour of duty.

He was invalided home in 1926 suffering from peritonitis. A report on the subsequent operation performed by Mr. Nitsh of Saint Thomas's Hospital appeared in the *Lancet* and aroused wide interest.

At the end of the war and for a short period afterwards he was stationed in Egypt.

The illness began with a feeling of extreme malaise and anorexia, but no definite signs of sickness. After two days of this the patient commenced to vomit, and was unable to retain any food. There was also a slight degree of pyrexia. Examination of the blood revealed nothing but a slight anaemia and the urine showed a trace of albumin. The liver, however, was large and tender whilst the spleen was just palpable. He also complained of bone and joint pains and an ache in his loins.

A few days later when the patient was apparently much better a fleeting rash similar to that seen in dengue appeared, and it was considered that the whole sickness was due to dengue and that the primary rash had been missed.

Three days after the rash appeared he had a very severe pain in the loins, and the next day passed urine which was about ten *per cent.* blood. On examination the blood was found not to be haemoglobinised. Two days later he had a similar pain followed by severe haematuria. On examination of this specimen a small section of an adult worm, thought to be a filaria, was found. The next specimen showed a terminal spined ovum.

Treatment with intravenous tartar emetic was started immediately and by the time a complete grain had been administered the improvement in the patient's condition was most marked. The vomiting had practically ceased, and the patient was able to retain light food. In all fifteen grains were given by which time all symptoms had disappeared. An ovum was found once more during the treatment, but subsequent examination have not shown any more. Since that time the patient has put on over three stone in weight, looks fit, and says that he is fitter than he has ever been since the war.

It is most probable that his infection was incurred in Egypt but it is possible that he got it in the Assumbo District, from which district the Medical Officer has once seen a case of urinary schistosomiasis, and the patient had recently done a strenuous trek in this area during the wet season.

At no time during the illness, which lasted seven weeks, was there much pyrexia, though headache, vomiting and nausea, severe aches and pains, especially in the loins, and almost complete insomnia were most marked.

C. WILSON.

SCIENTIFIC.

The undermentioned cases of schistosomiasis mansoni may be of interest.

Case I:

Native Boy.—Aged fourteen years, attended hospital for a large ulcer of left foot. He also complained of irritation of the legs.

O.E. was wasted, protuberant abdomen, enlarged spleen.

Blood film showed an eosinophilia of seven *per cent.*

Stool showed eggs of taenia, ankystome and ascaris.

Urine was not abnormal.

Treatment was given for ulcer, Felix mas for tapeworm followed after two days by tetracol.

His condition did not seem to improve. Two heads of taenia saginata were passed.

After three weeks in hospital he began to pass blood stained urine and blood in the stools.

The urine showed blood and epithelial cells but careful examination failed to show anything else.

The stool revealed the presence of several eggs of schistosomiasis mansoni. Ankylostomiasis was also still present.

Treatment was commenced with $\frac{1}{2}$ gr. injections of emetine hydrochloride, twice weekly for three weeks followed by an interval. A total of 6 gr. being given.

The stools were examined weekly, and schistosome eggs were found on one other occasion.

His condition improved rapidly, and he was discharged after two months.

Case II:

Native boy, aged eleven years, attended hospital with generalised oedema.

O.E. wasted, but masked with oedema of legs, abdomen, and face.

Blood film showed eosinophilia of four per cent.

Urine full of albumin.

First examination of stool was negative.

He was diagnosed as nephritis, and treated accordingly.

A second examination of the stool showed eggs of schistosome mansoni.

ANNUAL REPORT OF THE PORT HEALTH OFFICER, LAGOS,
FOR THE YEAR 1928.

Throughout the year 1928 the work of the Port Health Officer has been very busy, and has been carried out in a most efficient manner. The work has been carried out in accordance with the instructions of the Government, and the results have been most satisfactory. The work has been carried out in accordance with the instructions of the Government, and the results have been most satisfactory. The work has been carried out in accordance with the instructions of the Government, and the results have been most satisfactory.

APPENDIX I.

ANNUAL REPORT OF THE PORT HEALTH OFFICER,
LAGOS, 1928,

BY

N. S. TURNBULL, M.B., CH.B.,
Port Health Officer.

ANNUAL REPORT OF THE PORT HEALTH OFFICER, LAGOS, FOR THE YEAR 1928.

Throughout the year 1928, the routine of the Port Health work has differed very little from that adopted in former years. Though the construction of the Apapa disinfecting station was completed some considerable time ago, the installations of electric power and water supply have still to be provided. The trade figures show very little decrease in the amount of traffic on the Lagos side in spite of the fact that Apapa is now in full swing. Thus while 282,030 tons of cargo were handled on the Lagos side in 1928, 270,100 tons passed through the Lagos Customs sheds in 1928. Moreover until the population of Lagos is moved out to such a scheme as the Yaba one, and the main shipping offices move out of Lagos, it is unlikely that many passengers will present themselves on the Apapa side. The work of examination and disinfection of passengers is therefore likely to remain mostly on the Lagos side for some considerable time to come.

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.
- Two Native Sub-Inspectors of Sanitation.
- Eight Native Rat-Catchers.
- One Female Attendant.
- One Native Vaccinator.
- One Caretaker (Quarantine Station).
- Two Gangs Labourers (usual strength twenty).

The Clayton Machine is still being run by a labourer under supervision. The same labourer has done the work throughout the whole year and this system has proved entirely satisfactory.

The caretaker is the only permanent employee at the Quarantine Station, extra labour, cook, nurses, etc., being engaged temporarily as required.

INFECTIOUS DISEASES IN OUTSIDE PORTS.

Throughout the year infectious diseases was notified as having occurred at the following places:—

Plague.

Las Palmas	1st January, 1928
	4th January, 1928
	15th January, 1928
	18th February, 1928
	5th April, 1928
	27th September, 1928
	January, 1928
Palma Islands	30th August, 1928
	30th August, 1928

Yellow Fever.

Boma, Belgian Congo	17th January, 1928
Matafi, „ „	10th February, 1928
Accra	11th May, 1928
	25th May, 1928
	(Both Laboratory Infectious).
Grand Popo. Dahomey	10th June, 1928
	15th June, 1928
Abijan. Belgian Congo	16th June, 1928
	4th July, 1928
Bingerville. Ivory Coast	4th August, 1928
Bathurst	6th November, 1928
	16th November, 1928
	5th December, 1928
Ouidah. Porto Novo	14th November, 1928
	29th November, 1928

All vessels entering the port from these places have been subjected to a thorough inspection but it has not been found necessary to place any of them in quarantine. Only one passenger has arrived from Bathurst during the period of the outbreak. He was a sailor returning from leave to join the H.M.S. *Daffodil* then lying at Calabar. He was placed under observation during his stay in Lagos. In the case of the outbreak at Ouidah, all passengers from Porto Novo have been subjected to a thorough examination on arrival in Lagos. No cases of this disease have been imported into the port during the year.

Smallpox.

Lower Niumi. Gambia	20th September, 1928
Port Harcourt	1st September, 1928 (imported).
	22nd October, 1928 „
	25th October, 1928 „
Monrovia	15th November, 1928

GENERAL MEASURES TO PREVENT THE 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 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 masters 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 infected ports has been carried out. A rat-catching gang has operated upon all ships from plague infected ports and all rats have been forwarded to Ereko Dispensary for Bacterial examination. The European Rodent Inspector has supervised the discharge of all cargo likely to be infested with rodents and has systematically trapped all ships remaining more than two days in the port.

INFECTIOUS DISEASES IN LAGOS.

Throughout the year 519 cases of plague were notified as having occurred in Lagos. No cases occurred in harbour craft or in the vicinity of any of the wharves.

During the year the practice of isolation and observation of prospective passengers at the Quarantine Station has been discontinued. Instead, all African and Syrian passengers have been required to report at the Customs Disinfecting Station on the day of sailing when medical inspection, vaccination against smallpox, disinfestation of persons and clothing, fumigation of baggage and, in some cases, inoculation against plague have been 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 inspection of all passengers, crew and cargo, with a view to preventing the transportation of sick persons, dead bodies and rat-infested cargo by canoe. The rat-catching gang trapped 7,297 rodents during the year, 628 on shipping and 6,669 on the foreshore. Of these nine were found to be plague infected and were found at the following places within the harbour area:—

Public Works Department's compound, Ijora	3 rats.
s.s. <i>Hoggar</i>	3 ..
Woermann Line Wharf, Marina	2 ..
Itolo Foreshore	1 rat.

523 rats were recovered after fumigation of vessels in the harbour. Thus the total rodents killed in the port area amounted to 7,820 during the year under consideration, of which nine were infected.

YELLOW FEVER.

No cases of yellow fever were reported to the Port Health Office, Lagos, as having occurred in Lagos or its environs during the year, 1928. Throughout the year careful inspection of all native passengers travelling to and from Lagos has been carried in the hope of detecting possible chronic carriers of this disease. From suspects showing some degrees of pyrexia associated with albuminuria and icterus a sample of blood has been drawn and forwarded to the Yaba Rockefeller Laboratories for injection into rhesus monkeys, but 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 former 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 and supervision of the African Inspectors who carry out the inspection of the foreshore, canoes, etc. During the year 6,158 inspections of craft have been carried out and only thirty-eight cases of mosquito breeding have been discovered, giving a mosquito index of only .61%. This compares favourably with 1927 when the same index was 1.33%. This is attributable to the fact that all cases in privately owned craft have been prosecuted, while in the case of craft belonging to the Marine Department, severe punishment is meted out departmentally to persons guilty of neglect leading to mosquito breeding in bilges, etc., so that the marked improvement noted by the Port Health Officer towards the latter part of 1927 has been maintained throughout 1928. As in former years oil has been distributed to other departments for anti-mosquito purposes. Of the cases of mosquito breeding, twenty-seven occurred in craft belonging to the Marine Department, while only eleven occurred in privately owned craft, and one must remark upon the helpful co-operation of the various shipping firms in this matter.

SMALLPOX.

Only seven cases of smallpox have occurred in Lagos during the year and none of these within the harbour area. The routine vaccination carried out in former years upon all unprotected deck passengers has been continued throughout 1928.

INFECTIOUS DISEASES ON BOARD VESSELS ARRIVING IN LAGOS.

Four instances of "infected ships" have occurred in the port during the year.

(1) S.S. "HOGGAR".

This vessel arrived at the Customs Wharf about 9 a.m. on the 9th June, 1928, and was boarded by the Port Health Officer personally as usual. The ship reported all clear and no sickness on board at that time.

No death had occurred during the voyage, and the vessel carried a surgeon.

During the present voyage she had called at the following ports:—

Marseilles	...	12th May, 1928.	
Algiers	...	14th May, 1928.	
Bizerte			
Dakar	...	21st May, 1928.	
Conakry	...	24th May, 1928.	
Tabou	...	26th May, 1928.	
Grand Bassam		27th May, 1928.	
Sekondi	...	28th May, 1928.	
Lome	...	29th May, 1928.	
Kotonou	...	30th May, 1928.	
Duala	...	1st June, 1928.	Departed 7th June, 1928.
Lagos	...	9th June, 1928.	Departed 12th June, 1928.

The total number of persons on board was 179, comprised as follows:—

Officers and crew	73	embarked	Marseilles	12th May, 1928.
Kroomen	...	50	„	Tabou 25th May, 1928.
Passengers	...	56	„	Duala 7th June, 1928.

Of the passengers, thirty-one being deck passengers were examined, sixteen of these were either vaccinated or re-vaccinated and all were allowed to land. The vessel crossed to Apapa No. 3 berth on the 9th June, 1928, about 4 p.m. In the course of ordinary routine, about 150 traps were set on the ship on the same day. These were cleared on the 11th June, 1928. Twenty-four rats were caught and sent for examination to Ereko Dispensary. About 11 a.m. on that morning the Port Health Office was informed by telephone that one of the twenty-four rats was definitely positive for *B. pestis* and that several others were suspicious, though decomposition made a definite diagnosis impossible. The vessel was scheduled to sail that afternoon about 5 p.m. The Company's Agent (Fabre Fraissinet Line) and the Master of the ship were immediately informed that she would be held till the following afternoon. The usual fumigation order C.M.F. No. 70 was served on the Master and receipted by him. The various port authorities were duly informed and a police guard of six was obtained.

Quarters were obtained as follows:—

Officers and passengers—New Railway Offices, Apapa.

Crew—Upper Storey of No. 3 Shed, Apapa.

Kroomen and deck passengers—New Quarantine Station, Apapa.

To allow a supply of food to be prepared for those concerned the vessel was not vacated till 5 p.m.; and then a certificate that no living person or livestock remained on board was obtained from the Master.

The holds of the ship contained cargo as follows:—

- No. 1 African produce
- No. 2 African produce.
- No. 3 General cargo and kernels.
- No. 4 African produce.
- No. 5 Hides.

FUMIGATION.

The vessel had been prepared for fumigation between 12 noon and 5 p.m. All cabin, office, store and locker doors were left open, and arrangements were made whereby all fans throughout the vessel could be controlled by a single switch in the engine room. The vessel was an oil burner, and the fires were damped down and a head of steam left in the boilers.

Zyklon "B" was used throughout, the lowest concentration based on the cubic space of the various compartments being .15 *per cent.* As no allowance was made for cargo or engines, the actual concentration was much higher. Higher concentrations were used for the crews and passengers' accommodation and for the ship's store. The vessel was opened up between 1 and 3 a.m. so that at least seven hours were allowed to each compartment. The vessel was then left to clear until 7 a.m. when the various compartments were tested. At 8 a.m. the Chief Engineer and one fireman wearing gas masks were allowed on board to get up steam and start the dynamos. The lights and fans were switched on about 8.30 a.m. The vessel was entirely free of gas by 10 a.m. Pratique was granted and loading commenced. On instructions the passengers were confined to saloons in order to allow cleaning and searching of the cabins to be carried out and bedding to be aired.

Continuous search for rats was maintained up to sailing time with the following results:—

By trapping	...	...	24	Positives	1
By fumigation	...	...	163	„	2

Approximately seventy *per cent.* of these were *mus rattus alexandrinus*, and it may be pointed out at this stage that the majority of rats found in Lagos are *mus rattus rattus* so that it is highly improbable that these rats entered the ship during her stay in Lagos but were received from some outside port.

Chicken pox was found on three vessels during the year as follows:—

R.M.M.L. *Accra*—4 cases on 16th August.

R.M.M.L. *Apapa*—1 case on 12th September.

M.V. *Deido*—4 cases on 29th October.

All the above cases occurred among Krooboyes from Freetown, Sierra Leone, and the infected Krooman on the R.M.M.L. *Apapa* was found to have worked on the *Accra* during the previous voyage.

In all cases the sick were immediately removed to the Infectious Diseases Hospital for treatment and isolation; all contacts were vaccinated or re-vaccinated as a precautionary measure; quarters were fumigated with SO_2 and clothing, etc., was disinfected in Lelean's Sack Disinfectors. Inspection of the crew was carried out daily during the time that the vessels remained in the harbour.

SULPHUR FUMIGATION.

The Fumigation Barge *Galen* continues to work satisfactorily. During the year seven large ships, one tug and thirty-two lighters have been fumigated with SO_2 and forty-two rats have been recovered after fumigation by this method.

The Clayton Installation Company have very kindly supplied several lengths of tin lined copper hose and these have been found to withstand the climatic conditions much better than the ordinary wrought iron pipes originally supplied. A complete new set of these tin lined copper pipes has therefore been procured and is now installed on the barge.

CYANIDE GAS.

Much more work has been done with Zyklon " B " than in former years. Quarterly supplies of this fumigant are now regularly received. Some idea of the ease with which this method may be applied, even to big ships, may be gathered from the foregoing report on the fumigation of the s.s. *Hoggar*. It may be added that whilst fumigating that ship the two European Sanitary Inspectors were slightly gassed. This has been attributed to the fact that the type of mask used was German and these do not appear to fit the British type of features so well. In one case the main strap holding the mask to the face broke and the mask fell forward thus allowing a dose of gas to be inhaled. The inspector was able however to get off the ship before serious symptoms made their appearance. Narcotic effects came on shortly afterwards, necessitating forced walking, massage, etc. It was not, however, considered necessary to have recourse to the use of Lobulin or Caffein and complete recovery occurred in less than an hour.

British Box Respirators have now been obtained, but so far have not been in use. These contain rather a large amount of rubber in their construction and it is a well-known fact that the West African climate is very deleterious to rubber. These masks are therefore being stored at present in special cases over a pool of kerosene and next Annual Report may give some details as to their efficiency.

LIST OF FUMIGATIONS, LAGOS, 1928.

No. of ships fumigated with HCN	...	...	...	19
No. of ships fumigated with SO ₂	...	...	...	7
No. of lighters fumigated with HCN	...	...	...	62
No. of lighters fumigated with SO ₂	...	...	...	32
No. of tugs fumigated with HCN	...	...	...	8
No. of tugs fumigated with SO ₂	...	...	...	1
Total No. of craft fumigated	...	...	...	129
Tonnage fumigated with HCN	...	...	...	25,746 tons.
Tonnage fumigated with SO ₂	...	...	...	10,647 tons.
Total tonnage fumigated	...	...	...	36,393 tons.
No. of rodents recovered after fumigation	...	...	...	523
No. of rodents recovered after fumigation with HCN	...	...	...	481
No. of rodents recovered after fumigation with SO	...	...	...	42

PORT HEALTH RETURN FOR THE YEAR ENDING 31ST DECEMBER, 1928.

Ocean-going shipping.

No. of vessels entering port	...	...	...	...	928
No. of vessels leaving port	...	...	...	...	931
No. of passengers examined	...	...	...	...	31,849
No. of passengers vaccinated	...	...	...	...	18,191
No. of passengers under observation	...	...	...	...	5
No. of passengers under surveillance	...	...	...	...	Nil
No. of ships' crews vaccinated	...	...	...	...	102
No. of passengers disinfected	...	...	...	...	16,002
No. of kits fumigated	...	...	...	...	16,002
No. of ships fumigated	...	...	...	...	26

Craft, Lagos Harbour.

No. of lighters fumigated	...	...	...	...	...	94
No. of craft permanently stationed in Lagos	...	...	...	...	...	187
No. of inspections carried out	...	...	...	...	...	6,158
No. of craft dirty	...	...	...	...	...	717
No. of craft with mosquito larvae	...	...	...	...	...	38
No. of canoes inspected	...	...	...	...	...	25,054
No. of canoe passengers inspected	...	...	...	...	...	134,090
No. of canoes dirty	...	...	...	...	...	2,761
No. of canoes destroyed or removed	...	...	...	...	...	68

Sanitation of Foreshore.

	<i>Inspected.</i>	<i>Oiled.</i>	<i>Dirty.</i>	<i>Larvae.</i>
Tanks	240	3	35	3
Barrels	8,445	—	630	2
Catch pits	170	2	3	2
Drains	4,787	—	759	1
Compounds	2,439	—	229	11

Abatement Notices, etc.

No. of written Notices	...	...	...	...	...	15
No. complied with	...	...	...	...	...	1
Total prosecutions	...	...	...	...	...	14
Total convictions	...	...	...	...	...	11
Total Fines	...	...	...	...	...	£4 18s. 0d.

Rodents.

Trapped by Rodent Inspector on ships	...	...	...	...	628
Trapped by Rodent Inspector on foreshore	...	...	...	...	6,669
Recovered after fumigation	...	...	...	...	523

N. S. TURNBULL,
Port Health Officer.

Port Health Office,
Lagos.
January, 1929.

APPENDIX J.

REPORT ON THE PHARMACY SCHOOL, LAGOS, 1928,

BY

GORDON TAYLOR, M.R.C.S., L.R.C.P. (Lond.).

Superintendent.

APPENDIX I

REPORT ON THE PHARMACY SCHOOL, LAGOS, 1922

BY

GORDON TAYLOR, M.B.E., F.R.S. (Lond.)

Superintendent

SCHOOL OF PHARMACY, LAGOS—REPORT FOR 1928.

Compared with previous years there has been a notable increase in the number of students registered at the school of Pharmacy during 1928.

The figures, since the founding of the school in 1925, are as follows:—

<i>Year.</i>	<i>Number of students.</i>
1925	15
1926	30
1927	39
1928	55

The increase for 1928 is principally due to the registration of twenty unqualified persons who, previous to that year, had been employed by medical practitioners and pharmacists as assistants and apprentices respectively. Whereas any person, who had been employed in the compounding and dispensing of prescriptions for three years in Nigeria, was eligible for candidature to the examination held under the Drugs and Poisons Ordinance, (Cap. 50), without necessarily having had to previously attend a course of training and instruction in pharmacy and its associated subjects, under the Poisons and Pharmacy Regulations made under section 32 of the Poisons and Pharmacy Ordinance, 1927, which came into operation on January 1st, 1928, it is set out that no candidate for a certificate under the Ordinance shall be admitted to the examination unless he has previously been registered as a pharmaceutical student at the School of Pharmacy, Lagos, or other institution approved by the Board of Medical Examiners. As the School of Pharmacy, Lagos, is the only institution in Nigeria recognised by the Board, assistants and apprentices, desirous of qualifying, have been compelled to complete their training at the school.

Twenty-eight students have been subsidised by the Government, three by the Native Administration of Ibadan, one by the Native Administration of Zaria, and one by the American Baptist Mission Hospital at Ogbomosho.

2. The Rules, made by the Board of Medical Examiners, affecting the examination of candidates for certificates and diplomas and the curriculum and training connected therewith, were published in the *Nigerian Gazette* in 1928. The said Rules and certain regulations set out in the Poisons and Pharmacy Ordinance, 1927, have completely replaced the former regulations under which candidates were admitted to examinations. Under the new conditions a person, desirous of obtaining registration as a pharmaceutical student, must, in accordance with the provisions set out under Part I of the Rules, produce evidence of having passed at school an examination equivalent to that of the University of Cambridge or University of Oxford Junior Local Examinations, English, Latin, and Arithmetic being compulsory subjects. He must also produce a certificate of character signed by the Principal of the school, to the satisfaction of the Board and pass an Examination of Entrance in English, Latin, and Arithmetic. After registration, the student is required to attend a full-time and systematic course of instruction and training in pharmacy and its allied subjects for a period of three years at the School of Pharmacy, Lagos, or other recognised institution. At the termination of his training, and provided that he has shown diligent attendance and proficiency, he would be eligible for admission to the Dispenser's Examination. After passing the latter examination, he may receive registration and a licence to mix, prepare, or dispense, but not to sell, any drug or poison. The Board may, however, endorse a dispenser's licence with an authorisation which empowers the holder to sell drugs but not to use the title of Chemist and Druggist. If the dispenser is desirous of qualifying as a Chemist and Druggist, he must

attend a further part-time course for two years but this course has been so arranged that he would be in a position to attend the special classes at the school and at the same time earn a living as a dispenser.

Special provision has been made in the Rules for unqualified persons who had started their training previous to 1928. For instance, they have received exemption from the examination of entrance and have only had to complete their three years' training at the school before being allowed to enter for the Dispenser's Examination.

3. No alteration of the school premises has been made during 1928. Only two rooms have been available for conducting lectures; one has been converted into a combined dispensary and lecture room and the other into a combined pharmacognostical museum and lecture room, but both have been far too small and inadequate for the number of students in attendance.

Students have attended for practical chemistry and practical physics at King's College, the laboratories of which are a great improvement on the lecture rooms of the school.

During the latter part of the year extra dispensary equipment and fresh supplies of crude drugs, chemicals, and galenicals were received from England.

4. The staff consisted of—

The Superintendent.

One Chief Dispenser of the African staff.

Two Second-class Dispensers of the African staff.

The two latter members were appointed to the staff in February, 1928. Both had, prior to qualification, received valuable teaching experience as demonstrators of the school.

The Superintendent, assisted by one Second-class Dispenser, lectured to all classes on official pharmacy, inorganic chemistry, pharmaceutical chemistry, botany, physics, forensic pharmacy and urine analysis. He also took the Senior and Intermediate Classes in practical chemistry and all classes in practical physics and examination of urines.

The Chief Dispenser, with the assistance of the other Second-class Dispenser, took charge of the dispensing counter and lectured to all classes on general pharmacy and prescription reading. He also took the Junior Class in practical chemistry.

One of the Second-class dispensers lectured on pharmacognosy. The other attended for duty in the mornings at Massey Street Dispensary.

The Chief Dispenser proceeded on leave on December 10th, 1928.

5. Four demonstrators were appointed during the year, one for each of the following subjects: chemistry, pharmacognosy, botany and physics. No senior student has been appointed unless he has passed a competitive examination with distinction in the subject selected by him, but no student has been allowed to enter for the examination unless his conduct and character, both during and outside of instruction hours, have been exemplary and unless his school records show that he has attended regularly and applied himself diligently to his work.

No demonstrator received an honorarium but the position is regarded as a great honour and cherished by all students.

Demonstrators have attended all classes, have performed the duties of laboratory attendants, have, in their spare-time, assisted backward students, and once a week during the weekly examination in dispensing, have demonstrated in their subjects to those students waiting to dispense, or who have dispensed.

No demonstrator was appointed for pharmacy.

6. Owing to the larger number of students attending the classes it has been desirable, and with a larger teaching staff it has been possible, to improve upon the arrangement of classes. The following scheme has, so far, been found to be eminently satisfactory.

On admission, the student is appointed to the first year or Junior class. After the termination of a year, and provided that he has attended regularly and has exhibited a reasonable degree of advance in the various subjects of the syllabus, he is promoted to the second year or intermediate class and, at the termination of the second year, if he has continued to apply himself steadily and studiously to his work, to the third year or senior class; but the Governing Authority of the school may appoint a student to the next senior class before the end of a year, if the work of such a student has been meritorious to an unusual degree. The greater number of promotions to senior classes have been made in January from the results of the school examinations held during the past year.

7. The duties of the students have consisted of cleaning up and tidying up at the school, attendance at Massey Street Dispensary during rush hours, and dispensing of stock mixtures, ointments, powders, pills, suppositories, etc., for local Government dispensaries. As these duties form an important branch of their training, students have been required to carry them out carefully and thoroughly.

8. The courses of instruction and training have been systematically conducted in accordance with the syllabuses set out in the Rules made by the Board of Medical Examiners. Therapeutics and Pharmacology are not subjects of the syllabuses but they have, nevertheless, been treated in an elementary manner for the special benefit of students who, after qualification, may be posted at out-stations.

In order that students may better understand what is expressed in the lectures, a list has been posted at the end of every week of lessons to be learnt at home for the following week.

The subjects of the curriculum for the Dispenser's Qualifying Examination are pharmacy, dispensing, prescription reading, chemistry, pharmaceutical chemistry, pharmacognosy, botany, physics, forensic pharmacy and urine analysis.

A. Pharmacy.—Four lectures have been given every week on the chemicals, galenical preparations, and crude drugs of vegetable and animal origin mentioned in the British Pharmacopœia, 1914.

Special reference has been given to the following: the sources of official drugs; the important characters and tests by which official drugs are recognised and their purity determined; the modes of preparation of official galenicals and the principles upon which the processes are based; alternative preparations sanctioned in the pharmacopœia for use in tropical countries; the metric and imperial systems of weights and measures and conversions from one system to the other; chemical and physical incompatibility; posology; the solubilities of important official substances; the calculation of percentages and other quantities; the storage and preservation of drugs in Nigeria; the proportion 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, santonin, ipecacuanha, lead, mercury, nux vomica, opium, phenol, phosphorus, stramonium, strophanthus, squill, and all alkaloids and salts of alkaloids.

Lectures have been given twice weekly on general pharmacy. The following have received particular attention:—rules for the collection of medicinal plants; pharmaceutical operations requiring the

use of heat—water, oil, steam, and sand baths; distillation, condensers; sublimation; ignition, calcination, incineration, carbonisation; fusion; desiccation and exsiccation; steam and hot-air ovens; disintegration of solid substances—comminution; pulverisation; sifting, trituration, levigation, elutriation, trochiscation; solution—extraction; infusion; decoction; maceration; percolation; repercolation; decantation, the syphon and syringes; filtration, colation; dialysis; expression.

Students have been given every opportunity of acquiring a practical acquaintance with the operations by which the preparations of the pharmacopœia are made and with the apparatus commonly employed in pharmaceutical processes.

B. Dispensing.—Students have received as much practical training as it has been possible to give them in preparing the simple galenical preparations of the pharmacopœia and in dispensing mixtures, powders, pills, ointments, application, emulsions, suppositories, bougies, etc., in accordance with autograph prescriptions. They have written reports in their notebooks on chemical and physical changes, incompatibility of ingredients, order of mixing, methods of preparation, etc. The experience gained at the Massey Street Dispensary has been most advantageous because, in a busy dispensary, students learn from the first the necessity of having to do small things thoroughly and of always having to exercise painstaking care, whether it be in the dispensing of medicines or washing of bottles. The work at the school has always been carefully watched and checked. Students have been drilled to cultivate orderly and cleanly habits in respect to their person as well as in their methods of work and they have had to pay the closest attention and utmost care to their work at the dispensing counter.

C. Prescription Reading.—Lectures have been given twice a week on the Latin Grammar of Pharmacy, the construction of the prescription, Latin medical formulæ. At the conclusion of lectures specimen prescriptions have been written on the blackboard and questions put to the class on the grammatical construction, translation, posology, etc. Students have been trained to promptly detect errors and over-doses and to correctly rewrite prescriptions in full Latin.

D. Chemistry.—Since the science of chemistry can only be built up step by step and by careful reasoning, it has been found necessary to take the classes separately.

The Junior Class has received a systematic course, comprising four lessons a week, on the following:

The fundamental facts regarding science, energy, and matter; distinction between solids, liquids, and gases; the two important properties—weight and extension—common to all kinds of matter, and a third property—inflammability—possessed, in addition, by other forms of matter; chemical and physical changes; latent heat; critical temperature and critical pressure; single substances, mixtures, elements, and compounds; thermal phenomena of chemical action; exothermic and endothermic compounds; effect of temperature on the rate of chemical action; positive and negative elements; chemical attraction; indestructibility of matter; analysis and synthesis; metals and non-metals; symbolic chemistry; atomic weights and the atomic theory, atomic structure; formulæ; equations; valency; graphical representation of valency; compound radicals; the molecule; Avogadro's law; molecular weights; determination of the molecular weights of gaseous and dissolved substances; determination of atomic weights; compounds; laws of chemical combination; classification and nomenclature of compounds; bases, acids, and salts; chemical reaction; analysis and synthesis; action of acids on the metals; reactions resulting in oxidation and reduction; oxidising and reducing agents; catalysis and catalytic agents; reversible equations.

In inorganic chemistry the Junior Class has received lectures on :

The distinction between metals and non-metals; malleability and ductility occurrence of metals in nature; general remarks on the preparation of metals and their compounds;

Potassium, its history, natural compounds of potassium, preparations and properties of the metal, salts of potassium, and simple qualitative tests for potassium;

Sodium, natural compounds containing sodium, preparation and properties of the metal, salts of sodium and tests;

Hydrogen, its history, modes of preparation, and properties, hydrogen as a reducing agent, nascent hydrogen and Marsh's test, Graham's law of the diffusion of gases;

Oxygen, preparation and properties of oxygen, electrolysis of water, oxygen in relation to respiration; ozone, its preparation, properties and tests; oxozone; allotropy;

Water, determination of its composition, water of crystallisation, efflorescence and deliquescence, sources and varieties of water, temporary and permanent hardness of water, solvent action of water, the Law of Henry and Dalton;

Hydrogen dioxide, modes of preparation, properties, and tests;

Nitrogen, its history, method of preparation, properties, and tests;

The atmosphere, its composition, principal constituents, minor constituents, and occasional constituents;

Oxides of nitrogen—nitrous oxide; nitric oxide; nitrous anhydride, nitrogen peroxide, and nitric anhydride—their chemical histories, modes of preparation, important properties, and tests; the value of "laughing gas" as a general anaesthetic for minor surgical operations; nitric acid and nitrous acid;

Ammonium and salts of ammonium, the association of ammonia gas with Priestley in the seventeenth century, the analogy of the ammonium base to that of potassium or sodium, sources of the ammonium salts, salts of ammonium with special reference to the mode of preparation and chemistry of Ammonii Carbonas, B.P., tests;

The Junior Class has received a thorough training in the first principles of qualitative chemical analysis. Equation writing and the importance of quantivalence, a methodical preliminary examination of chemical substances and the detection of any metal in the formation of a precipitate when solutions of certain compounds are brought into contact, have received special attention. Students have been taught to take great care in writing out chemical reports in their laboratory notebooks because they will be required, in the qualifying examinations, to bring their original laboratory notebooks to the practical examinations for inspection by the examiners.

To enable students to clearly understand the chemical changes which are produced in the various operations of chemical analysis, stress has been laid on the importance of taking great pains in carrying out experiments, making observations, and expressing inferences. The experiments and confirmatory tests for the detection of the common metals have been completed.

The Intermediate and Senior Classes had previously completed the above course of lectures and training. During 1928 these classes received two lectures each week on the characters, modes of preparation and typical reactions of the undermentioned non-metallic and metallic elements and their important compounds:—

Chlorine, bromine, iodine, fluorine, carbon, silicon, boron, barium, strontium, calcium, magnesium, zinc, chromium, mercury, aluminium, tin, lead, arsenic, antimony, bismuth, manganese, iron, copper, and silver.

The Senior and Intermediate classes have completed the full course of practical training in inorganic chemistry. Special reference has been given to the analysis of the following acidulous radicles :

Carbonates, bicarbonates, acetates, sulphides, sulphites, hyposulphites, cyanides, ferrocyanides, ferricyanides, benzoates, oxalates, tartrates, citrates, iodides, bromides, chlorides, sulphocyanides, arsenites, arsenates, phosphates, chromates, bichromates, hypophosphites, salicylates, tannates, nitrates, nitrites.

All classes have attended for practical training at King's College but experiments have also been performed in conjunction with the lectures at the school. The Senior and Intermediate classes have worked together but Seniors have had more practical experience in the analysis of unknown substances and solutions. The training, which students have received in chemistry, has been of great value. They have been able to understand the chemical relation of substances to each other, to skillfully apply their knowledge behind the dispensing counter, and to dispense the medicine in the form most elegant from the pharmaceutical standpoint and most certain of exerting its full therapeutic efficaciousness.

E. Pharmaceutical Chemistry.—Two lectures have been given each week to the Senior and Intermediate classes on—

Organic chemistry, general principles; organic compounds and organic radicles; destructive distillation; decay; fermentation; putrefaction; determination of certain elements in organic compounds; calculation of the formula of an organic compound from the percentage composition; isomerism; polymerism; empirical, molecular, and constitutional formulæ; tautomerism; classification of organic compounds, chief types—alkyl halides, aldehydes, amides, amines, derivatives of cyanogen, compounds containing oxidized nitrogen; hydrolysis; saturated and unsaturated paraffins—methane, ethane, propane, butane, pentane, ethylene, acetylene; alcohols, primary, secondary, and tertiary alcohols, monohydric alcohols, methyl alcohols; formaldehyde and its tests; acetone, tests; ethyl alcohol, its preparation, properties, and tests; acetaldehyde; chloral and chloral hydrate; chloroform, properties; iodoform; butyl chloral; ethyl chloride; ethyl iodide; ethyl ether, continuous ether process, properties of ether; ethyl nitrite and ethyl acetate; di- and trihydric alcohols; glycerin, its alcoholic nature, preparations, properties and tests; nitroglycerin; cyanogen, hydrocyanic acid, potassium cyanide and ferrocyanide.

Students have completed the practical course, which consists of the identification by qualitative analysis of the following organic compounds :

Cyanides, ferrocyanides, ferricyanides, oxalates, acetates, tartrates, citrates, benzoates, salicylates, starch, sucrose, dextrose, lactose, salicin, cocaine, quinine, morphine, and strychnine.

Senior students have had more experience than Intermediate students in the practical analysis of unknown substances and solutions.

F. Pharmacognosy.—Lectures have been given twice weekly on the crude vegetable and animal drugs of the pharmacopœia. In order that students might acquire a complete knowledge of these drugs, the lectures have included a study of the morphological nature and structure, both macroscopical and microscopical, of organised drugs; the botanical and zoological sources, active and inactive constituents, the nature of constituents and the amounts in which they are present, the

tissues or cells in which constituents occur; the countries from which medicinal drugs are obtained; the cultivation, modes of collection, preparation for the market; history, and uses of drugs.

Specimens have been handed round during the lectures for examination of important characters, hand magnifying lenses being used, as required, for the purpose, and sections have been examined under the microscope to demonstrate the cells and tissues of important medicinal plants.

A few exotic specimens have been successfully grown. These, as well as indigenous plants, have been examined in the living state.

The Junior Class has completed the study of the official seeds, roots, rhizomes, corm, bulbs, woods, leaves, fruits, barks, herbs, juices, gums, resins and oleo-gum-resins.

The Senior Class and some of the students from the Intermediate Class have completed the entire course but senior students have had more time for revision and recognition.

G. Botany.—All classes have attended twice weekly for lectures and practical and experimental botany. Specimens have been handed round for examination of external morphological and anatomical characters and classification, sections have been cut, stained, and mounted for examination under the microscope of histological characters, and many experiments performed in connection with the study of plant physiology. Several important specimens have been grown for the purpose of study.

It has not been possible to complete the course but the following study has been made of the two important sub-divisions of botanical science:—

Morphology: distinction between unicellular and multicellular plants; the thallus; the chief categories of plant members, branching of members; plant cells, their structure, modifications and contents, cell-formation; meristematic and permanent tissues; epidermal, vascular and fundamental tissue-systems; structure and germination of the sunflower, broad bean, castor oil, and maize seeds; the stem of the angiosperm, nodes and internodes, erect and weak stems, underground stems, modification of stem-structure, the internal structure of dicotyledonous stems; the leaf of the angiosperm, parts of the leaf, leaf structure, phyllotaxis, venation; structure of the flower.

Physiology: the food materials of green plants; essential elements of the soil; osmosis and root absorption; chemical processes in the soil; selective absorption by roots; course of absorbed solutions; root pressure; transpiration; photosynthesis; chlorophyll; metabolism.

H. Physics.—All classes have attended twice weekly for lectures and once a week for practical physics.

The following subjects have been fully treated in the lectures: systems of units; properties of matter and energy; sources and nature of heat, work, and energy; effects of heat; thermometry, construction and graduation of the mercurial thermometer, the fahrenheit and centigrade scales, clinical thermometers, advantages of mercury as a thermometric fluid; expansion, of solids, *unequal* expansion of metals, co-efficients of expansion, measurement of expansion, force exerted in expansion and contraction, compensation of clocks and watches; change of density with temperature; expansion of liquids, real and apparent expansion, the peculiar behaviour of water; expansion of gases, the pressure of the atmosphere, the barometer, relation between volume and pressure of a gas at constant temperature, Boyle's law, relation between volume and temperature at constant pressure, Charles' law, absolute temperature, relation between pressure and temperature at constant volume, differential and air thermometers, measurement of expansion of

gases; specific heat and calorimetry; thermal capacity, methods of finding specific heats, fusion, melting points; latent heat, measurement of latent heat of water, ice-calorimeters; solution, the importance of solution in its application to pharmaceutical processes; the molecular changes that occur when ethyl alcohol is mixed with water; freezing mixtures; the expansion of water on freezing; change of state, evaporation, ebullition, boiling-points and the method of finding the boiling-point of a liquid; mass, force and weight; levers; the balance as a lever of the first class; parts of the balance, metric weights, the process of weighing; relation of weight to volume, density, absolute and relative densities; dialysis; diffusion; the syphon; water-pumps.

At the conclusion of lectures, students have been required to solve simple physical problems and describe experiments on the subject-matter of the lectures. It has not been possible to complete the course of lectures on the subject of heat.

All classes have attended for practical training at King's College but experiments have also been performed in conjunction with the lectures conducted at the school. Students have been trained to discern and appreciate the inter-relation of physical experiments, to write down in simple and precise language what they do and the inferences they draw, and even to anticipate subsequent stages in their investigation.

The practical training, conducted at King's College, has been in connection with the following subjects:

Measurement of length, the units of length with special reference to the metric unit, the metre-stick and experiments with the metre-stick, compasses, the screw-gauge, spherometer, construction and use of verniers;

Measurement of area, units of area with special reference to the square centimetre, measurement of the areas of squares, rectangles, triangles, parallelograms, etc., of the surface of a solid—the prism, cylinder, pyramid, and cone;

Measurement of volume, units of volume, the cubic centimetre, construction of a cubic centimetre, how to use a c.c. measure, the meniscus, to measure the volume of given solids;

Measurement of mass, units of mass, the gramme, distinctions between mass, force, and weight, comparison of different masses by means of a spring balance, the turning effect of a force;

Levers, the beam balance, taking a balance to pieces and inspection of each portion, rules for weighing, measurement of the mass of 1 c.c. of cold distilled water;

Measurement of absolute densities of solids and liquids;

Relative density, the specific gravity bottle and measurement of relative densities, the upthrust on any body immersed in water; the relation between the upthrust and the weight of the displaced water;

Exercises on conversions from the metric system to the imperial system of weights and measures;

Examination of thermometers and method of constructing a mercurial thermometer;

Experiment to prove that different metals expand unequally;

Experiments with the weight thermometer and differential thermometer;

Method of construction of a barometer;

Experiments in connection with specific heat, latent heat, and calorimetry.

I. Forensic Pharmacy.—All classes have received one lecture each on the regulations contained in the Poisons and Pharmacy Ordinance and Dangerous Drugs Ordinance. Special reference has been made to the regulations affecting dispensers and students have been given a full list of common poisons not specifically mentioned under Part A of the Second Schedule of the Poisons and Pharmacy Ordinance.

J. Urine Analysis.—All classes have attended once a week at the school for lectures and examination of urines. Nurses-in-training, attached to the African Hospital, have sometimes attended. Lectures have been given on the anatomy and physiology of the urinary system; collection and preservation of samples; physical characteristic—the amount voided in twenty-four hours, colour, odour, sediment, reaction, specific gravity, total solids; organic constituents of normal urine—urea, uric acid, purin bases, creatin and creatinin, oxalic acid, urinary pigments; inorganic constituents of normal urine—chlorides, phosphates, sulphates, carbonates, etc.; abnormal constituents—carbohydrates, proteins, indican, acetone bodies, bile, blood pigments, pus, etc.

The Senior Nursing Sister, African Hospital, kindly supplied specimens for physical examination and for the detection, by simple chemical tests, of the important abnormal and normal constituents.

9. The two Second-class Dispensers, who are on the school staff, have worked for the Chemist and Druggist qualifying examination. They will be eligible for admission to the examination in 1930. Much of their spare time has been devoted to the subjects of the syllabus. The Superintendent has, in the evenings, taken them through the following special courses:

- (a) The principles of quantitative chemical analysis, neutralisation, oxidation, precipitation, reduction, the necessary apparatus: chemical balance, flasks, beakers, pipettes, burette and stand, weighing bottles, etc., the use of indicators, methods of weighing and titrating, preparation and standardisation of test solutions, volumetric analysis of official chemicals and solutions, etc.
- (b) Light, radiation; distinctions between transparent, translucent, and opaque bodies; relation between absorption and radiation; propagation of light; images, shadows, and eclipses; photometry, illuminating power and intensity of illumination, the Law of Inverse Squares, the shadow photometer, the Bunsen photometer.

10. In order that the teachers may gauge the degree of progress made by each student in each of the subjects of the syllabus, and in order that the student may see for himself in which subject or subjects he is weak, but, more especially to give him every opportunity of qualifying at the termination of his training, school examinations have been held, as follows:—

Practical: once a week, in dispensing;

Practical and oral: once a month, practical in dispensing, and oral in all other subjects;

Written, practical and oral: once a year in December, in accordance with the syllabus.

The results have been posted up in the main lecture room for the information of the students and records kept in the office for use by teachers.

Ten candidates passed the dispensers's examinations held under the Ordinance and nine the examination of entrance for registration of pharmaceutical students.

11. Examinations under the Ordinance were conducted during January and July. Intermission of regular studies at the school took place at the same time in order that school departments might be available to examiners for conducting dispensing and oral parts of the examination.

12. Pharmacy and the various science subjects of the curriculum are useful stepping-stones to qualification in medicine. Matter, essential to the study of medicine, has therefore been included in the curriculum and, it is anticipated that, should the opportunity present itself, the student, who has prepared himself by diligent study and has secured qualification in pharmacy, will considerably benefit by the experience and training received at the School of Pharmacy.

13. The health of the students has generally been good. There was one death from nephritis. No outbreak of infectious disease occurred throughout the year.

14. The Superintendent attended all the meetings of the Board of Medical Examiners held during the year and was in January and July a member of the sub-committee appointed by the Board to conduct the Dispenser's Examination. He conducted the examination of entrance in July.

The Chief Dispenser was gazetted Secretary to the Board on the 26th of January, 1928.

APPENDIX K.

REPORT OF THE NIGERIAN BRANCH BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION, 1928.

BY

DR. T. F. G. MAYER,
Secretary.

APPENDIX K

REPORT OF THE NIGERIAN BRANCH
BRITISH EMPIRE LEBROSE ASSOCIATION INC.
in
DE T. E. MAYER
Secretary

REPORT OF THE NIGERIAN BRANCH, BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION FOR THE YEAR, 1928.

A great deal of useful work has been done in the past by members of the West African Medical Staff but for the most part their observations were recorded in Government publications in the Colony and consequently did not obtain the publicity they deserved.

Moreover, owing to conditions of leave in the service, the work was inclined to be sporadic.

No real organised campaign against leprosy had, however, been established for the needs of the Colony as a whole and the extent and prevalence of the disease had remained unknown beyond general impressions of prevalence here and rarity there and even these were seldom recorded on paper.

The British Empire Leprosy Relief Association was aware of the serious nature of the problem from records at their disposal including those of Dalziel late of the West African Medical Service and of a Frenchman named Tonkin respecting the Northern parts of Nigeria and the Soudan.

Mr. Oldrieve, Secretary of the British Empire Leprosy Relief Association, visited the Colony to organise a campaign against the disease, to obtain information and to arouse interest.

As a result of this, as is mentioned in the Annual Medical Report for 1927, a local branch of the Association was formed with Dr. T. F. G. Mayer as Secretary.

The Secretary was given the opportunity of a preliminary course of study under Dr. Muir at Calcutta, and of visiting several of the most up-to-date Leper Colonies in India.

The Nigerian Branch of the Association is organised on lines laid down by Mr. Oldrieve in the following way:—

A General Committee has been formed under the presidency of His Excellency the Governor which has elected from its members a small Executive Committee of residents in Lagos.

A Provincial Committee has been formed in each province under the chairmanship of the Resident.

The Provincial Committees will be responsible for all leprosy work going on in their provinces and will send information of interest to the Executive Committee, make requests for special drugs and so on, and control the distribution of supplies.

It is expected that this scheme will work well and be efficient both in devising methods of dealing with the peculiar conditions obtaining in the several provinces and in obtaining the necessary supplies and help.

The Secretary arrived in Nigeria early in March, 1928, and with the concurrence of the Medical Department a Memorandum, by him, on the treatment of leprosy in India as developed by Rogers and Muir was published under the title "Leprosy Relief Work".

This pamphlet has been circulated to every medical man in the Colony, to the heads of all Missionary bodies and to the senior Political Officers and has been used as a starting point for a general campaign against the disease.

On his arrival the Secretary found that work on modern lines was being done in many places notably at Itu where 800 early cases of leprosy were under treatment by Dr. Macdonald of the United Free Church of Scotland Mission and at Port Harcourt under Dr. Ferguson where 500 cases were receiving regular treatment.

There were also treatment centres at Yaba, Abeokuta, Ilesha, Warri and Onitsha in the Southern Provinces and at Zaria, Kano, Sokoto, Gusau, Maiduguri, Vom, Lokoja and Yola in the Northern Provinces.

Besides these larger treatment centres individual lepers were under treatment in practically every station where there was a Government Medical Officer.

The Annual Medical Report for 1927 gives the number of lepers under treatment as 2,046 of whom 616 were in-patients.

At the end of 1928, 2,112 lepers were under treatment as in-patients and 863 as out-patients in the various treatment centres.

The following table shows those in Government Leper Colonies and in the various Mission stations in the Northern and Southern Provinces at the end of the year.

GOVERNMENT.											MISSIONS.									
SOUTHERN PROVINCES.			Abeokuta.	Warri.	Onitsha.	Benin.	Agbor.	Port Harcourt.	Yaba.			Total.	Itu.	Uyo.	Uburu.	Ilesha.	Ogbomosho.	Total.		
In-Patients...	...	...	45	5	85	...	436	205	20	...	...	796	901	20	...	5	1	927
Out-Patients	...	...	21	45	237	4	...	148	...	...	...	455	50	40	128	...	...	218
NORTHERN PROVINCES.			Gusau.	Maiduguri.	Yola.	Lokoja.	Katsina.	Kano.	Sokoto.	Zaria.	Minna.		Vom.	Garkida.	Mkar.	Kunav.	Kunav.			
In-Patients...	...	...	17	20	80	27	115	107	3	...	2	371	12	6	...	...	...	18
Out-Patients	...	...	6	...	...	...	76	8	...	75	...	165	...	3	12	12	12	39
												1,787								1,202
GRAND TOTAL ...											2,989									

Soon after his arrival the Secretary conducted a tour through the Southern Provinces visiting practically every place where anti-leprosy work was being done and later a shorter tour through the Northern Provinces.

He then returned to headquarters where the chief work has been the accumulation of supplies and an attempt to obtain information by means of circular letters to Political and Medical Officers and Missionaries as to the distribution of the disease in the Colony.

It is not possible to lay down one hard and fast scheme of Leprosy Relief for Nigeria as a whole owing to the varying conditions of climate, density of population, habits of the various people and their likes and dislikes, the general shortage of medical men and so on.

These conditions in some localities resemble in complexity a chess-problem but the general policy advocated is the establishment of self-supporting colonies where the early and the infectious cases may receive treatment and their children may be protected from infection but the details have to be worked out for each Province and for each of the people in that province.

No people are more fitted for this task than the members of the several Provincial Committees.

There is no doubt that the Native Administrations in those parts of the Colony that are seriously affected are intensely interested in the hope of cure that is held out to their people and will welcome and assist any policy of establishing treatment centres in their midst.

The Government may depend on their enthusiastic support in this matter.



