

## **Annual medical and sanitary report / Nigeria.**

### **Contributors**

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1416  
NIGERIA.



ANNUAL

MEDICAL AND SANITARY  
REPORT

FOR THE YEAR

1925.

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LAGOS :  
PRINTED BY THE GOVERNMENT PRINTER.

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# MEDICAL AND SANITARY REPORT ON NIGERIA FOR THE YEAR 1925.

## CONTENTS.

	PAGE.
I. ADMINISTRATIVE ... ..	5
II. PUBLIC HEALTH ... ..	7
(a) General Remarks ... ..	7
(b) European Officials ... ..	8
(c) Native Officials ... ..	9
(d) Soldiers ... ..	10
(e) Police ... ..	10
(f) Prisoners ... ..	10
(g) Non-Official European Population... ..	11
(h) Non-Official African Population. ... ..	11
III. SANITATION ... ..	13
A. General review of work done, laws passed and progress made.	13
(i) Administrative ... ..	13
(ii) Preventive Measures ... ..	14
(iii) General Measures ... ..	24
(iv) School Hygiene ... ..	26
(v) Labour Conditions ... ..	27
(vi) Housing and Town planning ... ..	27
(vii) Food ... ..	27
B. Measures taken to spread Knowledge of Hygiene and Sanitation ... ..	28
C Training of Sanitary Personnel ... ..	29
D. Recommendations for Future Work ... ..	29
IV. METEOROLOGY ... ..	30
V. HOSPITALS AND DISPENSARIES ... ..	30
VI. SCIENTIFIC ... ..	31
TABLES ... ..	32 <i>et seq.</i>

## APPENDICES.

- A. Annual Report of the Medical Research Institute.
- B. Annual Dental Report.
- C. Annual Report of Government Analyst.
- D. Scientific Papers
- E. Report of Tsetse Fly Investigation.
- F. Report of Port Health Officer, Lagos.



# MEDICAL AND SANITARY REPORT ON NIGERIA FOR THE YEAR 1922

## CONTENTS

I. ADMINISTRATION	1
II. PUBLIC HEALTH	1
(a) General Principles	1
(b) Sanitary Administration	2
(c) Public Health	3
(d) Sanitation	4
(e) Hygiene	5
(f) Vaccination	6
(g) Notifiable Diseases	7
(h) Non-Notifiable Diseases	8
III. MEDICINE	9
A. General review of the state of medicine and public health	9
B. Administrative	10
C. Preventive Medicine	11
D. General Medicine	12
E. Special Medicine	13
F. Surgery	14
G. Obstetrics and Gynaecology	15
H. Pathology	16
I. Medicine taken in special hospitals of Nigeria and elsewhere	17
J. Treatment of Sanitary Problems	18
K. Recommendations for Future Work	19
IV. MANAGEMENT	20
V. HEALTH AND DISEASES	21
VI. SUMMARY	22
Index	23

## APPENDICES

- A. Annual Report of the Medical Officer, Lagos
- B. Annual Report of the Medical Officer, Port Harcourt
- C. Annual Report of the Medical Officer, Calabar
- D. Statistical Tables
- E. Report of the Tropical Research Committee
- F. Report of the Tropical Research Committee, Lagos



# Annual Medical and Sanitary Report on Nigeria for the year 1925.

## I. ADMINISTRATIVE.

### ESTABLISHMENT (including vacancies).

#### MEDICAL AND SANITARY.

##### TABLE I.

- Director of the Medical and Sanitary Service.
- Deputy Director of Medical and Sanitary Service.
- Deputy Director of Sanitary Service.
- 6 Assistant Directors of Medical Service.
- 1 Assistant Director of Sanitary Service.
- 5 Specialist Medical Officers.
- 11 Senior Medical Officers.
- 1 Pathologist.
- 91 Medical Officers—(18 vacancies).
- 5 Medical Officers of Health.
- 5 Medical Officers (African).
- 2 Women Medical Officers.

#### RESEARCH.

- 1 Director of Medical Research Institute.
- 1 Assistant Bacteriologist.
- 1 Government Analyst.

#### DENTAL.

- 2 Government Dental Surgeons—(1 unfilled).

#### TSETSE-FLY INVESTIGATION. (TEMPORARY).

- 1 Investigator (Specialist Medical Officer seconded from Medical Staff).
- 1 Entomologist (Special Service Officer).

#### NURSING STAFF.

- 8 Senior Nursing Sisters.
- 26 Nursing Sisters.

9 Sanitary Inspectors.  
3 Chief Dispenser Storekeepers.  
1 Laboratory Assistant.

- 9 Sanitary Inspectors.  
3 Chief Dispenser Storekeepers.  
1 Laboratory Assistant.

## 1. Clerk, Higher Division, Grade I

- 1 Clerk, Higher Division, Grade I.  
2 Chief Dispensers.  
2 Clerks, Higher Division, Grade II.  
1 Registrar of Vital Statistics.  
1 Deputy Registrar of Vital Statistics.  
12 Clerks, Higher Division, Grade III.  
37 Clerks, Lower Division and Probationers.  
10 Storekeepers.  
7 Senior Dispensers.  
18 First Class Dispensers.  
55 Second Class Dispensers.  
19 Dispensers-in-Training.  
10 Senior Nurses.  
24 Charge Nurses.  
43 First Class Nurses.  
96 Second Class Nurses.  
125 Nurses-in-Training.  
6 Laboratory Assistants.  
25 Lunatic Asylum Attendants.  
8 Wardens and Assistant Wardens.  
3 First Class Sanitary Inspectors.  
10 Second Class Sanitary Inspectors.  
38 Third Class Sanitary Inspectors.  
26 Sanitary Inspectors-in-Training.

(a) Statement of Revenue for the year 1925,	£	s.	d.
Revenue—Hospital and Medical Receipts ...	7,840	14	3

(b) Statement of Expenditure for the year 1925.

Personal Emoluments	...	...	...	*178,635	19	3
Other Charges Recurrent, £101,007 4s. 2d.			}	*107,164	10	6
„ „ Special, £6,157 6s. 4d.						
				£285,800	9	9

\* This includes Sanitary and Medical Research.



## II. PUBLIC HEALTH.

### (a) GENERAL REMARKS.

The returns for the year under consideration are for the Colony and Protectorate and include the British Mandated Territory of the Cameroons.

The plantations in the Cameroon territory have been bought up and returns from their hospitals and dispensaries are therefore no longer included in our Annual Return.

This reduces the total number in hospitals and dispensaries under Government supervision. On the other hand the following new stations were opened or old stations re-opened during the year:—

Oshogbo	}	Old stations re-opened.
Birnin Kebbi		
Ijebu-Ode	}	New stations opened.
Akure		
Azare		
Makurdi		

These were only in operation for a part of the year and three of them for so short a time as to contribute nothing to the Annual Return.

It has been possible again to station a second Medical Officer at Ibadan for work in connection with the Native Administration.

There has been a notable increase in the number of patients attending hospital and dispensary at Kaduna and Kano in the Northern Provinces.

Even apart from the outbreak of yellow fever the general health of the European Community was not as good as in the previous year. The incidence of yellow fever—twenty-one cases and nine suspected cases with eleven deaths—is the highest for a number of years. The invalidings are lower but the deaths are higher than last year. The invalidings per thousand for the average population is 10·6 in officials and 15·0 in non-officials.

The increase in the reported number of Europeans treated is due (a) to the increase of Europeans in the country, and (b) to taking over Dr. Gray's Hospital, Lagos, but this still leaves a discrepancy as compared with 1924. The total population in December 1924 was 3,830 and in December 1925, 4,050, showing an increase of 222 while the increased sickness is 841 raising the sickness incidence from 1·503 to 1·628 per head. The deaths were thirty-three and forty-nine respectively raising the death rate per 1,000 from 8·6 to 11·84.

The returns for Africans are no index of the general health of the African Community. The invalidings and deaths among the African Officials are higher than last year—the deaths considerably higher than during the previous five years. Malaria is still the most prevalent disease both among Europeans and Africans.

Outbreaks of cerebro spinal fever, relapsing fever, plague and smallpox occurred during the year.

### COMMUNICABLE DISEASES.

*Malaria.*—There is a progressive decrease in the number of cases among Europeans—from 1,281 in 1921 to 1,183 in 1925 with an increased population. The steady increase in Africans treated is due, I consider, to the increase in the number of Africans coming for treatment.

The Aestivo-autumnal type is the most common.

*Blackwater Fever.*—Thirty cases among Europeans and five cases among non-Europeans (2 Syrians, 1 East Indian, 1 West Indian, 1 African) with seven deaths and one death respectively. These figures compare



favourably with former years. An analysis of twenty of the cases appears in the report of the Medical Research Institute.

*Yellow Fever.*—There were twenty-one cases and nine suspected cases the highest on record for a number of years. The majority of the cases occurred in Lagos and a special report of these will be found in the Appendix. When these cases are plotted on a map of Lagos it is notable that the problem is almost exclusively one of the marine craft and the vicinity of wharves.

*Trypanosomiasis.*—All the European cases are reported from Jos and the majority of the African cases. These came largely from the Jemaa valley. Makurdi reports nine cases among Africans which were probably from the Gerti valley and the Benue. A conference was held at Kaduna in September to consider means for dealing with this disease and proposals submitted for dealing with the Hadeija Area. Another conference will be held late in 1926 when other parts of the Northern Provinces will receive special consideration. A Medical Officer of Health is now carrying on investigations in the Jemaa valley and clearings in the Gerti valley are being carried out. A report of the work down at Sherifuri during the year by the Tsetse fly Investigation appears in Appendix E.

*Relapsing Fever.*—This disease appeared in epidemic form throughout all the districts of the Northern Provinces. An outbreak occurred in the Ondo Province of the Southern Provinces. In this case with the co-operation of the Political Officers the disease was quickly controlled.

*Cerebro Spinal Fever.*—The outbreaks of this disease in the Northern Provinces were extensive and as usual were attended with high mortality.

*Smallpox.*—There was only one serious outbreak during the year—that in the Oyo Province. It was dealt with by the Senior Sanitary Officer and the local staff of vaccinators and did not last long.

*Leprosy.*—The treatment of this disease in Hospitals and Dispensaries where no compulsion to remain is enforced has resulted in a very considerable increase in the number of patients presenting themselves for treatment.

*Ancylostomiasis.*—This disease is widespread in the Southern Provinces. Success was obtained in the treatment by Carbon Tetrachloride which was extensively used in the mine area Enugu.

*Plague.*—This disease is still present and a fresh outbreak occurred during the year in the Ijebu-Ode Province. This disease is fully dealt with in another part of the report.

#### (b) EUROPEAN OFFICIALS.

The invalidings and deaths are slightly in excess of 1924. There were 129 invalidings and eighteen deaths.

Leave conditions.	Under 6 months.	Under 9 months.	Under 12 months.	Under 15 months.	Under 18 months.	Over 18 months.	Total.	Strength of Government Officers.
Old Regulation	13	9	9	2	—	—	33	514
New Regulation	11	13	17	23	31	1	96	887
Total ...	24	22	26	25	31	1	129	1,401

During 1925 the Invaliding and Death Rates of European Officials per thousand of average number resident, were as follows:—

Invaliding	...	88.0
Death	...	12.27



TABLE SHOWING SICK, INVALIDING AND DEATH RATES,  
EUROPEAN OFFICIALS.

	1923.	1924.	1925.
Total number resident ... ..	2,092	1,921	2,221
Average number resident ... ..	1,396	1,567	1,466
Total number on sick list ... ..	1,252	1,518	1,518
Total number of days on sick list ... ..	14,542	15,428	14,776
Average daily sick ... ..	39·84	42·2	40·46
Percentage of daily sick to average number resident ...	2·85	2·55	2·76
Average number of days to each patient ... ..	11·615	10·16	9·73
Average sick time to each resident ... ..	10·42	8·03	6·65
Total number invalided ... ..	146	119	129
Percentage of invalided to number resident ... ..	6·98	6·19	5·81
Percentage of invalided to average number resident ...	10·46	7·59	8·80
Total number of deaths ... ..	16	16	18
Percentage of deaths to number resident ... ..	·76	·83	·81
Percentage of deaths to average number resident ...	1·15	1·02	1·23

Anæmia, Neurasthenia, Malaria and Blackwater Fever are the main causes of invalidings. Anæmia and Neurasthenia each accounted for 16, Malaria 14 and Blackwater Fever 10.

The causes of invalidings of European Officials are as follows:—Malaria 14, Blackwater Fever 10, Dysentery 3, Plague 1, Pyrexia of uncertain origin 1, Rabies 1, Rheumatic Fever 1, Tuberculosis 4, Yellow Fever 5, Alcoholism 1, Anæmia 16, Insomnia 5, Debility following septic infection of hand 1, Neuritis 2, Encephalitis 1, Epilepsy 1, Neurasthenia 16, Nervous exhaustion 2, Myocarditis 1, Valvular Disease of the heart 4, Dilatation of heart 1, Arterio-sclerosis 1, Phlebitis 1, Lymphadenitis 1, Abscess 2, Bronchitis 1, Broncho-pneumonia 1, Pleurisy 2, Gastritis 2, Pyorrhoea 2, Gastric Ulcer 1, Dilatation of stomach 1, Dyspepsia 3, Intestinal obstruction 1, Hernia 1, Hepatitis 1, Jaundice 3, Cirrhosis of liver 1, other diseases digestive system 1, Nephritis 1, Urethritis 1, Pyelitis 1, Carcinoma kidney 1, Synovitis 1, Boil 1, Rodent ulcer 1, Gunshot wound 1, Fracture 2, Carbolic Acid Poisoning 1, Ankylostomum duodenale 1.

Causes of deaths of European Officials:—Malaria 3, Blackwater Fever 2, Septicæmia 1, Yellow Fever 4, Alcoholism 1, Valvular disease of heart 1, Broncho-pneumonia 1, Pleurisy 1, Appendicitis 1, Rupture Oesophagoeal vein 1, General injury 1 and one death from dysentery which took place at sea.

#### (c) AFRICAN OFFICIALS.

There has been a considerable increase in the invalidings and deaths among African Officials.

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

	1923.	1924.	1925.
Total number resident ... ..	3,050	3,195	3,020
Average number resident ... ..	2,936	3,104	2,790
Total number on sick list ... ..	2,525	3,536	3,156
Total number of days on sick list ... ..	19,454	25,680	26,881
Average daily sick ... ..	53·3	70·36	73·6
Percentage of daily sick to average number resident ...	1·8	2·2	2·6
Average number of days to each patient ... ..	7·7	7·3	8·5
Average sick time to each resident ... ..	6·6	8·03	8·9
Total number invalided ... ..	36	13	41
Percentage of invalided to number resident ... ..	1·18	·40	1·35
Percentage of invalided to average number resident ...	1·23	·419	1·47
Total deaths ... ..	13	11	39
Percentage of deaths to number resident ... ..	·426	·344	1·29
Percentage of deaths to average number resident ...	·44	·354	1·39



The causes of invaliding of African Officials were:—Arterio-sclerosis 2, Asthma 1, Bronchitis 1, Glaucoma 1, Locomotor Ataxy 1, Exophthalmos and defective vision 1, Delusional insanity 2, Heart disease 1, Neurasthenia 1, Defective vision 3, Local Injuries 2, Anæmia 2, Prostatic enlargement 2, Optic atrophy 2, Dyspepsia 1, Cardiac dilatation 2, Pulmonary tuberculosis 4, Diabetes 2, Cataract 1, Gastritis 1, Conjunctivitis 2, Myocarditis 1, Hemiplegia 1, Dementia 1, Cirrhosis of Liver 1, Melancholia 1, Paralysis 1.

Causes of deaths of African Officials were:—Cerebral thrombosis 1, Malaria 1, Pneumonia 5, Cerebral Hæmorrhage 1, Gonorrhœal Rheumatism 1, Peritonitis 1, Pneumonic Plague 2, Local Injury 1, Cellulitis 1, Endocarditis 1, Enteric Fever 1, Appendicitis 1, Tuberculosis 2, Whooping cough 2, Anæmia 1, Epilepsy 1, Bronchitis 4, Broncho pneumonia 6, Diarrhœa 1, Marasmus 4, Nephritis 1.

(d) SOLDIERS—NIGERIA REGIMENT—W.A.F.F.

The following figures show the health of the rank and file of the West African Frontier Force for 1925.

	Northern Provinces.	Southern Provinces.
Average daily strength ... ..	1,816	1,361
Total number on sick list ... ..	1,470	1,342
" days on sick list ... ..	13,837	11,785
Average daily sick ... ..	37.91	32.25
Total number of deaths ... ..	12	8
Death rate per 1,000 ... ..	6.6	5.8

(e) POLICE FORCE.

The following figures show the health of the rank and file of the Police Forces for 1925.

	Northern Provinces.	Southern Provinces.
Average daily strength ... ..	1,224	2,097
Total number on sick list ... ..	494	1,125
" of days on sick list ... ..	5,382	7,279
Average daily sick ... ..	14.7	19.9
Total number of deaths ... ..	12	8
Death rate per 1,000 ... ..	9.8	3.81

(f) PRISONS.

*Southern Provinces.*—There has been a noticeable improvement in the general health. Thirteen prisons show a considerable reduction in the death rate and there is a drop in the average number of days off duty on account of illness. The chief causes of death are intestinal and respiratory diseases. The following table shows the causes of death.

Disease.	Deaths.	Disease.	Deaths.
Dysentery ... ..	26	Septic Meningitis ... ..	1
Diarrhœa ... ..	18	Mania ... ..	2
Enteritis ... ..	3	Arterio sclerosis ... ..	2
Pneumonia ... ..	32	Hepatitis ... ..	2
Bronchitis ... ..	3	Sarcoma ... ..	1
Pleurisy ... ..	1	Hernia (strangulated) ... ..	1
Pul. Tuberculosis ... ..	2	Peritonitis ... ..	1
Cardiac Disease ... ..	11	Septicæmia ... ..	1
Tetanus ... ..	5	Local Injury ... ..	1
Ankylostomiasis ... ..	3	Indefinite ... ..	3
Cerebral Hæmorrhage ... ..	4		
" Abscess ... ..	1	Total ... ..	124



Of the large convict prisons that at Port Harcourt shows the largest number of deaths, viz. thirty-one, which is slightly worse than the previous year. This prison is being gradually rebuilt and the low mud walled cells are being replaced by brick buildings. The Enugu Convict prison which showed a death rate of 63 per 1,000 of daily average in both 1923 and 1924 has fallen to 27 per 1,000. Very considerable improvement has been effected in this prison and most of the low mud walled cells have been replaced by brick buildings, the bricks and the buildings being erected by prison labour. Good permanent brick built warder's lines have also been constructed.

Diet has been adequate and good.

*Northern Provinces.*—(Government Prisons). The sanitary reports on prisons in the Northern Provinces indicate that the general health has been good and in many instances is stated as being very good. Figures as to the causes of death are not available.

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

	Northern Provinces.	Southern Provinces.
Total number of Prisoners ... ..	2,210	38,185
Average daily strength ... ..	549	6,635.36
Total number on sick list ... ..	512	4,390
" " of days on sick list ... ..	6,871	49,357
Average daily sick ... ..	19.4	135.4
Total number of deaths ... ..	22	186
Death rate per 1,000 ... ..	40.07	28.03

#### NATIVE ADMINISTRATION PRISONS.

Little information is available. Generally the health is stated to be good or very good except in the case of Kano where it is stated to have improved. The total number of prisoners is given as 8,888, and the total deaths as 172, but as the other data given in the above table are not available no comparison can be made.

#### (g) NON-OFFICIAL EUROPEAN POPULATION.

The statistics available are incomplete and do not admit of the preparation of a table showing sick, invaliding and death rates. There are nine missionary or private practitioners from whom we get no information of sickness or invalidings. The invalidings recorded in the Government returns are Malaria 4, Anaemia 4, Appendicitis 2, Blackwater Fever 4, Cellylitis 1, Haemoptysis 1, Malaria and alcoholism 2, Phthisis 1, Sarcoma 1, Enteric fever 2, Neuritis 1, Neurasthenia 3, Alcoholism 1, Yellow fever 1, Dysentery 1, Cirrhosis of liver 1, Fracture of spinal column 1, Gastritis 2, Intestinal obstruction 1, Phosphaturia 1, Pneumonia 2. The deaths among European non-officials as furnished by the Registrar are:—Enteric 2, Malaria 2, Blackwater fever 4, Arterio sclerosis 1, Pneumonia 3, Yellow Fever 7, Pernicious Anaemia 1, other diseases circulatory system 2, Bronchitis 1, Peritonitis 1, Nephritis 1, Cystitis 1, General injuries 2, Abscess 1, Tuberculosis 1, Drowning 1.

Estimated European Non-Official Population ...	2,051
Invalidings recorded ... ..	37
Deaths ... ..	31

#### (h) NON-OFFICIAL AFRICAN POPULATION.

It is not possible to obtain statistics of any real value. It appears however, that apart from epidemics the health of the community was much as usual. The policy of the Medical Department is to serve the people of the country as widely and as effectively as possible. This involves a considerable amount of educational work to break down prejudice and convince the people of the very real advantages in prevention and treatment which are offered to them. As an example of this I quote from the Annual Report of the Training College at Katsina.



"The Medical Officer Dr. McCulloch gave a series of lectures and demonstrations on personal hygiene and sanitation to classes 4 and 5. Class 5 also watched an operation at the hospital. The pupils were certainly extremely interested in these lectures and demonstrations. They should now have a few sound ideas on the subject and be able to make it distinctly more interesting for the classes they teach. If only for this, the College feels greatly indebted to Dr. McCulloch for the amount of time he sets aside in preparing and giving these lectures. These pupils have since been arranging their notes in the form of a series of lessons for their use in teaching in Provincial Schools. Dr. McCulloch offered a prize for the most successful of these."

The visiting of towns and villages in their districts by the Medical Officers is encouraged and there are signs in several districts of the good work which results.

*Population and Vital Statistics.*—At the end of December 1924, the European population in Nigeria was estimated to be 3,830, constituted as follows, 1,465 Official males and 18 Official females, 1,837 non-Official males and 510 non-Official females. At the end of December 1925, the estimated European population was 4,050, showing 1,968 Official males, 31 Official females, 1,474 non-Official males and 577 non-Official females.

The total estimated population of Nigeria is 18,504,489, the population of the Northern Provinces being estimated as 10,297,509 and the Southern Provinces as 8,206,980.

*Registration of Births and Deaths.*—The Deputy Director of Medical and Sanitary Service is the Principal Registrar for Births and Deaths in Nigeria under the Births, Deaths and Burials Ordinance.

Registration of births and deaths of non-Natives is compulsory throughout Nigeria but in the case of Natives is only so in Lagos Township. It comes into force in Kano Township in January, 1926.

The question of establishing a simple form of registration of births and deaths which could be applied to all towns including Native Administration towns was discussed at the Medical Conference held at Accra and it was considered that even if the numbers of births and deaths could be registered it would be an advance of value and wherever possible further details as to whether male or female, adult, child or infant should be added. Proposals on these lines are being made.

The following table gives a summary of Vital Statistics for Lagos and Ebute Metta.

Estimated Population (Lagos and Ebute Metta) ...	109,076
Total Births ... ..	3,261
Birth Rate per 1,000 Population ... ..	29·8
Total deaths ... ..	2,753
Death rate per 1,000 Population ... ..	25·2
Death Causation of Certified by Medical Practitioners Number ... ..	1,330
Death Causation of Certified by Medical Practitioners per cent. ... ..	48·3
Deaths—Infants under one year ... ..	777
Infantile Mortality per 1,000 births ... ..	238·2
Deaths under one year Certified by Medical Practitioners ... ..	257
Deaths under one year Certified by Medical Practitioners per cent. ... ..	33·07
Deaths—Children under five years ... ..	1,139
Percentage of Deaths of children under five years to Total Deaths ... ..	41·3
Total Still-Births ... ..	135
Still-Births proportion per cent. of the Total Births ... ..	4·1
Deaths uncertified by Medical Practitioners Number ... ..	1,423
Deaths uncertified by Medical Practitioners per cent. ... ..	51·7



### III. SANITATION.

#### (A).—GENERAL REVIEW OF WORK DONE, LAWS PASSED AND PROGRESS MADE.

##### (I).—ADMINISTRATIVE.

*Staff.*—The European personnel of the Sanitary Staff consisted of the following members:—

- 1 Deputy Director of Sanitary Service, Dr. H. A. Foy.
- 1 Assistant Director of Sanitary Service, Dr. W. S. Clark.
- 3 Senior Sanitary Officers—Dr. R. W. Orpen, Dr. W. Allan and Dr. T. A. Dowse.
- 6 Medical Officers of Health:—

Dr. A. Crawford appointed M.O.H.	...	3.9.24
„ J. Cauchi	„	26.9.25
„ G. B. Walker	„ acting M.O.H.	1.10.24
„ G. R. Waller	„	14.1.25
„ J. Naudi	„	1.5.25
„ J. Macdonald (acting) not yet sanctioned by the Secretary of State.		

Subordinate Sanitary Staff—Nine European Sanitary Inspectors.

Six Non-Commissioned Officers were seconded from the Royal Army Medical Corps for one year for plague duty and arrived in Nigeria in November, 1924.

##### MOVEMENTS AND CHANGES IN STAFF.

Dr. H. Andrew Foy was on duty from the beginning of the year and proceeded on leave on November 6th, 1925.

Dr. W. S. Clark proceeded on leave on February 13th and resumed duty on August 20th, 1925.

Dr. R. W. Orpen arrived from leave on January 19th, 1925 and was on duty the whole of the year.

Dr. W. Allan was on duty until June 19th when he proceeded on leave and resumed duty again on December 10th, 1925.

Dr. T. A. Dowse was appointed a Senior Sanitary Officer and transferred to Nigeria from the Gold Coast to fill the vacancy caused by the promotion of Dr. W. S. Clark to Assistant Director of Sanitary Service. He assumed duty on March 4th, 1925 and was on duty for the rest of the year.

*Medical Officers of Health.*—Five of the six Medical Officers of Health allowed by the establishment have now been appointed, two definitely and three acting and an application for a sixth has been forwarded for sanction. Two of the above are already in possession of a diploma in public health, one has attended part of the course, another is at present taking the course and the remaining two will do so when on leave.

*African Staff.*—There were no changes in the clerical staff.

*Sanitary Inspectors.*—Extensive re-organisation of this branch is in progress. The total strength at present including temporary Sanitary Inspectors as well as those on the permanent establishment is eighty-three.

Sixty-four Vaccinators were provided for in the current year's estimates. The unsatisfactory nature of this grade was discussed at the Medical Conference held at Accra and it was recommended that they should be gradually abolished as a separate staff and their duties transferred to Sanitary Inspectors.



## ESTIMATES.

The Sanitary Estimates for the financial year 1925-26 provided for an expenditure of £63,693 as compared with £54,613 in 1924-25.

The Revenue for Nigeria for the financial year 1924-25 was £6,989,795.

## LEGISLATION.

1. Order in Council No. 16 of 1925 applied the provisions of the Births, Deaths and Burials Ordinance to Kano Township.
2. Order in Council No. 20 of 1925 applied some sections of the Public Health Ordinance to part of Owerri.
3. Order in Council No. 25 of 1925 applied the Public Health Ordinance and some of the Rules made under it, to a part of Abeokuta Town.
4. Order in Council No. 26 of 1925 applied the Public Health Ordinance to Government lands at Oshogbo.
5. Regulation No. 21 of 1925 entitled Quarantine Regulations 1925 gives considerable powers to deal with plague and to prevent its transmission by sea or by land.
6. Bye-Laws made under the Township Ordinance by the Lagos Town Council have been amended and should come into force in 1926.

## (II) PREVENTIVE MEASURES.

## (1) MOSQUITO AND INSECT-BORNE DISEASES.

(a) *Malaria*.—Although the death rate directly attributable to this disease is not great amongst either Europeans or Africans except perhaps amongst African infants, yet a great deal of illness and incapacity results. That it is not worse is probably due in large measure to the care that is taken in the use of mosquito-nets in West Africa and the prophylactic dose of quinine as individual measures and the following as general measures:—

The usual general measures of clearing of bush and long grass, filling in or draining or oiling of mosquito breeding places or possible breeding places, and regular inspection of premises are carried on in all stations. This work is carried on by African Sanitary Inspectors and labourers under the supervision of a Medical Officer or European Sanitary Inspector.

In the Southern Provinces where African Sanitary Inspectors are better educated records are compiled and Table (9) in the Appendix shows such records. The mosquito larva Index is doubtless lower in most instances than would be shown when a European armed with an electric torch makes inspections, *e.g.* in the case of Ibadan Township the index is given as 3% but Dr. Hansen of the Rockefeller Yellow Fever Commission found it to be 5%. This index should not be confused with that of the contiguous huge Native Administration town where it was found to be 49% by Dr. Hansen.

(b) *Yellow Fever*.—During the year an outbreak of yellow fever occurred, it was widely distributed over the Southern Provinces and it is probable that the epidemic extended to the north along the railway although only one case is known to have occurred so far north as Kaduna. In all twenty-one cases were actually reported and of these fourteen were fatal.



**Ibadan.**—The first case, a female Syrian, was diagnosed at Ibadan on the 30th April, and had taken ill on the 25th; this case ended fatal. Three other cases, all fatal, occurred at Ibadan, one an African, in June, the other two Europeans, one in August and the other in October. It is certain that unrecognised cases must have happened between the above. The high mosquito larva index of 49% in the Native Administration town has been mentioned already.

**Lagos.**—On the 1st of May, the first case was diagnosed in Lagos. A total of eleven cases, six of which ended fatally were reported officially in Lagos. Three of these became ill in April, four in May, one in June, two in July and one in September. In the light of what happened it is practically certain that at least three cases, two of which were fatal, had occurred in Europeans before the first diagnosed case but were not suspected to be yellow fever at the time.

**Warri.**—Two fatal cases were reported at Warri in July.

**Forcados.**—One case reported from the s.s. *New Columbia* at Forcados recovered. The patient, an Engineer, had spent a night in Lagos.

**Port Harcourt.**—Two fatal cases occurred, one each in June and July.

**Kaduna.**—One case ending in recovery was reported in August.

#### PARTICULARS OF THE REPORTED CASES.

No. of Case.	Date of onset of Disease.	Place where case occurred.	Nationality of patient.	Sex.	Age.	Length of Residence in West Africa.	Result.	Remarks.
1	April 30	Ibadan ...	Syrian ...	Female	30 years	6 months	Died	
2	" 23	Lagos ...	English ...	Male ...	35 "	5 "	"	
3	" 29	" ...	" ...	" ...	29 "	6 "	"	
4	" 29	" ...	" ...	" ...	41 "	6 "	Recovered	
5	May 2	" ...	" ...	" ...	30 "	1 month	Died	
6	" 16	" ...	Greek ...	" ...	21 "	8 months	"	
7	" 20	Forcados	English ...	" ...	28 "	—	Recovered	Ship Engineer, night at Lagos.
8	" 26	Lagos ...	" ...	" ...	20 "	3½ years	"	
9	" 28	" ...	" ...	" ...	48 "	15 "	"	
10	June 2	" ...	" ...	" ...	35 "	17 months	"	
11	" 5	Port Harcourt ...	" ...	" ...	48 "	12 years	Died	
12	" 9	Ibadan ...	African ...	" ...	18 "	—	"	
13	July 10	Warri ...	English ...	" ...	46 "	15 years	"	
14	" 12	Lagos ...	" ...	Female	32 "	1 month	Recovered	
15	" 14	Port Harcourt ...	African ...	Male ...	20 "	—	Died	
16	" 18	Warri ...	English ...	" ...	28 "	3½ years	"	
17	" 28	Lagos ...	" ...	" ...	53 "	—	"	Chief Engineer, S.S. <i>Akabo</i> .
18	Aug. 2	Kaduna ...	" ...	Female	38 "	3½ years	Recovered	
19	" 15	Ibadan ...	" ...	Male ...	44 "	18 "	Died	
20	Sept. 8	Lagos ...	" ...	" ...	26 "	5½ "	"	
21	Oct. 9	Ibadan ...	" ...	" ...	30 "	5 "	"	

Yellow fever was also reported in the Gold Coast in April, September, October and December, and in Monrovia, Liberia, in July, August and September.

The last considerable outbreak of yellow fever in Nigeria occurred in 1913. In that year a total of thirty-five cases were notified. Cases were reported from Lagos, Abeokuta, Forcados, Warri, Onitsha and Calabar so that infection was evidently widely spread in the year 1913.



During the years intervening between 1913 and 1925 cases were reported as follows:—

1914	one fatal case at	Jebba
1915	" " " "	Kaduna
1916	" " " "	Lagos
1917	four cases were reported in the Southern Provinces and several were stated to have occurred along the River Benue.	
1918	two cases,	Forcados and Benin
1919	one fatal case at	Warri
1920	" " " "	Lagos
1921	... ..	—
1922	two cases at	Warri
1923	none reported	
1924	three isolated cases.	

During 1916, 1917 and 1918 yellow fever was also reported in other Colonies, *e.g.*, Dahomey, Gold Coast, Sierra Leone and the Gambia in 1916; Gambia, Sierra Leone, Gold Coast and Congo in 1917; and from Sierra Leone, the Gold Coast and Dahomey in 1918.

It would appear that although yellow fever is present at all times it has years of epidemic prevalence amongst the indigenous inhabitants and that between these epidemics it is present as sporadic cases only and probably also with decreased virulence. In these periods it might be presumed that Europeans and other non-immunes obtain a certain degree of immunity. It is recognised by the long resident Syrians that their people seldom die of yellow fever after a residence of about three years.

*Prophylaxis.*—Intensive anti-mosquito works especially against domestic breeding mosquitoes is the chief preventive measure. The larvæ of *Aedes argenteus* which at first constituted 75% of all larvæ collected gradually became reduced to under 35%.

Anti-mosquito measures were also strictly enforced in the port area, *e.g.* ships were anchored at a distance from the infected shore, tugs, lighters, etc., moored near the shore were systematically inspected, fumigated and oiled, canoes along the foreshore were dealt with also, clearing of the foreshore of articles likely to favour mosquito breeding, loading and unloading between 7 a.m. and 6 p.m. from and into lighters, etc.

During an outbreak of yellow fever in a port town the harbour vessels are probably particularly dangerous to non-immunes living on board them and special anti-mosquito inspection and oiling is carried out on these vessels as a port sanitary routine measure.

*Anti-Yellow Fever Inoculation.*—By the kindness of the Yellow Fever Commission of the Rockefeller Foundation a quantity of Noguchi's *Leptospira* vaccine and Serum was placed at the disposal of the Government.

Practically all non-Africans were inoculated in the areas where yellow fever was known to exist and a total of 515 persons were reported to have been inoculated. As the epidemic did not produce a large number of known cases it is difficult to state definitely the value of the vaccine as a prophylactic, the course of the epidemic being very similar to that of 1913 when no vaccine was used.

The following table shows the number of prophylactic inoculations given each month.



## ANTI-YELLOW FEVER INOCULATIONS (NOGUCHI'S VACCINE).

Date.	SEX.		Number of persons inoculated.
	Male.	Female.	
1925.			
July ... ..	71	23	94
August ... ..	232	3	235
September ... ..	120	17	137
October ... ..	29	6	35
November ... ..	4	4	8
December ... ..	6	...	6
Total ... ..	462	53	515

*Serum Treatment.*—As regards the value of this sufficient experience is not available on which to base a definite opinion.

*Leptospira icteroides* has not been found in any of the cases diagnosed as yellow fever.

## YELLOW FEVER COMMISSION—ROCKEFELLER FOUNDATION.

A commission arrived in Lagos in the month of June, 1925 and has established a headquarters at Yaba, Lagos, on a site adjacent to the Medical Research Institute. Members of the Commission have visited and investigated the mosquito prevalence in many of the native towns in the interior of Nigeria and in other Colonies along the West Coast of Africa. The object of the Commission is a preliminary survey followed by such co-operative control work as the findings developed by the survey seem to indicate as the best means for the suppression of yellow fever in West Africa.

The Director of the Commission is Dr. H. Beeuwkes, M.D., and we are indebted to him for much assistance both during the epidemic and since in the diagnosis of cases and in the institution of anti-mosquito work.

(c) *Filarial Disease.*—No approximately accurate information is available as to its prevalence. It is widely spread and *Loa loa* infection is notably common in certain areas, e.g. Cross River and at Sapele in the Niger delta. Elephantiasis is also common.

(d) *Trypanosomiasis.*—Investigation and work in connection with this disease is carried out by the Medical branch of the Department.

## (2).—EPIDEMIC DISEASES.

The chief epidemic diseases are—smallpox, cerebro-spinal fever, relapsing fever, plague and influenza. Others prevalent but less epidemic are:—Dysentery, enteric fever, pneumonia, tuberculosis, leprosy, yaws and syphilis.

Compared with 1924 the year 1925 may be said to have been comparatively free from serious outbreaks of epidemic disease if one excepts the first part of the year into which were continued the epidemics of the previous year. The numbers of cases reported are very incomplete and likely to be misleading and are therefore omitted.

## SMALLPOX.

An outbreak involving a number of towns in the Oyo Province which began about the end of 1924 developed in 1925 in the months February to May and was the only considerable epidemic which occurred.



Groups of cases were reported from many places all over Nigeria the largest being sixty-five cases with eight deaths which occurred amongst labour employed on railway construction but was quickly suppressed.

*Vaccination.*—This is carried out with imported Lanolinated Lymph prepared by the Lister Institute. Vaccine to the value of £5,173 was imported during the year.

The following table gives the results:—

#### VACCINATIONS.

##### *Southern Provinces.*

	1923.	1924.	1925.
Total number vaccinated	225,021	237,133	285,763
Number inspected	—	185,146	236,614
Number successful	115,840	131,162	186,561
Percentage successful of those inspected	51·4%	70%	78·8%

##### *Northern Provinces.*

	1923.	1924.	1925.
Total number vaccinated	20,334	34,617	45,063
Number inspected	—	26,177	31,477
Number successful	10,754	17,542	26,267
Percentage successful of those inspected	52·8%	67%	83·4%

Vaccination is compulsory in the Southern Provinces but in the Northern Provinces in certain areas only.

#### VACCINE LYMPH—LOCAL PRODUCTION.

This subject was discussed at the Medical Conference held in Accra this year and it was recommended that a central institute should be established. It is proposed that the vaccine institute should be in the vicinity of the Veterinary headquarters at Vom in the Northern Provinces of Nigeria. It is realised that the close co-operation of the Veterinary Department is necessary for the success of the scheme and the question of site and the general arrangements are being gone into by the Veterinary and Medical Departments and definite proposals will be made in due course.

#### CEREBRO-SPINAL FEVER.

There was a remarkable reduction in the prevalence of this disease. The epidemic of the previous year was continued into the early months of 1925 but as this died down the remainder of the year was comparatively free from the disease in epidemic form. No cases were reported from Sokoto, Birnin Kebbi, Katsina and Bauchi. It was slightly prevalent in Kano, Maidugari, Jos, Kaduna, Ilorin and Lokoja. It was more prevalent in Kontagora, Zaria, Keffi, Ibi and Yola.

In the Southern Provinces, cerebro-spinal fever has never been epidemic, sporadic cases only occur and these are generally imported from the north. Six cases were reported during the year, three at Ibadan, two at Lagos and one at Calabar.

#### RELAPSING FEVER.

There has been a great reduction in the prevalence of this disease also. The epidemic of 1924 was continued on into the early months of the year; Sokoto (Birnin Kebbi), Yelwa, Kano, Katsina, Maidugari, Bauchi, Gwando and Wase districts producing 90% of the cases reported in the Northern Provinces.



The Southern Provinces which had escaped almost altogether in 1924 were invaded along a Hausa trade route from the north and an outbreak took place in the Ado Ekiti-Ishan area. The disease occurred in the months of September to December and was soon suppressed. A total of 178 cases with sixty-seven deaths were reported but in all probability was nearer 300. Owing to the different habits of the people of the Southern Provinces the disease does not tend to spread readily. The inhabitants in the south do not as a rule wear so much clothing; they are also cleaner in their persons than the inhabitants further north where water is probably scarce. The method of spread of the disease and its prophylaxis is carefully explained to the people wherever possible. Serbian barrel sterilisers were established in various places for the sterilisation of clothes. This is a disease in which the results of treatment with an arsenical such as Novarsenobillon are spectacular and where organisation and staff permitted, large numbers were treated by this drug.

#### PLAGUE (BUBONIC).

The outbreak of plague which began in Lagos in July, 1924, and remained restricted to Lagos and Iddo Islands during that year, appeared on the mainland in the village of Agege about twelve miles up the railway. The first cases were recognised in March, 1925, and a total of twelve cases with nine deaths were reported. It was a true spread of bubonic plague for out of 967 local rats examined six were found to be plague infected. Human cases occurred in March, April, May and July but from that time on neither infected rats nor further human cases have been found.

The chief point was that infection had spread to the mainland and that further steady though perhaps slow extension was practically certain to occur. Between October 23rd and December 5th, 1924, plague infected rats had been discovered in the Railway goods sheds at the terminus on Iddo Island and special precautions had been taken to prevent the transport of rats in vans, waggons and merchandise, but it appears probable that infection was spread to Agege by rail as plague occurred in two villages near the railway and further up line in April and May, one case in each village although in the case of the second village (Kurere) a history of a number of other suspicious deaths was got and as the village was small, very dilapidated and deserted it was burned.

#### IJEBU ODE OUTBREAK.

In August a considerable outbreak was reported from Ijebu Ode Province further to the north-east and over thirty miles east of the railway. This outbreak involved a group of villages three to five miles apart. Over five hundred cases with nearly four hundred deaths were reported. (See chart 2.)

The following details are given :—

Village.	Population.	Cases.	Deaths.
Ogere ... ..	2,000 approx.	297	201
Itishan ... ..	1,600 "	108	88
Ishara ... ..	2,800 "	69	58
Iperu ... ..	6,000 "	47	31
Shagamu ... ..	6,000 "	1	1 (probably imported).



## ABEOKUTA OUTBREAK.

In November plague was reported in an outlying section of the large town of Abeokuta and forty-four cases with forty-four deaths were reported. This outbreak was very localised and appears to have stopped suddenly.

## LAGOS.

Plague in Lagos is now endemically established and seems likely to remain so until very considerable improvement of its sanitary condition takes place. One hundred and four cases with eighty-eight deaths were notified during the year as compared with 414 cases in 1924 from July 28th to December 31st. It is probable that a much larger number actually occurred for many cases with groin, axillary or cervical adenitis were met with in which no satisfactory cause for the adenitis could be found and the patients were not very indisposed. There was also a suspicious increase in the number of deaths certified as due to pneumonia. One case in a European occurred *viz*: the Medical Officer of Health, Lagos, who cut his finger whilst performing a post-mortem on a plague body, in spite of immediate disinfection, developed plague but fortunately recovered.

*Kano*.—One fatal case of plague, a male, adult African, was reported at Kano in November. The diagnosis was confirmed post-mortem. The case occurred near the terminus of the railway and the source of the infection was not clearly traced. It was stated that a member of the deceased's family had returned ill from Lagos but had recovered. Four hundred and twenty-one rats caught in the vicinity were examined microscopically but none were found to be plague infected.

## PLAGUE (PRIMARY PNEUMONIC).

An outbreak of primary pneumonic plague occurred in Lagos in July, 1925, and there were in all five undoubted cases.

The first case was admitted to the African Hospital on the 13th July and died on the 16th of what was diagnosed to be a left lobar pneumonia but post-mortem examination revealed *B. pestis* in the lung. The second case was admitted to hospital on the 15th July and died on the 17th. He was a nurse and had nursed the first case. The third case was admitted to hospital on the 16th July and died on the 18th; he also was a nurse and had nursed the second case. The fourth case was also a nurse, he became ill on the 21st July, was removed to the Infectious Diseases Hospital and died on the 23rd; he had nursed cases two and three. The fifth case was a labourer at the African Hospital and had transported the fourth case to the Infectious Diseases Hospital, he became ill on the 26th July and died on the 27th.

All admissions to the hospital were now segregated until plague could be excluded and all cases of pneumonia were segregated in a special ward and the nurses attending them protected with overalls and plague masks until the probability of pneumonic plague could be excluded. No further cases of primary pneumonic plague occurred. Two or three suspicious cases were seen, one on the 28th July and two in September, but in two of these no particular precautions had been taken and no infection appears to have been transmitted to those in contact with them.

## PLAGUE PROPHYLAXIS.

The anti-plague measures detailed in the Annual Medical Report for 1924 were continued but not without some interruption, for it was found that owing to the wording of the Quarantine Ordinance action against plague could not be taken legally unless the place was declared to be in quarantine and quarantine could not be imposed and the place declared infected except on the occurrence of at least two human cases



and these two cases had to occur within five days of each other otherwise no quarantine was imposed. This was amended and new plague regulations made.

As the wording of the Quarantine Ordinance is unsatisfactory and confusion exists between the terms "infected place" and "a place in quarantine," it is proposed to draft a new and simpler Ordinance.

*The infection in Rats* which at the beginning of the year was 0.5% of those examined decreased in February and from March to June only an occasional infected rat was found. In June the number increased reaching 1% in September and 2.3% by the end of the year. The cases of human plague also increased. (See chart 1.)

The usual temporary measures of anti-plague inoculation, rat destruction, isolation, disinfection, general cleansing and refuse disposal were carried out. It is recognised that very considerable improvement in the housing of Lagos will be necessary to render them less attractive to rats and that protection of food supplies is essential also. Lagos being an island all the food supplies have to be imported and as no markets exist except for the sale of meat trading is done in the streets and large quantities of food are stored at night in huts and freely exposed to rats. There is great need for good concrete lock up markets and the provision of these is bound up with the necessity for a town planning scheme. Under quarantine regulations made towards the end of the year power is given for the enforcement of the rat proofing of stores and action is being taken.

As the refuse of the town could not be effectively dealt with and the refuse dumps attracted rats a sum of £20,000 has been granted by Government for the construction of a proper destructor.

Plague infected premises which cannot otherwise be dealt with effectively are demolished and a few insanitary huts have been got rid of by this means.

In the Ijebu-Ode area three Medical Officers and the necessary African staff were appointed for plague work. The villages are in the Native Administration area and had no sanitary organisation. They were reported as very insanitary even for native towns. The village of Ogere which suffered most severely was correspondingly more insanitary owing to the large number of deaths and the custom of house burial. Many bodies had only a few inches of soil over them and the only measure that could be taken was to break down the mud walls of the huts over them to afford better burial.

After a few weeks labour a considerable improvement was effected.

The Native Administration was advised to make a rule that all household food supplies should be protected from rats and that all large stores of produce should be kept on their farms and not stored in their huts. This was agreed to as being quite feasible, for large earthenware pots suitable for storing food are largely used in the district.

Funds were also supplied to the Medical Officer in charge for the purpose of building a sample type of rat proof granary which the natives could copy and one such was built. The rule as regards protection of household food supplies has not been very effective so far but there is likelihood of improvement. At Abeokuta, also a Native Administration area, similar advice was given.

The rodents responsible for the dissemination of plague are *Rattus rattus*, *R. Norvegicus* and *Mus musculus*.

#### ANTI-PLAGUE INOCULATION.

A total of nearly 200,000 anti-plague inoculations were performed; 117,000 of these were done in Lagos and the remainder in other parts of Nigeria.



### RAT DESTRUCTION.

198,500 rodents were destroyed and 180,000 of these in Lagos alone.

The rat examination laboratory established in 1924 in Lagos is regularly in use and 72,748 of the rats were dissected and smears made for microscopical examination. Out of this number 283 were found to be plague infected, the examination of the smears being carried out at the Medical Research Institute.

### POST-MORTEM EXAMINATIONS.

In Lagos 210 post-mortem examinations were made in cases in which death was suspected to be due to plague, and many more deaths were investigated in which no dissection was made.

### INFLUENZA.

This disease has been reported as being epidemic in many places e.g. Port Harcourt, Ibadan and Onitsha in the Southern Provinces and Zaria, Minna, Kaduna and Jos in the Northern Provinces. These epidemics were of a mild type and the mortality was small.

### PNEUMONIA.

Pneumonia was reported from a few stations, Kaduna and Kano in the Northern and Lagos in the Southern Provinces. Reporting of cases is of course very imperfect and no approximately accurate idea of its prevalence can be got. It was very prevalent in Lagos and 360 deaths were registered as due to this cause. It is reported as always present at Enugu and epidemics occur in the early months of the year.

### DYSENTERY.

Dysentery is prevalent all over the country and is generally reported as being of the amoebic type. In Lagos where registration of births and deaths of natives is carried out eighty deaths from dysentery have been registered.

### ENTERIC FEVER.

Little is known as to the prevalence of this disease in Nigeria; a total of fifteen cases came to notice during the year, eight of which were reported from the Government prison, Kano.

### TUBERCULOSIS.

Very little accurate information is available as to the prevalence of tuberculosis in Nigeria. Cases occur in widely separated places. As a rule infection is of the pulmonary type and so far as is known invariably ends fatally.

In Lagos where 48% of the deaths are certified by a Medical Practitioner some idea of the number of deaths from tuberculosis may be had.

#### *Tuberculosis in Lagos (certified deaths.)*

	1921.	1922.	1923.	1924.	1925.
Pulmonary Tuberculosis ... ..	57	74	85	69	72
Tuberculosis, other parts ... ..	8	4	6	23	10
Totals ... ..	65	78	91	92	82



The estimated mid year population of Lagos for 1925 was 109,076.

As only 48·2% of deaths are certified by a Medical Practitioner it is probable that about an equal number occur among the uncertified deaths.

The Resident Medical Officer of the African Hospital, Lagos, reports that 2·4% of the total admissions to hospital in 1925 were for tuberculosis; in 1924 the percentage was 2·6.

#### LEPROSY.

Interest in the suppression of this disease has been awakened by the visit of Mr. F. Oldrieve, the Secretary of the British Empire Leprosy Relief Association, to Nigeria, and it is proposed to form a branch in Nigeria. At present, knowledge of the extent of leprosy in Nigeria is very defective. A few leper camps exist wherever the local chiefs and people have favoured the segregation of lepers in their area; such segregation camps exist at Zaria, Yola, Maidugari and Keffi in the Northern Provinces and at Onitsha and Ogwashi in the Southern Provinces. There is no compulsion with regard to these and the inmates go out and in as they choose, public opinion being the controlling factor although the hope of treatment is also a powerful inducement.

There is a leper Asylum at Lagos but here there is compulsory detention.

At large Medical Stations where treatment of lepers has been carried on lepers come from distant parts of the country for treatment. At Port Harcourt over a hundred have so collected and owing to inadequate accommodation for them have become a nuisance in the township. An endeavour is being made to establish a camp for them. In the meantime some have been accommodated in the Infectious Diseases Hospital.

#### YAWS.

Yaws is rare in some parts of the country and prevalent in others. In the Northern Provinces it has been reported as very prevalent in Kontagora, Lokoja and around Ankpa in the Munshi Province. In the Southern Provinces it is widely spread all over the country east of the Niger River and in certain localities west of the Niger. It is reported as specially prevalent at Enugu and Abakaliki east of the Niger and at Agbor to the west. Wherever treatment is known to be available large numbers of patients soon come for treatment.

#### SYPHILIS.

This disease is very prevalent especially in the coast towns in the south, along rivers and is reported to be widely distributed and very prevalent in the Northern Provinces in the Mohammedan areas. Treatment is carried out at all Medical Stations and increasing numbers avail themselves of it. No general anti-venereal campaign has been instituted.

#### (3)—HELMINTHIC DISEASE.

Infestation with ascaris, hook-worm and guinea-worm is common in the Southern Provinces and in the Northern Provinces guinea-worm and tape worm (*T. Saginata*). *Bilharzia* occurs in various parts of the country; *S. haematobium* and *S. mansoni* have both been found, but their prevalence does not appear to be great.

Hook-worm infection does not appear to be common in the Northern Provinces and this may be due to the dryness of the soil as well as to the use of deep cesspit latrines with consequent less fouling of the soil.

In the Southern Provinces generally hook-worm infection is very common and 50% to 90% infections in different areas is not unusual. Speaking generally they seem to cause very little injury to health for the number of worms harboured is usually small.



## UDI COAL MINE.

Owing to the discovery of hook-worm infection in a European Official connected with the Colliery an investigation into the sanitary arrangements of the mine was made, also all Europeans were examined for hook-worm infection. Four were found infected and were treated with Carbon tetrachloride.

The sanitary arrangements were found to be inadequate and there was much fouling of the interior of the mine. Advice as to the arrangements to be adopted was given and treatment of all labourers with Carbon tetrachloride was begun. About 1,000 labourers per day work at the Colliery.

Towards the end of the year a Medical Officer of Health was detailed to inspect and report on what had been done. He reported that the latrine accommodation was still inadequate and made recommendations as to what should be done. He commented on the sodden condition of the ground in parts of the mine and on the difficulty of efficient drainage, the importance of which the mining officials are well aware. Tarring of the entrance to each mine for a distance of about fifty yards was also advised. An examination of both surface and under-ground labourers was carried out to ascertain the number of each infested and the results showed 41.6% and 44.1% respectively. This was considerably lower than is usual in the neighbouring villages and may have been due to previous treatment with Carbon tetrachloride.

Ten European Officials employed in the mines were also examined and one was found infected.

The report was communicated to the Manager of the Colliery and the General Manager of the Railway under whom the Colliery is.

## (III)—GENERAL MEASURES OF SANITATION.

## (1) SEWAGE DISPOSAL.

In the Northern Provinces the almost universal system in all stations is the pail latrine with trenching of nightsoil for Europeans and the deep cesspit for natives. The deep cesspit if properly made and covered is an effective method of disposal suited to the country. Frequently however they are a source of fly breeding. In certain areas also cesspits are in close proximity to wells (Kano) and contamination of the water is probable. This insanitary condition is being abolished in township areas.

In the Southern Provinces the pail system is also in use for Europeans and for Africans, also in many townships. The method of disposal varies in different stations, being trenched, dumped in creeks or rivers or incinerated.

In some African towns deep cesspit latrines have been introduced where formerly there was no system of disposal at all. Where the soil is suitable this is a cheap and effective method but with the drawback that fly breeding is difficult to prevent. Experiments have been begun with fly traps connected with the large public type of cesspit.

In certain parts of Lagos water closets have been constructed in connection with Government premises the sewage being discharged direct into the adjacent lagoon.

Funds have been provided in the 1926-27 Estimates for the construction of an experimental septic tank water closet and it is proposed to erect this at Port Harcourt.

Should this experiment be successful it is proposed to develop a type suitable for other towns where there is an adequate pipe-borne water supply—*e.g.* Enugu, Calabar, &c.



In townships the Local Authority is responsible for conservancy but as the township funds are always inadequate financial assistance is given by the Sanitary Department for the payment of labour or the employment of a contractor. Each year in some of the townships public bucket latrines are erected as funds allow.

## (2)—SCAVENGING AND REFUSE DISPOSAL.

The most common practice is the provision of public dust bins to which the public convey their refuse. These are emptied daily by labour paid by funds supplied by the Sanitary Department or by prison labour.

The refuse is removed to the place of disposal by head load, by sanitary carts, by donkeys with panniers or by motor waggon as in Lagos.

Refuse is in most places disposed of by burning in incinerators, or by burial, dumping in rivers or swamps and also used for filling up old borrow-pits. In Lagos the disposal of the large amounts of refuse collected daily, has been a problem and large dumps existed on the outskirts of the town and in it. These harboured rats and funds have been provided in the Sanitary Estimates 1926-27 for the construction of a large destructor at an estimated cost of £20,000. In some of the townships each year so far as funds permit, public dust bins and refuse incinerators of a small type are built.

## (3)—DRAINAGE. (SUBSOIL AND SURFACE).

So far as I am aware the only subsoil drainage is that of the Race Course in Lagos.

### SURFACE DRAINAGE.

In the great majority of stations surface drainage is by earth drains. These in some places act satisfactorily but in others are difficult to keep even and free from excavations and weeds. Permanent surface drainage with masonry drains is being carried on in Lagos, Port Harcourt, Calabar and Sokoto. In Sokoto on account of mosquito breeding a permanent scheme of surface and subsoil drainage was begun in the gardens last year and is still being carried on. The results during last rainy season are reported as satisfactory. At Port Harcourt a considerable scheme of brick surface drains is being carried out in the Native town by the Public Works Department, 850 linear yards have been completed and 2,500 yards are under construction.

In the European area 650 feet of brick drains were constructed during the year. The resulting improvement is already very great.

At Calabar 208 yards of concrete drain were laid. The brick surface drains of Calabar, originally good, have been allowed to fall into disrepair.

In Lagos the drain construction programme is being steadily carried out by the Town Council with resulting great improvement and a further 1,748 linear yards of masonry drains have been added to the system. It was also necessary to construct 1,400 yards of earth drains.

## (4)—WATER SUPPLIES.

The chief event under this heading during the year is the completion and opening of the Enugu Water Works and Enugu township now possesses a good pipe-borne supply.

There is considerable activity in other places in the preparation of water supply schemes and funds are being provided in the Estimates for the next financial year for pipe-borne water supplies for Kaduna, Zaria, Ibadan, Ijebu Ode, Port Harcourt, Aba and Onitsha and for the improvement of the Calabar supply. Investigations are still being carried on by a water Engineer for a pipe-borne supply for Kano and it



is hoped that this will be pressed forward as rapidly as possible as the water supply of Kano, inadequate at any time, has been still further reduced by doing away with the Kano dam.

The pipe-borne supply to Benin City which has been in existence for many years and is now quite inadequate requires improvement.

#### (5)—OFFENSIVE TRADES.

The chief offensive trade is hide curing, and in the meantime the chief difficulty has been the disposal of the arsenical waste. It was feared that some wells in the vicinity might be liable to contamination and samples of soil at various distances were taken and sent to the analyst for examination for arsenic. In those samples found to contain arsenic the arsenic was in insoluble combination with iron, so no danger was presumed to exist.

Soap making is also carried on (Lagos) but no offensive fats are used.

The existing law provides full powers for the control of offensive trades.

#### (6)—BUSH CLEARING.

A large amount of labour is used each year for the clearing of bush and grass. Owing to moister conditions much more of this has to be done in the southern part of the country than in the north.

In many stations in the south and a few in the north an endeavour is being made to dig up the roots and stumps of trees, scrubs and bush grass and to plant the area with Dhub grass. Where this is successful the labour of bush and grass cutting is considerably reduced.

In newly cleared areas where numerous tree stumps are left the top of the stumps decay and over 30% of such have been found to contain mosquito larvæ or eggs. These breeding places are rendered more favourable by the sprouts and shoots which grow from these stumps shading and concealing the decayed wood. In the Southern Provinces a considerable amount of the clearing is done by gangs of prisoners.

#### (7)—SANITARY INSPECTIONS.

A considerable amount of travelling had to be undertaken by Sanitary Officers especially in the Northern Provinces on account of reported outbreaks of infectious disease. Owing to the great distances to be covered and the small staff available the amount of time taken up has been large. These visits also were hurried as no sooner did an officer arrive in one area than his presence was demanded in another. These hurried inspections rendered very difficult and usually impossible the formulating or development of regular schemes for improvement.

The following stations were visited during the year and a few more than once:—

Kano, Zaria, Sokoto, Birnin Kebbi, Yelwa, Kontagora, Zungeru, Minna, Jos, Jemaa, Baro, Lokoja, Makurdi, Abinsi, Ibi, Yola, Bida and Gusau in the north and Badagry, Ikorodu, Epe, Abeokuta, Ibadan, Ijebu Ode, Iperu, Oshogbo, Oyo, Ifon, Owo, Benin City, Sapele, Warri, Agbor, Akure, Asaba, Onitsha, Awka, Enugu and Port Harcourt in the south.

#### (IV)—SCHOOL HYGIENE.

It has not been found possible up to the present to develop this important branch of public health owing to want of staff. No information is available of the physical condition of pupils and it is realised that the sanitary condition of schools is far below what is required in establishments which set themselves to develop the youthful character.



## (V)—LABOUR CONDITIONS.

The Government is the largest employer of labour, *e.g.* Railway Construction, coal mines and Public Works. Smaller numbers are employed at the tin mines and by various Commercial Firms. On Railway Construction, labourers are housed in temporary camps and are looked after medically by the construction Medical Officers. Colliery labour is drawn from the surrounding villages and most of the labourers live in their villages. A camp has been formed for colliery labourers at the Iva Valley mine, the buildings are substantial mud walled huts mostly of large size. These large huts have been more or less roughly partitioned off into cubicles as the average labourer prefers to have his own single compartment. A certain number of labourers occupy these huts.

The District Medical Officer attends to these when required.

In most cases however the labour is what may be termed casual and labourers work more or less regularly and are daily labourers and no particular care is taken of them.

## (VI)—HOUSING AND TOWN PLANNING.

(a) *Housing*:—A housing committee with one female member on it was appointed by His Excellency the Governor to take evidence and formulate recommendations as to the types of houses which should be built.

This is a step in the right direction and the designing of types suitable for the different parts of the country with different climatic conditions should do much to improve the present unsatisfactory housing. The chief defects in permanent and semi-permanent quarters have been lack of sufficient protection from the heat rays of the sun and from glare, absence as a rule of mosquito proofing of even one cubicle and a tendency to keep the ceilings too low. Temporary quarters (bush houses) with good thatch roofs are usually quite sun proof and the difficulty with these is usually that they are not kept in good repair.

(b) *Town Planning*:—As mentioned in the Annual Report for 1924 the procedure for town-planning was re-organised and Town Planning Committees were appointed for the Northern and Southern Provinces respectively. That in the South has functioned fairly well but in the Northern Provinces there has been difficulty in getting the committee to meet and a monthly meeting only was required as a routine procedure. If the work of town-planning is to proceed without undue delay it may be necessary to still further decentralize and give the Local Authority with its Health Board, in each township more freedom of action.

## TOWN-PLANNING IN NATIVE ADMINISTRATION AREAS.

As the town-planning organisation has no jurisdiction in Native Administration Areas a simple set of rules for the guidance of Native Administrations issued first in 1919 has been revised and re-issued in the hope that some improvement may result.

The question of town-planning was discussed at the Medical Conference held at Accra in December 1925, and certain recommendations are being made as result.

## (VII)—FOOD IN RELATION TO HEALTH AND DISEASE.

## INSPECTION AND CONTROL.

At all stations where slaughtering of animals takes place and at which there is stationed a Medical Officer or a Sanitary Inspector, inspection of meat is carried out. As all animals are inspected before slaughter badly diseased meat is never seen. The commonest parasite found is a liver fluke *Fasciola gigantica*, 443 times in 14,554 animals.



Other diseased conditions in order of frequency are:—pleurisy, pneumonia, metastrongylus in the lungs of pigs, abscess and cirrhosis of the liver in pigs—*Cysticercus bovis* has not been found to be common.

In the larger townships supervision is exercised over bakeries and the general food stuffs exposed for sale, both local and imported. Formerly large quantities of blown canned foods were destroyed but not nearly so much unsound food has been found lately.

An adequate diet is admittedly a most important public health consideration and generally speaking where food is plentiful and good the physique of the people and their resistance to disease appears to be much better. *Ankysostome* infection may be present to the extent of 50% to 90% in a well-fed tribe and yet cause little or no disability. In a poorly fed tribe the opposite appears to be the case and the symptoms of infection are evident.

Over a considerable area of the country especially east of the Niger in the Southern Provinces there is usually a period of food shortage of from two to four months between March and July and deficiency oedema can be found amongst the general population before the new crops are available. In a country so extensive as Nigeria and with so many different tribes the articles of diet vary greatly in different areas. The chief articles are:—Yams, cassava, plantains, native rice, maize, guinea-corn and millet, ground-nuts, beans, palm oil, ground-nut oil, onions, tomatoes, peppers and a variety of green leaves. Dried and fresh fish, shrimps, snails, beef, mutton, goat flesh and in various parts almost any thing that creeps, walks or flies.

Rice, wheat flour, biscuits, stockfish and a variety of canned goods are imported and at the three ports Lagos, Port Harcourt and Calabar, there are cold storage plants used for imported beef, mutton, game, vegetables, etc. There is difficulty all over the country in getting sufficient fresh vegetables for the European official population due largely no doubt to the frequent changes of station of officials.

#### MARKETS.

There is no properly constructed market in any town in Nigeria at present. The usual native market is held under the shade of trees and with perhaps a few bush huts as shelters. In some towns there are more or less regular lines of booths or temporary market stalls whilst in a few others an attempt at a more permanent market is made and streets of mud-walled, grass-thatched stalls have been built, *e.g.*, Jos. In many of the townships of the south markets are laid out regularly by the Local Authority and market sheds built. These consist of a concrete floor usually with a corrugated iron roof but no sides, they are divided into stalls and rented at so much per month.

#### SLAUGHTER HOUSES.

Most stations and towns of importance have either masonry built slaughter houses or an open concrete slaughter platform.

#### DAIRIES.

There are no dairies and fresh milk is rarely obtainable in the Southern Provinces but in the Northern Provinces fresh milk can be got in many parts of the country.

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

*Schools.*—Hygiene and Sanitation is included as a subject in the curriculum of every Government and Assisted School. A graduated course of instruction suitable to the several classes in Primary and Secondary Schools is included in the Education Code for the guidance of Teachers.



Students in Training Colleges and Teachers attending Evening or Vacation Classes are given courses of lectures in Hygiene and Sanitation and how to teach it. Inspections by Sanitary Inspectors and by Medical Officers have an educative influence amongst adults. "Health Week" is held each year in Lagos.

#### C.—TRAINING OF SANITARY PERSONNEL.

This is a weak point in the Sanitary organisation. In 1917, a syllabus of training was drawn up and a class for training Sanitary Inspectors was begun. The course of training extended to three years but the third year was usually spent in practical work as a Sanitary Inspector. The course was conducted by the Medical Officer of Health, Lagos, in his spare time and the arrangement has never worked well. For the past two years training has practically ceased as owing to epidemic disease and increased work generally the Medical Officer of Health has been unable to devote sufficient time to this work. This has resulted in a considerable shortage of trained men and one half of the staff consists of temporary inspectors few of whom will be suitable for training for the permanent staff.

In order to offer better prospects and encourage better candidates to come forward for training a re-organisation of the African Staff has been carried out and better pay and prospects offered.

The question of training of Sanitary Inspectors was discussed at the Medical Conference held at Accra in December and certain proposals have been made to Government.

#### D.—RECOMMENDATIONS FOR FUTURE WORK.

1. An increase in the Sanitary Staff. The great area of Nigeria and the more rapid rate at which it is now developing, renders it absolutely necessary that much greater decentralization should take place. This would mean the formation of areas in the Northern and Southern Provinces, each in charge of a Senior Sanitary Officer or a Senior Medical Officer of Health. At present, it is impossible without a sufficient, permanent organisation to formulate and follow up schemes for sanitary improvement, or maintain a continuity of policy in any area. Port Harcourt is now the second port in Nigeria and is the terminus of the Eastern Railway and will require a port health organisation yet it has been found impossible to post a Medical Officer of Health there for more than five months during the past eighteen months.

2. More attention should be directed to the sanitation of large Native Administration towns especially those in proximity to main trade routes.

3. The establishment of an efficient sanitary organisation as part of the machinery of each Native Administration area.

W. S. CLARK,

*Acting Deputy Director Sanitary Service.*



## IV.—METEOROLOGY.

There is nothing out of the usual to record under this section for the period under review.

The average annual rainfall in the Northern Provinces over seventeen stations is about 40 inches, the stations with the lowest rainfall being Geidam, Katagum, Maiduguri, Sokoto and Birnin Kebbi, the highest, Naraguta, and Kaduna. In the Southern Provinces the average annual rainfall over thirty-three stations was 79 inches, the highest recorded for 1925 was from Brass with 135 inches, other stations with over 100 inches being Victoria, Opobo, Calabar, Forcados, Port Harcourt, Sapele, Bamenda, Degema and Warri, while Agege, Ibadan, Olokemeji, Ondo and Oyo were all under 50 inches.

The average annual rainfall at Debunsha in the Cameroons is given as 412 inches taken over a period of twelve years.

The meteorological returns for the year are given in Table V.

## V.—HOSPITALS AND DISPENSARIES.

During the year much needed advance was made in the provision of Hospitals and Dispensaries. Two new wards were completed in the Kaduna African Hospital, one for females. A new outpatient block was completed for the African Hospital, Zaria, an outpatient block and a ward block were completed at a new site near Faggi in Kano Township. Similar buildings were erected at Jos. The erection of the New Massey Dispensary, Lagos, with special provision for maternity, for women's and children's diseases was commenced. A woman doctor has been appointed and is getting experience and gaining the confidence of the people by her work in the African Hospital. She is learning the Yoruba language as is also the European Nursing Sister. A large extension to the African Hospital at Port Harcourt was commenced and should be completed in 1926. The proposals for a new African Hospital and Medical Store at Lagos were submitted to the Legislative Council in October and approved in principle. They have since been approved by the Secretary of State and it is hoped building will be commenced early in 1926. Plans have been prepared for extension of the African Hospital at Calabar, Kaduna and Kano, and new African Hospitals are projected at Abeokuta, Aba and Ijebu-Ode. A new European Hospital is being built at Enugu and new European Hospitals for Jos, Ibadan and Kano have been arranged. A new African Hospital is under consideration for Ibadan and an outpatient block for Makurdi. In addition a Native Administration Hospital has been started at Ibadan and one is projected for Maiduguri.

A second Medical Officer was re-established at Ibadan and Birnin Kebbi and Oshogbo were re-opened. New stations were commenced at Ijebu-Ode, Akure, Azare and Makurdi.

The total number of cases treated in the Hospitals and Dispensaries was 224,901. This number is exclusive of patients treated by Medical Officers on tour which do not appear on the returns.

## TOTAL CASES TREATED IN GOVERNMENT HOSPITALS AND DISPENSARIES WITH TOTAL DEATHS.

1924.	Cases.	Deaths.	European Population.	
European	5,759	33	December, 1924	3,830
African	205,870	1,649		
Total	211,629	1,682		
1925.	Cases.	Deaths.	European Population.	
European	6,601	48	December, 1925	4,050
African	218,300	1,579		
Total	224,901	1,627		

The details are given in Tables VI and VII.



## VI.—SCIENTIFIC.

The Annual Reports from the Director of the Medical Research Institute, the Government Analyst, the Dental Surgeon, the Port Health Officer and the following Scientific Papers contributed by Medical Officers appear in the Appendix. Arrangements are being made whereby it is hoped that in future these papers may be made of greater interest by the reproduction of photographs.

By Dr. E. E. Maples ...	Lumbar Hernia (with photographs.)
" " D. G. F. Moore	Goundou (with photograph.)
" " F. Ross ...	Uterine Fibromyoma and Ectopic Gestation.
" " " ...	Malignant Disease (with photograph.)
" " H. R. Morehead	Blackwater Fever and Quinine.
" " " "	Malignant Disease in European.
" " I. G. Cummings	Laboratory Work, Port Harcourt.
" " E. C. Braithwaite	Carcinomata in Natives of Africa (with photographs.)
" " " "	Foreign Bodies impacted in the small Intestine.
" " " "	Case of Bilharzia of the Bladder.
" " " "	Treatment of Leprosy.
" " " "	Hepatic Abscess (Amœbic.)
" " " "	Uric Acid Calculus.
" " " "	Duodenal Ulceration and Septic Peritonitis following on Extensive Burns.
" " T. L. Craig ...	Diabetes and Cataract.
" " G. F. Forde ...	Treatment of Yaws with Stovarsol.
" " T. M. R. Leonard	Hepatic Abscess, Non-Surgical Treatment.
" " " "	Acute Gangrenous Appendicitis.
" " W. B. Johnson	Case of Human Infection with Coenurus
" " " "	Two Cases of Granulomatus Abdominal Tumours.
" " " "	Case of Adeno-carcinoma of both Ovaries.
" " " "	Case of Submaxillary Cyst.
" " " "	Case of Lymphangioma of Face (with photo).
" " " "	Rupture and Extrusion of the Cervix Uteri.
" " Quintin Stewart	Six cases of Malignant Neoplasms in Northern and Southern Provinces:—three Sarcomata. three Carcinomata.
By Drs. Aitken, A. Connal, G. M. Gray and Smith;	Yellow Fever in Lagos, 1925.
By Dr. W. R. Parkinson	Large Lipoma of shoulder.

31st May, 1926.

D. ALEXANDER,

*Director of the Medical and Sanitary Service.*



TABLE II.  
FINANCIAL.

I.—ESTIMATED EXPENDITURE FOR THE YEAR 1925.

A.—*Personal Emoluments.*

MEDICAL.

Administrative Officers ... ..	£11,100
Surgical Specialists ... ..	6,600
Senior Medical Officers ... ..	12,650
Medical Officers (European and African)	71,154
Dental Surgeon ... ..	893
European Nursing Staff ... ..	9,754
Clerical Staff ... ..	5,379
Dispensers and African Nursing Staff ...	30,100
Other items under Personal Emoluments	27,728
Total Personal Emoluments ... ..	£175,358

SANITATION.

Administrative Officers ... ..	£2,800
Senior Sanitary Officers and Medical Officers of Health ... ..	7,573
European Sanitary Inspectors ... ..	3,959
African Sanitary Inspectors ... ..	5,786
Other items under Personal Emoluments	8,553
Total Personal Emoluments ... ..	£28,671

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European Staff ... ..	£4,272
African Staff ... ..	256
Total Personal Emoluments ... ..	£4,528

B.—*Other Charges.*

MEDICAL.

Medical, Surgical, Dental and X Ray Equipment and supplies ... ..	£17,400
Diets, Provisions and Necessaries ... ..	11,600
Other items ... ..	30,605
Total, Other Charges ... ..	£59,605

SPECIAL EXPENDITURE.

Tsetse Fly Investigation ... ..	£5,000
Hospital Equipment ... ..	4,000
Total Special Expenditure ... ..	£9,000

SANITATION.

General Sanitary ... ..	£21,666
Plague Expenses ... ..	19,000
Total Other Charges ... ..	£40,666

MEDICAL RESEARCH INSTITUTE.

Miscellaneous Other Charges ... ..	£2,185
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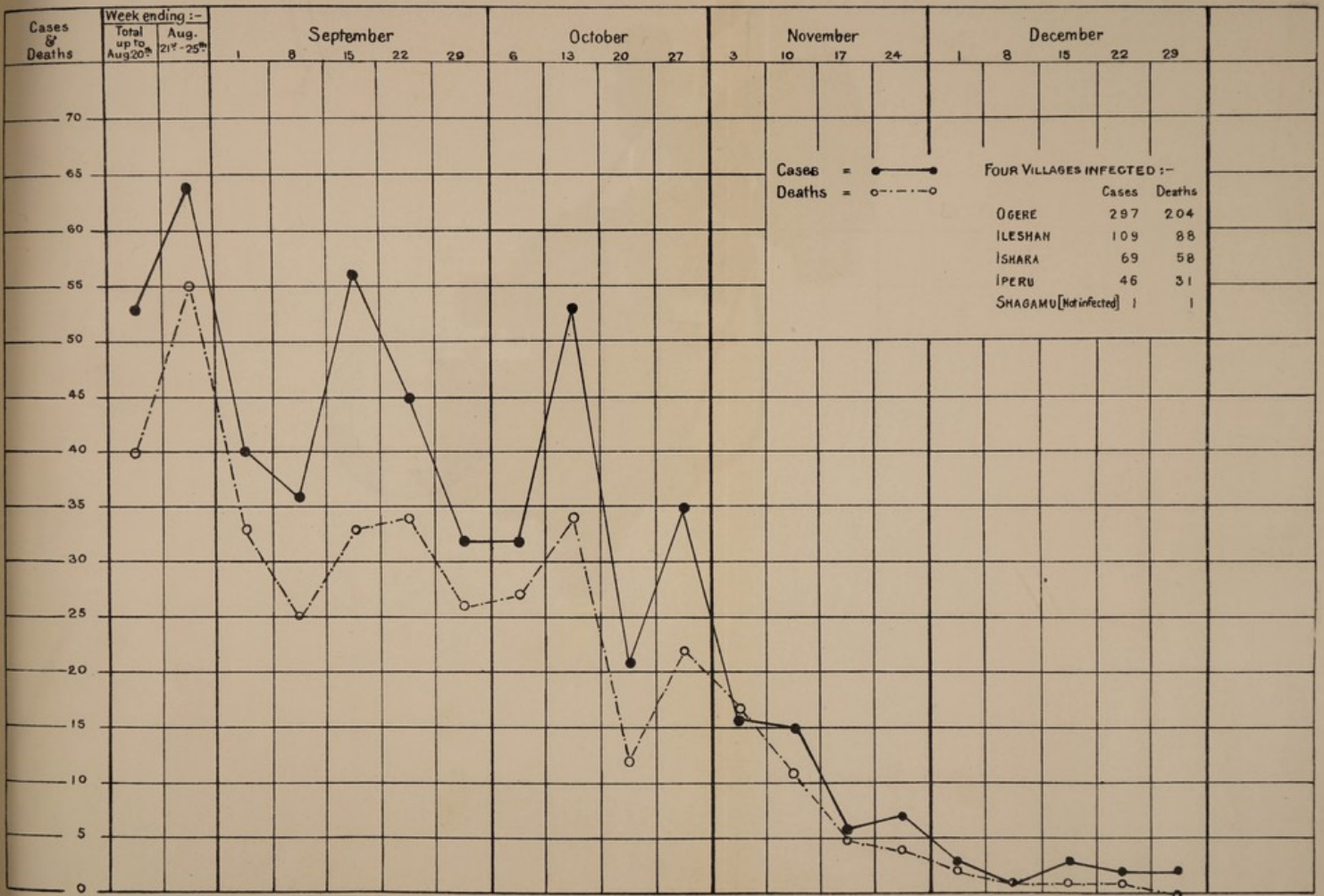
II.—ESTIMATED RECEIPTS FOR THE YEAR, 1925.

Hospital and Medical Receipts ... ..	£7,841
Births and Deaths ... ..	9
Total ... ..	<u>£7,850</u>



# Plague in Ijebu Ode Province 1925.

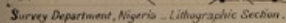
Chart 2.







## Chart 1.





# PLAGUE IN LAGOS

1925.



TABLE III.

## RETURN OF STATISTICS OF POPULATION FOR THE YEAR.

				Europeans and Whites.	Africans.	Asiatics.
Estimated Number of inhabitants in 1925 all classes				18,504,489		
"	"	"	births during the year 1925	figures not available.		
"	"	"	deaths during the year 1925	49		
"	"	"	arrivals during the year 1925	3,279	8,115	107
"	"	"	departures during the year 1925 ... ..	3,010	9,132	115

TABLE IV.

## (1).—TOWN AREA AND OPEN SPACES.

Year.	LAGOS.		CALABAR.	
	Approximate Area in Acres.	Number of Proclaimed Open Spaces.	Approximate Area in Acres.	Number of Proclaimed Open Spaces.
1923	1,152	3	9.2 sq. miles	3
1924	1,152	3	9.5 " "	3
1925	1,152	3	9.5 " "	3

## (2).—POPULATION.

Year.	LAGOS.			CALABAR.		
	Number of Europeans.	Number of Natives.	Total.	Number of Europeans.	Number of Natives.	Total.
1923	—	—	104,530	118	16,499	16,651
1924	—	—	105,763	115	16,438	16,580
1925	—	—	109,076	114	15,938	16,082



TABLE IV—*continued.*

## (3).—HOUSING.

Year.		LAGOS.				CALABAR.			
		Houses.		Huts.		Houses.		Huts.	
		Number occupied by Europeans.	Number occupied by Natives.	Number occupied by Europeans.	Number occupied by Natives.	Number occupied by Europeans.	Number occupied by Natives.	Number occupied by Europeans.	Number occupied by Natives.
1923	...	477	8,814	38	6,200	65	58	—	2,405
1924	...	478	6,391	36	6,441	68	58	—	2,451
1925	...	544	6,861	21	7,578	68	58	—	2,503

## (4).—ERECTION OF NEW BUILDINGS DURING THE YEAR.

Year.	LAGOS.		CALABAR.	
	Number of houses built without sanction.	Number of huts built without sanction.	Number of houses built without sanction.	Number of huts built without sanction.
1923	3	18	—	40
1924	9	25	—	17
1925	5	33	—	3

## ACTION TAKEN.

Year.	LAGOS.		CALABAR.	
	Number of prosecutions.		Number of prosecutions.	
	Houses.	Huts.	Houses.	Huts.
1923	3	18	—	40
1924	6	41	—	17
1925	13	30	—	3

TABLE IV—continued.—(5).—LATRINES—PUBLIC.

Year.	LAGOS.						CALABAR.										
	Number of Latrines.			No. erected during the year.			Number of Latrines.			No. erected during the year.							
	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.					
	Number.	Number of seats.	Number.	Number of seats.	Number.	Number of seats.	Number.	Number of seats.	Number.	Number of seats.	Number.	Number of seats.					
1923	34	250	32	225	...	1	...	5	...	1	...	19	145	18	132	...	...
1924	34	223	32	197	...	1	...	5	...	1	...	19	145	18	132	...	...
1925	29	184	29	178	...	1	...	11	...	1	...	19	145	18	132	...	12

LATRINES—continued. (PRIVATE).

Year.	LAGOS.								CALABAR.							
	No. of private latrines.	Average No. of pails of nightsoil removed daily.	Average No. of clean pails substituted for soiled pails.	No. of nightsoil men employed.	No. of cesspools.	No. of cesspools cleaned.	No. of new cesspools constructed during the year.	No. of old cesspools abolished.	No. of private latrines.	Average No. of pails of nightsoil removed daily.	Average No. of clean pails substituted for soiled pails.	No. of nightsoil men employed.	No. of cesspools.	No. of cesspools cleaned.	No. of new cesspools constructed during the year.	No. of old cesspools abolished.
1923	8,309	924	924	48	...	...	...	...	480	368	528	81	137	137	17	6
1924	7,786	903	903	48	...	...	...	...	511	357	497	80	182	182	51	6
1925	11,761	717	717	51	...	...	...	...	502	545	681	84	181	181	1	2

TABLE IV—continued.—(6).—LATRINES—PRIVATE.



TABLE IV—continued.—(6).—REMOVAL OF REFUSE.

Year.	LAGOS.						CALABAR.					
	Number of dust-bins.	Number of carts removing street refuse daily.	Amount of refuse removed daily.	Number of carts removing refuse from yards and premises daily.	Amount of refuse removed from yards and premises daily.	Number of men employed for re-moving refuse.	Number of dust-bins.	Number of carts removing street refuse daily.	Amount of refuse removed daily.	Number of carts removing refuse from yards and premises daily.	Amount of refuse removed from yards and premises daily.	Number of men employed for re-moving refuse.
1923	...	...	...	...	...	...	116	5	Approx. 16 tons.	...	Approx. 4 tons.	95
1924	...	...	...	...	...	...	117	5	16 tons.	...	4 tons.	92
1925	...	...	...	...	...	...	118	5	17 tons.	...	4 tons.	93

(7).—MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

Year.	LAGOS.												CALABAR.											
	Buried or Trenched.			Burnt.			Thrown into Sea.			Otherwise dealt with.			Buried or Trenched.			Burnt.			Thrown into Sea.			Otherwise dealt with.		
	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.	Daily average number of excreta.	Daily average number of cart-loads of refuse.	Daily average number of offal-loads.
1923	...	...	...	16	...	...	1,338	...	...	...	...	...	208	4	...	5	...	160	4	1 Cwt.	...	...	...	...
1924	...	...	...	23	...	...	880	...	...	...	...	...	217	3	...	5	...	140	7	1 Cwt.	...	...	...	...
1925	...	...	...	17	...	...	700	...	...	...	...	...	181	3	...	5	...	364	8	1 Cwt.	...	...	...	...

TABLE IV—continued.

8. Average daily number of cartloads of tin cans, bottles, broken crockery, and other incombustible materials removed from houses, huts, and compounds.

YEAR.	LAGOS.	CALABAR.
1923 ... ..	...	0·25
1924 ... ..	...	0·44
1925 ... ..	...	0·42

(9).—WATER SUPPLY.

### PIPE-BORNE WATER.

Year.						LAGOS.			CALABAR.		
						Source (river, lake or spring).	No. of public standpipes.	No. of private standpipes.	Source (river, lake or spring).	No. of public standpipes.	No. of private standpipes.
1923	...	...	...	...	...	River	185	1,757	Spring	6	102
1924	...	...	...	...	...	"	199	1,913	"	6	104
1925	...	...	...	...	...	"	203	2,011	"	6	104

## WELLS.

Year.			LAGOS.				CALABAR.			
			Public.		Private.		Public.		Private.	
			Number.	Number with pumps protected against surface water and mosquitoes.	Number.	Number with pumps protected against surface water and mosquitoes.	Number.	Number with pumps protected against surface water and mosquitoes.	Number.	Number with pumps protected against surface water and mosquitoes.
1923	...	...	6	1	2,462	5	...	...	3	...
1924	...	...	5	...	2,388	5	...	...	3	...
1925	...	...	4	...	2,254	5	...	...	3	...

## TANKS (PUBLIC).

Year.	LAGOS.			CALABAR.		
	Number mosquito protected and served by pumps.	Number above ground.	Number mosquito protected.	Number mosquito protected and served by pumps.	Number above ground.	Number mosquito protected.
1923 ...	...	...	...	..	2	1
1924 ...	...	...	...	...	2	1
1925 ...	...	...	...	...	2	1



TABLE IV—(continued.)

## TANKS (PRIVATE).

Year.	LAGOS.						CALABAR.					
	Number under ground.	Number mosquito protected and served by pumps.	Number above ground.	Number mosquito protected.	No. of 400 galls. capacity or less.	Number above 400 galls.	Number under ground.	Number mosquito protected and served by pumps.	Number above ground.	Number mosquito protected.	No. of 400 galls. capacity or less.	Number above 400 galls.
1923 ... ..	...	...	280	269	242	38	...	...	58	50	29	29
1924 ... ..	...	...	294	294	257	37	...	...	62	53	33	29
1925 ... ..	...	...	190	188	161	29	...	...	62	53	33	29

## NATURE OF TANKS.

Year.	LAGOS.			CALABAR.		
	Wood.	Iron.	Concrete.	Wood.	Iron.	Concrete.
1923 ... ..	...	221	59	...	58	...
1924 ... ..	...	222	72	...	62	...
1925 ... ..	...	147	43	...	62	...

## BARRELS.

Year.	LAGOS.		CALABAR.	
	Number.	Number mosquito protected.	Number.	Number mosquito protected.
1923 ... ..	811	66	353	1
1924 ... ..	762	137	380	1
1925 ... ..	...	...	386	1

## (10).—DRAINAGE.

## (MASONRY DRAINS) PUBLIC DRAINS.

Year.	LAGOS.			CALABAR.		
	Linear yards.	Linear yards reconstructed during the year.	Linear yards repaired during the year.	Linear yards.	Linear yards reconstructed during the year.	Linear yards repaired during the year.
1923 ...	46,640	400	200	13,924	210	184
1924 ...	46,067	110	...	14,922	54	98
1925 ...	48,400	1,748	...	14,430	208	30

TABLE IV—(continued.)

## PRIVATE DRAINS (MASONRY DRAINS).

Year.	LAGOS.			CALABAR.		
	Linear yards.	Linear yards reconstructed during the year.	Linear yards repaired during the year.	Linear yards.	Linear yards reconstructed during the year.	Linear yards repaired during the year.
1923 ...	...	...	...	16,669	...	...
1924 ...	...	...	...	16,669	...	...
1925 ...	...	...	...	...	...	...

## PUBLIC DRAINS—continued. EARTH DRAINS OR DITCHES.

Year.	LAGOS.			CALABAR.		
	Linear yards of ditches cleaned.	Linear yards of ditches dug and graded.	Average frequency of clearing ditches of grass.	Linear yards of ditches cleaned.	Linear yards of ditches dug and graded.	Average frequency of clearing ditches of grass.
1923 ...	...	500	three months.	16,267	431	Approximate monthly.
1924 ...	...	933	do.	16,267	1,360	do.
1925 ...	...	1,400	do.	28,307	12,040	do.

## PRIVATE DRAINS—continued. EARTH DRAINS OR DITCHES.

Year.	LAGOS.			CALABAR.		
	Linear yards of ditches cleaned.	Linear yards of ditches dug and graded.	Average frequency of clearing ditches of grass.	Linear yards of ditches cleaned.	Linear yards of ditches dug and graded.	Average frequency of clearing ditches of grass.
1923 ...	...	...	...	5,112	388	Approximate monthly.
1924 ...	...	...	...	5,112	436	do.
1925 ...	...	...	...	5,562	450	do.



TABLE IV—(continued.) 11. INSPECTIONS AND PROSECUTIONS.

Year.	LAGOS.								CALABAR.							
	No. of Inspectors employed.	No. of houses inspected.	No. of houses where larvae were found.	No. of notices served to remove conditions causing breeding of larvae.	No. of persons fined for having mosquito larvae on premises.	No. of notices served to remove insanitary condition of premises.	No. of persons fined for not removing insanitary conditions after notice.	No. of Soda and Aerated factories inspected.	No. of Inspectors employed.	No. of houses inspected.	No. of houses where larvae were found.	No. of notices served to remove insanitary conditions causing breeding of larvae.	No. of persons fined for having mosquito larvae on premises.	No. of notices served to remove insanitary conditions on premises.	No. of persons fined for not removing insanitary conditions after notice.	No. of Soda and Aerated factories inspected.
1923	38	586,912	13,817	454	2,181	1,732	115	3	8	103,794	316	...	295	1,096	42	1
1924	38	461,331	8,824	519	1,225	2,449	194	4	7	109,001	169	...	161	835	11	1
1925	38	347,904	8,947	921	1,368	5,724	215	3	7	105,411	142	...	114	401	13	1

TABLE IV—(continued.)

## MOSQUITO INDEX.

Station.	Houses Inspected 1925.	Houses with larvae 1925.	Rainfall 1925.	Rainfall 1924.	Mosquito Larva Index 1925.	Mosquito Larva Index 1924.
Lagos ... ..	347,904	8,947	76.40	49.92	2.5	1.8
Abeokuta ... ..	85,908	1,918	56.30	42.14	2.2	2.5
Ibadan ... ..	18,293	280	41.39	54.28	1.5	3.0
Ondo ... ..	5,533	74	45.51	43.13	1.3	1.3
Badagry ... ..	11,804	116	...	...	.9	1.5
Epe ... ..	48,977	719	...	...	1.4	2.0
Ijebu-Ode ... ..	23,100	1,772	...	...	7.6	3.9
Ado-Ekiti ... ..	3,008	12	...	...	.3	0.4
Warri ... ..	32,942	54	100.74	106.66	.1	0.1
Forcados ... ..	11,691	75	120.56	178.01	.6	0.3
Sapele ... ..	3,258	15	106.50	96.3	.4	0.3
Koko ... ..	986	6	...	...	.6	0.5
Benin-City ... ..	16,987	104	73.89	81.86	.6	1.0
Onitsha ... ..	24,594	182	...	...	.7	0.3
Siluko ... ..	8,100	33	...	...	.4	0.4
Asaba ... ..	6,516	7	64.65	78.20	.1	0.1
Enugu ... ..	58,276	109	78.75	66.91	.1	0.3
Agbor ... ..	7,621	24	78.11	63.96	.3	0.5
Calabar ... ..	105,411	142	127.97	136.15	.1	0.1
Bonny ... ..	...	...	...	...	...	...
Brass ... ..	22,375	37	135.05	144.32	.1	0.09
Opobo ... ..	16,523	22	129.97	108.66	.1	0.2
Owerri ... ..	15,837	58	87.42	110.05	.3	0.7
Degema ... ..	14,830	57	101.74	113.86	.3	0.4
Ikot-Ekpene ... ..	9,494	24	97.52	129.85	.2	0.3
Ogoja ... ..	6,677	12	79.06	93.11	.1	0.2
Abakaliki ... ..	4,351	...	79.20	100.68	...	...
Obubra ... ..	1,953	3	76.64	98.01	.2	0.9
Afikpo ... ..	1,064	...	85.38	88.81	...	...
Port Harcourt ... ..	71,205	989	108.21	117.74	.1	1.2
Ikom ... ..	3,368	23	76.27	117.84	.6	0.7
Awka ... ..	2,187	25	...	...	1.1	0.7
Aba ... ..	17,739	184	...	...	...	1.1



TABLE V.  
METEOROLOGICAL RETURNS FOR 1925.

STATION.	Absolute Shade Max.	Absolute Shade Min.	Average Max.	Average Min.	Relative Humidity.	Rainfall inches.
	°	°	°	°	%	
Ilorin ... ..	98	47	89·4	60·8	75·8	59·95
Kaduna ... ..	99	40	87·2	57·6	70·2	66·60
Maiduguri ... ..	114	45	97·3	67·6	57·4	19·15
Kano ... ..	112	44	91·8	66·4	53·9	34·10
Lokoja ... ..	99	50	87·3	70·2	74·7	46·54
Yola ... ..	108	58	92·5	71·6	57·0	42·00
Zaria ... ..	99	42	86·9	60·3	56·3	44·01
Lagos ... ..	93	63	86·7	74·7	80·3	76·40
Forcados ... ..	97	60	84·7	70·7	84·2	120·56
Ibadan ... ..	104	61	92·2	70·9	88	41·39
Calabar ... ..	95	58	81·5	56·2	87	127·97
Enugu ... ..	97	55	88·6	72·6	80·4	78·75

**TABLE VI.**  
**RETURN OF DISEASES AND DEATHS (EUROPEAN)**  
**FOR THE YEAR 1925.**

Diseases.	* IN-PATIENTS.					OUT-PATIENTS.	
	‡ Remaining in Hospital at the end of 1924.	TOTAL.		† Total cases treated.	§ Remaining in Hospital at the end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Infective Diseases.							
Beri-Beri ... ..	...	...	...	...	...	...	...
Cerebro-Spinal Fever ... ..	...	...	...	...	...	...	...
Chicken Pox ... ..	...	...	...	...	...	4	...
Cholera ... ..	...	...	...	...	...	...	...
Dengue ... ..	...	2	...	2	...	3	...
Diphtheria ... ..	...	...	...	...	...	...	...
Dysentery :—							
(a) Amœbic ... ..	1	57	...	58	2	54	...
(b) Bacillary ... ..	...	...	...	...	...	3	...
(c) Type not determined ... ..	...	3	...	3	...	8	...
Endocarditis-infective ... ..	...	...	...	...	...	...	...
Enteric ... ..	...	8	2	8	...	...	...
Erysipelas ... ..	...	...	...	...	...	...	...
Gonorrhœa ... ..	...	2	...	2	1	102	...
Influenza ... ..	...	31	...	31	...	179	...
Kala-Azar ... ..	...	...	...	...	...	1	...
Leprosy :—							
(a) Nodular ... ..	...	...	...	...	...	...	...
(b) Anaesthetic ... ..	...	...	...	...	...	...	...
Malaria :—							
(a) Tertian ... ..	1	6	...	7	...	8	...
(b) Quartan ... ..	...	...	...	...	...	...	...
(c) Aestivo-autumnal ... ..	3	321	2	324	6	785	3
(d) Chronic ... ..	1	4	...	5	...	2	...
(e) Type not determined ... ..	...	9	...	9	...	43	...
Blackwater Fever ... ..	1	23	7	24	2	7	...
Measles ... ..	...	...	...	...	...	2	...
Papataci Fever ... ..	...	...	...	...	...	1	...
Plague ... ..	...	1	...	1	...	...	...
Pneumonia ... ..	1	8	3	9	1	1	...
Pyrexia of uncertain origin ... ..	...	9	...	9	...	18	...
Rabies ... ..	...	...	...	...	...	...	...
Relapsing Fever ... ..	...	1	...	1	...	1	...
Rheumatic Fever ... ..	...	...	...	...	...	3	...
Septicaemia ... ..	...	1	1	1	...	1	...
Small-Pox ... ..	...	...	...	...	...	...	...
Syphilis (a) Primary ... ..	...	3	...	3	1	14	...
(b) Secondary   ... ..	...	2	...	2	...	9	...
(c) Inherited ... ..	...	...	...	...	...	...	...
Tetanus ... ..	...	...	...	...	...	...	...
Trypanosomiasis (Sleeping Sickness) ... ..	...	5	...	5	...	3	...
Tuberculosis ... ..	...	5	...	5	...	1	1
Undulant Fever ... ..	...	...	...	...	...	...	...
Whooping Cough ... ..	...	...	...	...	...	...	...
Yaws ... ..	...	...	...	...	...	...	...
Yellow Fever ... ..	...	20	11	20	...	10	...
Other Diseases ... ..	...	1	...	1	...	7	...
Intoxications.							
Alcoholism ... ..	...	11	1	11	...	5	...
Morphinism ... ..	...	...	...	...	...	...	...
Other Intoxications ... ..	...	...	...	...	...	...	...
Carried forward ... ..	8	533	27	541	13	1,275	4

The form shows in the main the arrangement of diseases in the Nomenclature of the Royal College of Physicians, 1906 Edition.

\* In-patients are those treated in Hospitals and Institutions, and the term does not apply to those treated in their own quarters, even though they would ordinarily be in-patients if there were suitable accommodation.

† "Total cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ i.e., the year previous to that for which the return is made.

§ The figures in this column to be carried on to the next year's return.

|| "Tertiary Syphilis" is a term sometimes applied to the latter symptoms.

Note:—Diseases not enumerated in this table should be entered as "Other Diseases" under their appropriate headings, and should not be specified.



TABLE VI.—RETURN OF DISEASES AND DEATHS (EUROPEAN)  
FOR THE YEAR 1925—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at the end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at the end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
General Diseases.							
Brought forward ...	8	533	27	541	13	1,275	4
Anæmia ... ..	...	21	...	21	...	180	...
Anæmia-Pernicious ... ..	...	...	...	...	...	4	1
Diabetes ... ..	...	...	...	...	...	1	...
Exophthalmic goitre... ..	...	...	...	...	...	...	...
Gout ... ..	...	...	...	...	...	3	...
Leucocythæmia ... ..	...	...	...	...	...	2	...
Lymphadenoma ... ..	...	...	...	...	...	...	...
Myxœdema ... ..	...	...	...	...	...	...	...
Purpura ... ..	...	...	...	...	...	...	...
Rickets... ..	...	...	...	...	...	...	...
Scurvy ... ..	...	...	...	...	...	1	...
Other Diseases ... ..	...	7	...	7	...	33	...
Local Diseases.							
DISEASES OF THE NERVOUS SYSTEM.							
Sub-section 1.—Diseases of the Nerves:—							
Neuritis ... ..	...	8	...	8	...	34	...
Meningitis ... ..	...	...	...	...	...	...	...
Myelitis ... ..	...	1	...	1	...	2	...
Hydrocephalus ... ..	...	...	...	...	...	...	...
Encephalitis ... ..	...	...	...	...	...	...	...
Abscess of brain... ..	...	...	...	...	...	...	...
Congestion of brain ... ..	...	1	...	1	...	...	...
Other Diseases ... ..	...	12	...	12	1	15	...
Sub-section 2.—Nervous Disorders and Diseases of Undetermined Nature:—							
Apoplexy ... ..	...	...	...	...	...	...	...
Paralysis ... ..	...	...	...	...	...	1	...
Chorea ... ..	...	...	...	...	...	...	...
Epilepsy ... ..	...	...	...	...	...	1	...
Neuralgia ... ..	...	4	...	4	...	57	...
Hysteria ... ..	...	2	...	2	...	1	...
Other Diseases ... ..	...	23	...	23	...	100	...
Sub-section 3. Mental Diseases:—							
Idiocy ... ..	...	...	...	...	...	...	...
Mania ... ..	...	...	...	...	...	...	...
Melancholia ... ..	...	...	...	...	...	1	...
Dementia ... ..	1	...	...	1	...	...	...
Delusional Insanity ... ..	...	...	...	...	...	...	...
Other Diseases ... ..	...	1	...	1	...	2	...
DISEASES OF THE EYE.							
Conjunctivitis ... ..	...	3	...	3	...	73	...
Keratitis ... ..	...	...	...	...	...	...	...
Ulceration of cornea ... ..	...	2	...	2	...	4	...
Iritis ... ..	...	...	...	...	...	...	...
Optic neuritis ... ..	...	...	...	...	...	...	...
Cataract ... ..	...	...	...	...	...	...	...
Other Diseases ... ..	...	...	...	...	...	21	...
Carried forward ...	9	618	27	627	14	1,811	5

TABLE VI.—RETURN OF DISEASES AND DEATHS (EUROPEAN)  
FOR THE YEAR 1925—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
<b>Local Diseases—<i>contd.</i></b>							
Brought forward ...	9	618	27	627	14	1,811	5
<b>DISEASES OF THE EAR.</b>							
Inflammation ...	...	4	...	4	...	57	...
Other Diseases ...	...	1	...	1	...	101	...
<b>DISEASES OF THE NOSE.</b>							
Inflammation ...	...	...	...	...	...	30	...
Other Diseases ...	...	2	...	2	...	38	...
<b>DISEASES OF THE CIR- CULATORY SYSTEM.</b>							
Pericarditis ...	...	1	...	1	...	...	...
Endocarditis ...	...	...	...	...	...	...	...
<b>Valvular Disease:—</b>							
(1) Mitral ...	...	3	...	3	...	6	...
(2) Aortic ...	...	1	...	1	...	2	...
(3) Tricuspid ...	...	...	...	...	...	...	...
(4) Pulmonary ...	...	...	...	...	...	1	...
Arterial sclerosis ...	...	...	...	...	...	2	1
Aneurism ...	...	...	...	...	...	1	...
Other Diseases ...	1	13	2	14	...	11	1
<b>DISEASES OF THE RESPIRA- TORY SYSTEM.</b>							
Laryngitis ...	...	3	...	3	...	41	...
Bronchitis ...	...	23	...	23	...	252	1
Broncho-pneumonia ...	...	1	1	1	...	...	...
Abscess of Lung ...	...	...	...	...	...	...	...
Gangrene of Lung ...	...	...	...	...	...	...	...
Emphysema ...	...	...	...	...	...	3	...
Pleurisy ...	1	10	1	11	1	11	...
Empyema ...	...	...	...	...	...	2	...
Other Diseases ...	...	13	...	13	2	63	..
<b>DISEASES OF THE DIGES- TIVE SYSTEM.</b>							
Stomatitis ...	...	1	...	1	...	12	...
Caries of teeth ...	...	3	...	3	...	123	...
Pyorrhœa alveolaris ...	...	2	...	2	...	11	...
Glossitis ...	...	...	...	...	...	3	...
Sore throat ...	...	1	...	1	...	63	...
Inflammation of tonsils ...	...	13	...	13	...	66	..
Gastritis ...	2	34	...	36	3	167	...
Ulceration of stomach ...	...	4	...	4	1	8	...
Hæmatemesis ...	...	2	...	2	...	2	...
Dilatation of stomach ...	...	...	...	...	...	3	...
Stricture of stomach ...	...	...	...	...	...	...	...
Dyspepsia ...	1	13	...	14	...	218	..
Enteritis ...	2	29	...	31	...	53	...
Appendicitis ...	...	25	...	25	2	10	1
Colitis ...	...	5	...	5	...	11	...
Ulceration of intestines ...	...	1	...	1	1	...	...
Sprue ...	...	...	...	...	...	...	...
Hernia ...	1	5	...	6	1	4	...
Diarrhœa ...	...	18	...	18	...	179	...
Carried forward ...	17	849	31	866	25	3,365	9



TABLE VI.—RETURN OF DISEASES AND DEATHS (EUROPEAN,  
FOR THE YEAR 1925—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
<b>Local Diseases—contd.</b>							
<b>DISEASES OF THE DIGESTIVE SYSTEM—continued.</b>							
Brought forward ...	17	849	31	866	25	3,365	9
Constipation ... ..	...	2	...	2	...	81	...
Colic ... ..	...	5	...	5	...	46	...
Hæmorrhoids ... ..	...	5	...	5	...	34	...
Pancreatitis ... ..	...	...	...	...	...	...	...
Hepatitis—Acute ... ..	...	4	...	4	1	29	...
Abscess ... ..	...	9	...	9	...	1	...
Cirrhosis ... ..	...	2	...	2	...	1	...
Jaundice ... ..	...	8	...	8	1	8	...
Peritonitis ... ..	...	...	...	...	...	1	1
Ascites ... ..	...	...	...	...	...	...	...
Other Diseases ... ..	...	20	1	20	...	37	...
<b>DISEASES OF THE LYMPHATIC SYSTEM.</b>							
Splenitis ... ..	...	2	...	2	...	3	...
Inflammation of lymphatic gland ... ..	2	12	...	14	...	39	...
Suppuration of lymphatic gland ... ..	1	3	...	4	...	9	...
Lymphangitis ... ..	...	...	...	...	...	2	...
Elephantiasis ... ..	...	...	...	...	...	...	...
Other Diseases ... ..	...	1	...	1	...	1	...
<b>DISEASES OF THE URINARY SYSTEM.</b>							
Acute nephritis ... ..	...	3	1	3	...	2	...
Bright's Disease... ..	...	...	...	...	...	3	...
Pyelitis ... ..	...	2	...	2	...	1	...
Calculus ... ..	...	2	...	2	...	1	...
Renal colic ... ..	...	1	...	1	...	6	...
Cystitis ... ..	...	10	1	10	...	33	...
Vesical calculus... ..	...	...	...	...	...	2	...
Suppression ... ..	...	...	...	...	...	...	...
Hæmaturia ... ..	...	1	...	1	...	3	...
Chyluria ... ..	...	...	...	...	...	...	...
Other Diseases ... ..	...	3	...	3	...	8	...
<b>DISEASES OF THE GENERATIVE SYSTEM.</b>							
<b>Male Organs:—</b>							
Urethritis... ..	...	1	...	1	...	37	...
Gleet ... ..	...	1	...	1	1	11	...
Stricture ... ..	...	6	...	6	...	7	...
Prostatitis ... ..	...	3	...	3	...	8	...
Soft chancre ... ..	...	1	...	1	...	26	...
Condyloma ... ..	...	...	...	...	...	...	...
Inflammation of scrotum ... ..	...	...	...	...	...	1	...
Hydrocele ... ..	...	...	...	...	...	2	...
Orchitis ... ..	...	3	...	3	...	15	...
Epididymitis ... ..	...	3	...	3	...	10	...
Abscess of testicle ... ..	...	...	...	...	...	...	...
Other Diseases ... ..	...	5	...	5	...	13	...
Carried forwrd ...	20	967	34	987	28	3,846	10

TABLE VI.—RETURN OF DISEASES AND DEATHS (EUROPEAN)  
FOR THE YEAR 1925—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Local Diseases—contd.							
Brought forward ...	20	967	34	987	28	3,846	10
DISEASES OF THE GENERATIVE SYSTEM—continued.							
Female Organs:—							
Ovaritis ... ..	...	...	...	...	...	...	...
Ovarian cyst ... ..	...	...	...	...	...	...	...
Endometritis ... ..	...	1	...	1	...	...	...
Displacement of uterus ... ..	...	...	...	...	...	...	...
Vaginitis ... ..	...	...	...	...	...	...	...
Amenorrhœa ... ..	...	...	...	...	...	4	...
Dysmenorrhœa ... ..	...	...	...	...	...	7	...
Menorrhagia ... ..	...	...	...	...	...	3	...
Leucorrhœa ... ..	...	...	...	...	...	2	...
Other Diseases ... ..	...	1	...	1	...	...	...
AFFECTIONS CONNECTED WITH PREGNANCY.							
Abortion ... ..	...	1	...	1	...	1	...
Other Affections ... ..	1	1	...	2	...	5	...
AFFECTIONS CONNECTED WITH PARTURITION.							
Delayed Labour ... ..	...	...	...	...	...	...	...
Retained placenta ... ..	...	...	...	...	...	...	...
Premature Birth ... ..	...	...	...	...	...	...	...
Other Affections ... ..	...	1	...	1	...	...	...
AFFECTIONS CONSEQUENT ON PARTURITION.							
Post-partum hæmorrhage ... ..	...	...	...	...	...	...	...
Puerperal septicæmia ... ..	...	...	...	...	...	...	...
Mastitis ... ..	...	...	...	...	...	...	...
Abscess of breast ... ..	...	1	...	1	...	...	...
Other Affections ... ..	...	...	...	...	...	...	...
DISEASES OF ORGANS OF LOCOMOTION.							
Osteitis ... ..	...	2	...	2	...	8	...
Arthritis ... ..	...	4	...	4	...	21	...
Spondylitis ... ..	...	...	...	...	...	...	...
Bursitis ... ..	...	...	...	...	...	9	...
Myalgia ... ..	...	13	...	13	1	115	...
Other Diseases ... ..	...	11	...	11	...	53	...
DISEASES OF CONNECTIVE TISSUE.							
Cellulitis ... ..	...	17	...	17	2	55	...
Abscess ... ..	1	23	1	24	1	33	...
Other Diseases ... ..	...	2	...	2	...	9	...
Carried forward ...	22	1,045	35	1,067	32	4,171	10



TABLE VI.—RETURN OF DISEASES AND DEATHS (EUROPEAN)  
FOR THE YEAR 1925—continued.

Diseases.				IN-PATIENTS.				OUT-PATIENTS.		
				Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
					Admis- sions.	Deaths.			Cases treated.	Deaths.
Local Diseases—contd.										
Brought forward ...				22	1,045	35	1,067	32	4,171	10
DISEASES OF THE SKIN.										
Ulcer ... ..					6		6		111	
Urticaria ... ..					2		2		23	
Eczema ... ..					4		4		64	
Boil... ..					10		10		134	
Carbuncle... ..					5		5		3	
Herpes ... ..									29	
Psoriasis ... ..									15	
Oriental sore ... ..										
Tinea ... ..									101	
Scabies .. ..									15	
Acne ... ..									4	
Prickly heat ... ..									48	
Other Diseases ... ..					14		14	1	145	
INJURIES.										
General ... ..					13	2	13		12	1
Local ... ..				1	67		68	2	466	
TUMOURS.										
Benign ... ..					2		2		11	
Malignant ... ..					3		3		1	
MALFORMATIONS ... ..									1	
POISONS.										
Vegetable ... ..									1	
Animal ... ..										
Other Poisons ... ..					5		5		5	
PARASITES.										
ANIMAL PARASITES.										
Protozoa ... ..					2		2		2	
Trematoda (Flukes) ... ..										
Cestoda :—										
Taenia solium ... ..									1	
Taenia saginata... ..					1		1		4	
Other Cestodes ... ..									2	
Nematoda :—										
Ascaris ... ..									3	
Trichocephalus dispar ... ..										
Trichina ... ..										
Dracunculus ... ..										
Filaria ... ..					1		1		6	
Strongylus ... ..										
Ankylostomum ... ..									4	
Oxyuris ... ..										
Other Nematodes ... ..										
Insecta :—										
Insects producing myiasis ... ..									1	
Dematophilus penetrans ... ..									5	
Other Insects ... ..									7	
Total ... ..				23	1,180	37	1,203	35	5,395	11

Note :—Not included in the above was one death from drowning.

**TABLE VII.**  
**RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)**  
**FOR THE YEAR 1925.**

Diseases.	*IN-PATIENTS.					OUT-PATIENTS.	
	†Remaining in Hospital at end of 1924.	TOTAL.		† Total cases treated.	§Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Infective Diseases.							
Beri-Beri ... ..		7	3	11	...	4	...
Cerebro-Spinal Fever ... ..	...	106	74	106	2	25	15
Chicken Pox ... ..	13	797	...	810	8	759	...
Cholera ... ..	...	...	...	...	...	...	...
Dengue ... ..	...	1	...	1	...	1	...
Diphtheria ... ..	...	1	...	1	...	4	...
Dysentery :—							
(a) Amœbic ... ..	7	695	84	702	10	1,053	3
(b) Bacillary ... ..	...	8	3	8	...	6	...
(c) Type not determined ... ..	...	72	14	72	3	544	7
Endocarditis-infective ... ..	...	...	...	...	...	...	...
Enteric ... ..	1	14	7	15	...	5	...
Erysipelas ... ..	...	1	...	1	...	1	...
Gonorrhœa ... ..	45	554	5	599	31	3,578	...
Influenza ... ..	1	311	4	312	19	1,260	...
Kala-Azar ... ..	...	1	...	1	...	...	...
Leprosy :—							
(a) Nodular ... ..	133	154	14	287	201	227	...
(b) Anaesthetic ... ..	203	71	18	274	189	529	...
Malaria :—							
(a) Tertian ... ..	...	26	...	26	...	82	...
(b) Quartan ... ..	2	...	...	2	...	...	...
(c) Aestivo-autumnal ... ..	50	1,579	29	1,629	20	17,887	13
(d) Chronic ... ..	...	4	...	4	...	380	...
(e) Type not determined ... ..	4	54	2	58	3	498	...
Blackwater Fever ... ..	...	5	1	5	...	...	...
Measles... ..	...	10	...	10	...	32	...
Papataci Fever ... ..	...	...	...	...	...	...	...
Plague ... ..	2	23	13	25	...	58	36
Pneumonia ... ..	24	764	205	788	33	499	38
Pyrexia of uncertain origin... ..	1	39	3	40	...	274	...
Rabies ... ..	...	1	...	1	...	1	...
Relapsing Fever ... ..	32	596	69	628	7	463	11
Rheumatic Fever ... ..	2	239	2	241	4	330	1
Septicaemia ... ..	...	22	21	22	...	5	...
Small-pox ... ..	3	166	36	169	...	53	8
Syphilis (a) Primary ... ..	6	153	4	159	13	431	...
(b) Secondary   ... ..	28	341	8	369	38	1,090	...
(c) Inherited ... ..	6	12	3	18	...	68	...
Tetanus... ..	1	41	29	42	1	5	...
Trypanosomiasis (Sleeping Sickness) ... ..	2	59	16	61	9	13	...
Tuberculosis ... ..	10	188	77	198	12	198	2
Undulant Fever ... ..	...	...	...	...	...	...	...
Whooping Cough ... ..	...	5	1	5	1	74	2
Yaws ... ..	16	191	...	207	6	1,817	...
Yellow Fever ... ..	...	3	3	3	...	...	...
Other Diseases ... ..	1	83	3	84	3	1,163	1
Intoxications.							
Alcoholism ... ..	...	3	...	3	...	1	...
Morphinism ... ..	...	...	...	...	...	...	...
Other Intoxications ... ..	...	...	...	...	...	1	...
Carried forward ... ..	597	7,400	751	7,997	613	33,419	137

The form shows in the main the arrangement of diseases in the Nomenclature of the Royal College of Physicians, 1906 Edition.

\* In-patients are those treated in Hospitals and Institutions, and the term does not apply to those treated in their own quarters, even though they would ordinarily be in-patients if there were suitable accommodation.

† "Total cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ i.e., the year previous to that for which the return is made.

§ The figures in this column to be carried on to the next year's return.

|| "Tertiary Syphilis" is a term sometimes applied to the later symptoms.

Note:—Diseases not enumerated in this table should be entered as "Other Diseases" under their



TABLE VII.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)  
FOR THE YEAR 1925—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
General Diseases.							
Brought forward ...	597	7,400	751	7,997	613	33,419	137
Anæmia ... ..	5	114	6	119	8	2,661	1
Anæmia-Pernicious ... ..	...	...	...	...	...	...	...
Diabetes ... ..	...	3	1	3	...	22	...
Exophthalmic goitre... ..	...	2	...	2	1	9	...
Gout ... ..	...	...	...	...	...	7	...
Leucocythæmia ... ..	...	...	...	...	...	...	...
Lymphadenoma ... ..	...	...	...	...	...	1	...
Myxœdema ... ..	...	...	...	...	...	1	...
Purpura... ..	...	...	...	...	...	...	...
Rickets... ..	...	...	...	...	...	16	...
Scurvy ... ..	...	1	...	1	...	5	...
Other Diseases ... ..	2	47	5	49	1	670	1
Local Diseases.							
DISEASES OF THE NERVOUS SYSTEM.							
Sub-section 1.—Diseases of the Nerves:—							
Neuritis ... ..	...	16	...	16	1	234	...
Meningitis ... ..	...	16	10	16	...	6	1
Myelitis ... ..	...	18	3	18	1	3	...
Hydrocephalus ... ..	...	1	...	1	...	4	1
Encephalitis ... ..	...	...	...	...	...	...	...
Abscess of brain ... ..	...	...	...	...	...	...	...
Congestion of brain ... ..	...	...	...	...	...	4	...
Other Diseases ... ..	...	14	6	14	...	288	...
Sub-section 2.—Nervous Disorders and Diseases of Undetermined Nature:—							
Apoplexy ... ..	...	6	4	6	...	3	1
Paralysis ... ..	12	45	17	57	3	38	...
Chorea ... ..	...	1	...	1	...	3	...
Epilepsy ... ..	1	28	3	29	1	135	2
Neuralgia ... ..	...	26	...	26	1	1,350	...
Hysteria ... ..	...	5	...	5	...	9	...
Other Diseases ... ..	1	56	7	57	5	398	...
Sub-section 3.—Mental Diseases:—							
Idiocy ... ..	...	1	...	1	...	5	...
Mania ... ..	7	31	5	38	33	5	...
Melancholia ... ..	7	47	3	54	50	2	...
Dementia... ..	1	8	4	9	4	10	1
Delusional Insanity ... ..	2	29	1	31	30	8	1
Other Diseases ... ..	1	11	1	12	...	11	...
DISEASES OF THE EYE.							
Conjunctivitis ... ..	2	155	...	157	...	3,993	...
Keratitis ... ..	1	14	...	15	...	80	...
Ulceration of cornea ... ..	...	14	...	14	...	76	...
Iritis ... ..	2	22	...	24	1	167	...
Optic neuritis ... ..	...	6	...	6	...	133	...
Cataract ... ..	...	18	...	18	...	65	...
Other Diseases ... ..	1	67	...	68	4	958	...
DISEASES OF THE EAR.							
Inflammation ... ..	...	29	...	29	...	2,156	...
Other Diseases ... ..	...	9	...	9	...	885	...
Carried forward ...	642	8,260	827	8,902	757	27,840	146

TABLE VII.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN,  
FOR THE YEAR 1925—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Local Diseases—contd.							
Brought forward ...	642	8,260	827	8,902	757	47,840	146
DISEASES OF THE NOSE.							
Inflammation ... ..	...	3	...	3	...	78	...
Other Diseases ... ..	...	2	...	2	...	185	...
DISEASES OF THE CIRCULA- TORY SYSTEM.							
Pericarditis ... ..	...	4	2	4	...	47	...
Endocarditis ... ..	...	8	2	8	...	19	1
Valvular Disease:—							
(1) Mitral ... ..	5	86	29	91	6	258	4
(2) Aortic ... ..	...	21	7	21	...	56	...
(3) Tricuspid ... ..	...	1	...	1	...	5	...
(4) Pulmonary ... ..	...	...	...	...	...	1	...
Arterial sclerosis ... ..	...	6	...	6	1	6	...
Aneurism ... ..	...	3	1	3	...	11	...
Other Diseases ... ..	...	64	17	64	1	171	1
DISEASES OF THE RESPI- RATORY SYSTEM.							
Laryngitis ... ..	1	18	...	19	4	165	...
Bronchitis ... ..	19	789	23	808	48	20,983	10
Broncho-pneumonia ... ..	2	92	25	94	5	119	10
Abscess of Lung... ..	...	1	1	1	...	1	...
Gangrene of Lung ... ..	...	1	...	1	...	2	...
Emphysema ... ..	...	1	...	1	...	...	...
Pleurisy ... ..	2	153	6	155	7	383	...
Empyema... ..	...	4	2	4	...	6	...
Other Diseases ... ..	3	42	7	45	4	319	1
DISEASES OF THE DIGESTIVE SYSTEM.							
Stomatitis ... ..	...	24	...	24	1	1,265	...
Caries of teeth ... ..	...	7	...	7	...	1,810	...
Pyorrhœa alveolaris ... ..	...	6	...	6	2	228	...
Glossitis ... ..	...	4	...	4	...	475	...
Sore throat ... ..	...	10	...	10	...	414	...
Inflammation of tonsils ... ..	...	29	...	29	...	670	...
Gastritis ... ..	1	67	...	68	...	1,267	...
Ulceration of stomach ... ..	...	6	3	6	...	7	...
Hæmatemesis ... ..	...	3	...	3	...	10	...
Dilatation of stomach ... ..	...	...	...	...	...	2	...
Stricture of stomach ... ..	...	...	...	...	...	2	...
Dyspepsia... ..	...	32	...	32	2	2,712	...
Enteritis ... ..	...	59	6	59	1	848	2
Appendicitis ... ..	3	17	4	20	1	18	...
Colitis ... ..	2	24	1	26	2	243	...
Ulceration of intestines ... ..	...	1	1	1	...	22	...
Sprue ... ..	...	...	...	...	...	4	...
Hernia ... ..	48	731	30	779	57	721	3
Diarrhœa ... ..	2	549	31	551	6	3,664	13
Constipation ... ..	...	52	...	52	...	14,223	...
Colic ... ..	...	154	...	154	4	2,087	...
Hæmorrhoids ... ..	1	61	...	62	2	396	...
Carried forward ...	731	11,395	1,025	12,126	911	101,743	191



TABLE VII.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)  
FOR THE YEAR 1925—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total Cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Local Diseases—contd.							
Brought forward ...	731	11,395	1,025	12,126	911	101,743	191
DISEASES OF THE DIGESTIVE SYSTEM—continued.							
Pancreatitis ... ..	...	1	...	1	...	44	...
Hepatitis—Acute ...	1	38	4	39	3	68	...
Abscess ... ..	2	39	9	41	...	32	1
Cirrhosis ... ..	...	26	9	26	2	15	...
Jaundice ... ..	1	60	3	61	3	202	6
Peritonitis ... ..	1	31	15	32	2	17	1
Ascites ... ..	5	46	18	51	6	53	...
Other Diseases ... ..	4	84	9	88	6	449	6
DISEASES OF THE LYMPHATIC SYSTEM.							
Splenitis ... ..	...	36	3	36	1	746	1
Inflammation of lymphatic gland ... ..	5	215	...	220	7	1,259	...
Suppuration of lymphatic gland ... ..	5	122	...	127	6	228	...
Lymphangitis ... ..	...	7	...	7	...	24	...
Elephantiasis ... ..	13	159	5	172	17	167	...
Other Diseases ... ..	2	29	2	31	2	51	...
DISEASES OF THE URINARY SYSTEM.							
Acute nephritis ... ..	1	47	11	48	6	32	1
Bright's Disease ... ..	...	5	2	5	1	46	1
Pyelitis ... ..	...	4	2	4	...	2	...
Calculus ... ..	...	3	...	3	...	1	...
Renal colic ... ..	...	1	...	1	...	...	...
Cystitis ... ..	2	59	3	61	4	234	...
Vesical calculus ... ..	...	2	1	2	...	2	...
Suppression ... ..	...	5	...	5	...	2	...
Hæmaturia ... ..	...	13	1	13	...	15	...
Chyluria ... ..	...	7	...	7	...	6	...
Other Diseases ... ..	2	38	...	40	2	56	1
DISEASES OF THE GENERATIVE SYSTEM.							
Male Organs:—							
Urethritis ... ..	...	31	...	31	1	302	...
Gleet ... ..	...	3	...	3	...	102	...
Stricture ... ..	10	211	18	221	7	295	...
Prostatitis ... ..	...	...	...	...	...	46	...
Soft chancre ... ..	1	49	...	50	6	330	...
Condyloma ... ..	...	1	...	1	...	6	...
Inflammation of scrotum ...	1	1	...	2	...	25	...
Hydrocele ... ..	19	246	...	265	12	245	...
Orchitis ... ..	1	92	...	93	4	318	...
Epididymitis ... ..	1	51	...	52	1	132	...
Abscess of testicle ... ..	1	50	...	51	3	13	...
Other Diseases ... ..	16	152	3	168	5	312	...
Carried forward ...	825	13,859	1,143	14,184	1,018	107,620	209

TABLE VII.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR  
THE YEAR 1925—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Local Diseases—contd.							
Brought forward ...	825	13,359	1,143	14,184	1,018	107,620	209
Female Organs :—							
Ovaritis .. ...	...	2	...	2	...	28	...
Ovarian cyst ... ..	...	9	2	9	1	15	...
Endometritis ... ..	...	55	...	55	1	130	...
Displacement of uterus ...	...	2	...	2	...	27	...
Vaginitis ... ..	4	16	...	20	3	177	...
Amenorrhœa ... ..	...	...	...	...	...	90	...
Dysmenorrhœa ... ..	...	20	...	20	...	225	...
Menorrhagia ... ..	...	...	...	...	...	73	...
Leucorrhœa ... ..	...	3	...	3	...	28	...
Other Diseases ... ..	2	98	9	100	3	366	...
AFFECTIONS CONNECTED WITH PREGNANCY.							
Abortion ... ..	...	28	2	28	...	64	...
Other Affections ... ..	...	12	2	12	...	75	...
AFFECTIONS CONNECTED WITH PARTURITION.							
Delayed Labour ... ..	1	21	8	22	...	5	...
Retained placenta ... ..	...	8	...	8	...	6	...
Premature Birth ... ..	...	8	5	8	...	8	...
Other Affections ... ..	...	19	...	19	...	11	1
AFFECTIONS CONSEQUENT ON PARTURITION.							
Post-partum hæmorrhage ...	...	...	...	...	...	19	1
Puerperal septicæmia ... ..	...	4	3	4	...	19	...
Mastitis ... ..	...	4	...	4	...	75	...
Abscess of breast ... ..	...	4	...	4	1	13	...
Other Affections ... ..	...	10	...	10	...	5	...
DISEASES OF ORGANS OF LOCOMOTION.							
Osteitis ... ..	3	44	3	47	4	379	...
Arthritis ... ..	10	189	3	199	15	2,133	1
Spondylitis ... ..	...	2	...	2	...	24	...
Bursitis ... ..	...	16	...	16	1	67	...
Myalgia ... ..	9	283	...	292	3	7,426	...
Other Diseases ... ..	10	168	7	178	8	1,229	...
DISEASES OF CONNECTIVE TISSUE.							
Cellulitis ... ..	8	358	...	366	23	2,183	...
Abscess ... ..	26	539	4	565	27	2,715	...
Other Diseases ... ..	1	43	1	44	2	439	...
Carried forward ...	899	15,324	1,192	16,223	1,110	125,674	212



TABLE VII.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR  
THE YEAR 1925—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in Hospital at end of 1924.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1925.	TOTAL.	
		Admis- sions.	Deaths.			Cases treated.	Deaths.
Local Diseases—contd.							
Brought forward ...	899	15,324	1,192	16,223	1,110	125,674	212
DISEASES OF THE SKIN.							
Ulcer ... ..	83	966	22	1,049	86	18,460	1
Urticaria ... ..	..	7	..	7	..	233	..
Eczema ... ..	1	32	..	33	1	1,526	..
Boil ... ..	4	45	..	49	1	1,629	..
Carbuncle ... ..	..	6	1	6	..	42	..
Herpes ... ..	..	9	..	9	1	106	..
Psoriasis ... ..	..	4	..	4	..	42	..
Oriental sore ... ..	..	1	..	1	..	..	..
Tinea ... ..	..	19	..	19	1	2,998	..
Scabies ... ..	..	39	..	39	..	2,426	..
Acne ... ..	..	1	..	1	..	5	..
Prickly heat ... ..	1	..	..	1	..	33	..
Other Diseases ... ..	7	112	2	119	3	1,801	..
INJURIES.							
General ... ..	13	86	27	99	9	297	9
Local ... ..	80	1,441	71	1,521	109	30,925	2
TUMOURS.							
Benign ... ..	5	185	5	190	1	499	..
Malignant ... ..	3	60	8	63	4	74	..
MALFORMATIONS ... ..	..	7	1	7	..	35	..
POISONS.							
Vegetable ... ..	..	2	..	2	..	2	..
Animal ... ..	1	11	2	12	..	86	1
Other Poisons ... ..	..	21	3	21	..	87	..
PARASITES.							
ANIMAL PARASITES.							
Protozoa ... ..	..	6	..	6	..	24	..
Trematoda (Flukes) ... ..	1	18	..	19	..	55	..
Cestoda:—							
Tænia solium ... ..	1	37	..	38	..	487	..
Tænia saginata ... ..	..	10	..	10	..	2,556	..
Other Cestodes ... ..	3	1	..	4	..	33	..
Nematoda:—							
Ascaris ... ..	..	113	1	113	4	5,280	..
Tricocephalus dispar ... ..	..	5	..	5	..	47	..
Trichina ... ..	..	..	..	..	..	1	..
Dracunculus ... ..	9	352	1	361	14	946	..
Filaria ... ..	..	15	..	15	1	212	..
Strongylus ... ..	..	3	..	3	..	..	..
Ankylostomum ... ..	2	534	17	536	3	660	..
Oxyuris ... ..	..	..	..	..	..	27	..
Other Nematodes ... ..	..	59	1	59	..	121	..
Insecta:							
Insects producing myiasis ... ..	..	..	..	..	..	2	..
Dematophilus penetrans ... ..	..	..	..	..	..	93	..
Other Insects ... ..	..	3	..	3	..	131	..
Total ...	1,113	19,534	1,354	20,647	1,348	197,655	225

TABLE VIII.  
RETURN OF SURGICAL OPERATIONS.

	Total Cases.	Cured.	Relieved.	Unrelieved.	Died.
<b>A. GENERAL.</b>					
Amputations ... ..	107	80	17	1	9
Appendectomy ... ..	20	18	...	...	2
Arthrotomy ... ..	7	5	2	...	...
Colotomy ... ..	1	...	1	...	...
Gastro-Enterostomy ... ..	2	...	2	...	...
Herniotomy ... ..	693	647	12	10	24
Laparotomy ... ..	76	55	7	1	13
Excision-Benign Tumour and Cysts ... ..	236	215	16	3	2
Excision-Glands ... ..	77	74	3	...	...
Laminectomy ... ..	1	...	1	...	...
Excision—Breast ... ..	4	4	...	...	...
Osteotomy ... ..	7	4	2	1	...
Sequestrotomy ... ..	47	41	5	1	...
Thyroidectomy ... ..	6	4	...	...	2
Trephining ... ..	5	3	1	1	...
Other operations ... ..	312	186	65	22	39
<b>B. EYE.</b>					
Cartaract Extraction ... ..	13	12	1	...	...
Enucleation ... ..	7	4	3	...	...
Other operations ... ..	4	2	2	...	...
<b>C. EAR.</b>					
Mastoid—Schwartz's opera- tion ... ..	2	2	...	...	...
Other operations ... ..	10	10	...	...	...
<b>D. GENITO—URINARY—MALE.</b>					
Ext: Urethrotomy ... ..	49	29	16	4	...
Elephantiasis of the Scrotum	39	30	7	...	2
Hydrocele ... ..	197	175	16	4	2
Circumcisions ... ..	304	303	1	...	...
Cystotomy ... ..	32	18	12	...	2
Orchidopexy ... ..	1	1	...	...	...
Orchidectomy ... ..	5	5	...	...	...
Vasectomy ... ..	5	5	...	...	...
Other operations ... ..	153	99	50	...	4
<b>2. Genito—Urinary—Female</b>					
Abd: Hysterectomy ... ..	14	11	...	...	3
Oophorectomy ... ..	11	8	1	...	2
Salpingo—Oophorectomy ... ..	12	12	...	...	...
Vesico—Vaginal Fistula ... ..	8	1	2	5	...
Ventral Fixation Uterus ... ..	6	5	1	...	...
Salpingectomy ... ..	5	5	...	...	...
Perineoplasty ... ..	4	3	1	...	...
Other operations ... ..	126	56	70	...	...
<b>E. OBSTETRICAL.</b>					
Forceps Extraction ... ..	19	14	...	...	5
Podalic Version ... ..	2	1	...	...	1
Craniotomy ... ..	3	1	...	...	2
Other operations ... ..	8	6	...	...	2
<b>F. MINOR SURGICAL OPERATIONS ...</b>					
	2,485	2,350	122	7	6
<b>Total ... ..</b>	<b>5,125</b>	<b>4,504</b>	<b>439</b>	<b>60</b>	<b>122</b>



## RETURN OF MINERAL OPERATIONS.

A. General		B. Iron Mines		C. Other Mines		D. Other Mines		E. Other Mines		F. Other Mines		G. Other Mines		H. Other Mines		I. Other Mines		J. Other Mines		K. Other Mines		L. Other Mines		M. Other Mines		N. Other Mines		O. Other Mines		P. Other Mines		Q. Other Mines		R. Other Mines		S. Other Mines		T. Other Mines		U. Other Mines		V. Other Mines		W. Other Mines		X. Other Mines		Y. Other Mines		Z. Other Mines																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity	No.	Name	Value	Quantity

## INTRODUCTION

The following has been prepared by the Director of the Institute and the members of the staff.

Dr. H. H. Henshaw, who was acting as Assistant Director, is mentioned in detail on page 11.

Mr. E. F. Jones, who was acting as Assistant Director, is mentioned in detail on page 11.

Dr. A. H. Smith, who was acting as Assistant Director, is mentioned in detail on page 11.

Mr. J. H. Jones, who was acting as Assistant Director, is mentioned in detail on page 11.

It is hoped to publish the summary of work by Dr. H. H. Henshaw in the Institute of Pathology, at Lagos, Nigeria, from the beginning of 1925 to the end of 1925, and to publish a summary of the progress of the work of the Institute.

In 1925 the Institute of Pathology, at Lagos, Nigeria, was the national health center for the whole of Nigeria, and the work of the Institute was the work of the national health center.

## APPENDIX A.

### ANNUAL REPORT OF THE MEDICAL RESEARCH INSTITUTE, 1925,

BY

ANDREW CONNAL, M.D., D.P.H., D.T.M., AND H.





## INTRODUCTORY.

The Director has been on duty throughout the year as has been also the honorary Entomologist.

Dr. H. Morrison who was acting as Assistant Bacteriologist proceeded on leave on 27th March.

Mr. E. F. Hines, Laboratory Assistant, went on leave on 23rd May and returned to duty on 22nd October.

Dr. E. C. Smith took up the appointment of Assistant Bacteriologist on 23rd July and immediately commenced an investigation of the skin conditions prevalent in Lagos.

Mr. Hobson, Government Analyst, returned from leave on 5th February.

It is pleasant to record that the assumption of duty by Dr. G. G. Butler in October, as Pathologist at Lagos Hospital, freed the Research Institute of practically all routine work, and considerable progress has already been made in research.

In June the West African Yellow Fever Commission, of the International Health Board, commenced its labours. Relations with these workers have been pleasant and mutually helpful.

## PLAGUE.

Plague in its several forms has not disappeared from Lagos although the number of its victims is considerably lessened. Small extensions of the disease have taken place during the year but not farther than Abeokuta by rail, or than the neighbourhood of Ijebu-Ode by lagoon.

Such outbreaks as did occur beyond Lagos, were restricted in area, involved few cases and were promptly and efficiently dealt with. The clinical material sent to the Institute is treated shortly under the headings of "smears," "histological" and "rodents." There was one instructive series of cases, however, which illustrates the difficulty of diagnosis. A patient was admitted to the African Hospital in July, suffering from pneumonia. The sputum was examined but plague bacilli were not found. The patient died and a native nurse who had been in attendance on him contracted pneumonia very shortly thereafter. Again in this case *B. pestis* could not be distinguished in the sputum. This nurse died and a second native nurse who had looked after his confrere contracted pneumonia also. The sputum of this third case was seen by several observers who were all agreed that *B. pestis* was not distinguishable in the stained smear. At the post-mortem examination of the third case, two guinea-pigs were inoculated on a scarified area of the abdomen with material from the lung. Stained smears from these organs showed a large number of various bacteria without any typical bi-polar staining bacilli. However, by the second day both pigs had developed buboes and both were dead on the fifth day with an acute plague infection, the only organisms present in the lesions being typical *B. pestis*. It is clear, therefore that a form of pneumonic plague occurs, in which the sputum is the typical rusty viscid one of ordinary pneumococcal pleuro-pneumonia, and in which the plague bacilli are so scanty or so altered in appearance and so mixed with other organisms that the only reliable means of diagnosis is by inoculation of a susceptible laboratory animal.

The main object of this section is to continue the recording of the results of direct inoculation of plague from guinea-pig to guinea-pig without the intermediary of the flea or of artificial culture media.

The Report of 1924 ended with Guinea-pigs A.A., Y. and Z.



Guinea-pig A.A. was the fifth animal in a direct infection from a human bubo, the bacilli in which were mostly coccoid. The transmission in each instance was made from material taken from a bubo at an interval of from one to twelve hours after death.

In order to save repetition the results are tabulated.

Table (1) shows the results from Guinea-pig A.

It will be seen that the infection died out in the thirteenth pig of the series, during a period of eighty-four days. The first animal, guinea-pig A. died in five days. The succeeding three survived seven to nine days, the fifth and sixth died in four days, the seventh in five days, and then as the table shows there are the suggestive periods of 8, 7, 4, 3, 4, 7 and 9 days.

Table (3) deals with the findings in the series beginning again from Guinea-pig A. but transmitted from that animal to Monkey C. Guinea-pig D, therefore, which heads the list was inoculated from the mixed juices of spleen, lungs, and bronchial glands of Monkey C. The sequence is a long one, comprising forty-four guinea-pigs and it continued from 30th November, 1924 until 11th July, 1925, a period of two hundred and twenty-three days. The longest survival apart from the last two guinea-pigs was nine days, and the shortest was two days. Three to seven days, however, were the most common duration.

There were two side-issues from this series. The first was from Guinea-pig P.A. in which there was a purulent condition of the bronchial glands. Guinea-pig T.A. was inoculated therefrom. It died in three days. Two small inflamed glands at the site of inoculation were the only macroscopic signs post-mortem. *B. pestis* was numerous in smears from the glands, but was not seen in the smears of the organs. Guinea-pig V.A. was inoculated from Guinea-pig T.A. but on its death five days later no signs of plague were found. The other side-issue was from Guinea-pig Y.C. This guinea-pig developed a bubo rapidly but showed no other signs of illness. After nineteen days the bubo was aspirated and the pus rubbed on a scarified area on the abdomen of Guinea-pig Z.C. From this another series was continued the details of which are to be seen in Table (2).

It has to be noted that instead of using the bubo as the source of the infective material, Guinea-pig G.D. was inoculated from the spleen of Guinea-pig F.D. In this series it will be observed that in a big proportion the lungs were affected.

These three tables show the results of plague infection in guinea-pigs in a direct line from 22nd November until 18th September, a period of two hundred and ninety-eight days.

There remains one series, as set out in Table (4).

It begins with Guinea-pig G. which was inoculated on 30th November from the contents of a human bubo, and it covers a period of one hundred and fifty-four days.

Several general conclusions can be arrived at, after reviewing these data. Rarely did the infection terminate fatally in less than three days, at the stage of an acutely inflamed bubo, and when it did happen the toxæmia must have been profound. Most of the deaths took place in from four to six days when the bubo had become hæmorrhagic and friable, with small beads of pus. In the earlier stages of this condition of the bubo, the spleen is usually finely speckled, *i.e.* with minute abscesses. In the later stages the spleen practically always shows speckling but of a coarser nature, *i.e.* larger abscesses, and in some cases the liver shows the same appearance. When the bubo had become definitely broken down and purulent it was the rule to find abscesses in both the spleen and the liver. Still later when the contents of the bubo have become thickened and caseous, the lungs may also show abscess formation.



TABLE (1).—INOCULATIONS FROM GUINEA-PIG A. TO GUINEA-PIG DB.

Guinea-Pig.	Inoculated.	Died.	Bubo.	Spleen.	Liver.	Lungs.	Heart.	Period lived.
A.	22-11-24	27-11-24	Hæmorrhagic ++	Speckled ++	Speckled ++	Congested, Pleuritis +	Petechiae +	5 days
C.	27-11-24	6-12-24	Caseous ++	do. ++	do. +	Abscess rt. lung ++	Pericarditis +	9 "
K.	6-12-24	14-12-24	do. ++	do. ++	do. ++	Congested +	... +	8 "
T.E.	14-12-24	21-12-24	do. ++	do. ++	do. ++	Speckled ++	... +	7 "
X.	21-12-24	25-12-24	Hæmorrhagic ++	do. ++	do. ++	Congested -	... +	4 "
AA.	25-12-24	29-12-24	Purulent ++	do. ++	do. ++	do. ++	... +	4 "
DA.	29-12-24	3-1-25	Hæmorrhagic ++	do. ++	do. ++	do. -	... +	5 "
FA.	3-1-25	11-1-25	Caseous +	do. ++	Congested -	Exudate, rt. pleura -	... -	8 "
JA.	11-1-25	18-1-25	Hæmorrhagic ++	do. ++	do. ++	Speckled ++	Pericarditis -	7 "
OA.	18-1-25	22-1-25	do. ++	do. ++	do. ++	Congested -	... -	4 "
RA.	22-1-25	25-1-25	do. ++	do. -	do. -	do. -	... -	3 "
UA.	25-1-25	29-1-25	do. ++	do. -	do. -	do. -	... -	4 "
AB.	29-1-25	5-2-25	do. +	do. -	do. -	do. -	... -	7 "
DB.	5-2-25	14-2-25	nil.	nil.	nil.	nil.	... -	9 "

TABLE (2).—INOCULATIONS FROM GUINEA-PIG ZC. TO GUINEA-PIG LD.

Guinea-Pig.	Inoculated.	Died.	Bubo.	Spleen.	Liver.	Lungs.	Heart.	Period lived.
ZC.	8-7-25	16-7-25	Hæmorrhagic ++	Speckled +	Speckled +	Speckled +++	...	8 days
BD.	16-7-25	23-7-25	do. ++	do. ++	do. ++	Congested -	...	7 "
CD.	23-7-25	28-7-25	do. ++	do. ++	do. ++	do. ++	...	5 "
DD.	28-7-25	1-8-25	do. ++	do. ++	do. ++	Broncho-pneumonia ++	...	4 "
ED.	1-8-25	7-8-25	Caseous ++	do. ++	do. ++	Congested ++	...	6 "
FD.	7-8-25	12-8-25	do. ++	do. ++	do. ++	Intense Congestion ++	...	5 "
GD.	12-8-25	18-8-25	Hæmorrhagic ++	do. ++	do. ++	Congested +	...	6 "
HD.	18-8-25	24-8-25	Caseous ++	do. ++	do. ++	Speckled ++	...	6 "
ID.	24-8-25	28-8-25	Hæmorrhagic +	do. ++	do. ++	Slight Congestion ++	...	4 "
JD.	28-8-25	1-9-25	do. +	Congested ++	do. ++	Broncho-pneumonia ++	...	4 "
KD.	1-9-25	18-9-25	Caseous +	Speckled. +	Speckled +	Speckled +	...	17 "
LD.	18-9-25	...	nil.	nil.	nil.	nil.	...	...

The signs + and - denote the finding or not finding of B. pestis in smears.



TABLE (3).—INOCULATIONS FROM GUINEA-PIG D. TO AD.

Guinea-Pig.	Inoculated.	Died.	Bubo.	Spleen.	Liver.	Lungs.	Heart.	Period lived.
D	30.11.24	6.12.24	Purulent ++	Speckled +++	Speckled +++	Congested +	Pericarditis	6 days.
L	6.12.24	15.12.24	" +	" +++	Friable +++	" +	"	9 "
S	15.12.24	26.12.24	Casuous ++	" +++	Speckled +++	Speckled +++	"	7 "
Y	22.12.24	26.12.24	Haemorrhagic +	" +++	Congested +	Pneumonia Rt. +	"	4 "
BA	26.12.24	2.1.25	Casuous +++	" +	" +	Congested +	"	7 "
EA	2.1.25	6.1.25	Purulent +	Congested -	" -	Slightly Congested -	"	4 " (killed).
HA	6.1.25	12.1.25	Haemorrhagic +	Speckled -	" -	" -	"	6 "
KA	12.1.25	16.1.25	" ++	Congested +	" +	" -	"	4 "
MA	16.1.25	19.1.25	" ++	" -	" -	" -	"	3 "
PA	19.1.25	22.1.25	" ++	Speckled +++	Friable -	Congested + Bronchial glands enlarged	"	"
SA	22.1.25	25.1.25	Haemorrhagic ++	Congested +++	Friable ++	Congested ++	"	3 "
YA	25.1.25	28.1.25	" ++	" +++	" +	" slightly	"	3 "
XA	28.1.25	2.2.25	Purulent +	Speckled +	" -	"	"	5 "
BB	2.2.25	9.2.25	Haemorrhagic +	" +++	" +	Speckled +++	"	7 "
EB	9.2.25	15.2.25	" +	" +++	Congested ++	Congested +	"	6 "
HB	15.2.25	18.2.25	" ++	" +++	" -	"	"	3 "
JB	18.2.25	20.2.25	" ++	" +	" -	" slightly	"	2 "
KB	20.2.25	25.2.25	" ++	Speckled +	" +	"	"	5 "
NB	25.2.25	1.3.25	" ++	Enlarged +++	" +	"	"	4 "
PB	1.3.25	4.3.25	" ++	Congested +++	Pale +	"	"	3 "
RB	4.3.25	6.3.25	" ++	" slightly -	" -	"	"	2 "
TB	6.3.25	9.3.25	Congested ++	Speckled -	Dark red -	Pale -	"	2 "
VB	9.3.25	13.3.25	Haemorrhagic ++	Congested -	Congested -	Congested -	Pericarditis	4 "
XB	13.3.25	15.3.25	Congested +	" +	" +	" slightly	"	2 "
ZB	15.3.25	19.3.25	Haemorrhagic +	Speckled +	Friable +	Speckled +++	"	4 "
BC	19.3.25	25.3.25	Casuous +	Enlarged +++	Congested ++	Congested +	"	6 "
DC	25.3.25	30.3.25	" +	" +++	" +	" slightly	"	5 "
FC	30.3.25	3.4.25	Haemorrhagic ++	Speckled +	Deeply congested +++	"	"	4 "
HC	3.4.25	8.4.25	" ++	Congested +++	" +	"	"	5 "
JC	8.4.25	12.4.25	" ++	Speckled +	Congested +	"	"	4 "
KC	12.4.25	17.4.25	" ++	Enlarged +++	Deeply congested +	"	"	5 "
MC	17.4.25	22.4.25	" ++	Finely speckled +++	Congested +	" slightly	"	5 "
NC	22.4.25	28.4.25	" +	Speckled +	Friable +	"	"	6 "
OC	28.4.25	4.5.25	Casuous +	" +++	Congested ++	" slightly	"	6 "
QC	4.5.25	11.5.25	" +	" +	Speckled -	"	"	7 "
RC	11.5.25	17.5.25	Friable +	" +++	Congested +	Congested slightly	"	6 "
SC	17.5.25	23.5.25	Casuous +	" +++	" +	"	"	6 "
TC	23.5.25	27.5.25	Purulent +	" +	" -	" slightly	"	7 "
UC	27.5.25	3.6.25	Casuous ++	" +	" -	"	"	4 "
VC	3.6.25	10.6.25	" ++	" +	" +	" slightly	"	7 "
WG	10.6.25	14.6.25	Purulent +	" +	" +	"	"	4 "
XC	14.6.25	19.6.25	Casuous +	" +	Swollen pale	Hepatisation +	"	5 "
YC	19.6.25	11.7.25	" -	" +	Congested -	Pale -	"	22 "
AD	11.7.25	3.8.25	Nil -	Two Nodules -	Nil	Nil	Nil	23 "

TABLE (4).—INOCULATIONS FROM GUINEA-PIG G. TO PC.

Guinea-Pig.	Inoculated.	Died.	Bubo.	Spleen.	Liver.	Lungs.	Heart.	Period lived.
G.	30-11-24	9-12-24	Caseous ++	Speckled ++	Speckled +	Intensely congested ++	...	9 days (killed).
O.	9-12-24	16-12-24	do. +	do. +	do. +	Congested +	...	7 do.
V.	16-12-24	24-12-24	Purulent ++	Congested +	Congested +	do. +	...	8 do.
Z.	24-12-24	28-12-24	Caseous ++	do. +	Friable -	do. +	...	4 do.
OA.	28-12-24	4-1-25	Haemorrhagic +	do. +	do. +	do. +	...	7 do.
GA.	4-1-25	10-1-25	do. +	Congested -	Congested -	do. -	...	6 do.
IA.	10-1-25	14-1-25	do. +	Speckled +	do. -	do. -	...	4 do.
LA.	14-1-25	17-1-25	do. +	Congested -	do. -	do. -	...	3 do.
NA.	17-1-25	21-1-25	do. +	Speckled +	Friable -	do. -	...	4 do.
QA.	21-1-25	25-1-25	do. +	do. +	do. +	do. -	...	4 do.
WA.	25-1-25	29-1-25	do. +	do. +	Enlarged +	do. +	...	4 do.
ZA.	29-1-25	3-2-25	do. +	do. +	do. +	do. +, Bronchial glands inflamed +	...	5 do.
OB.	3-2-25	9-2-25	do. +	do. +	Congested +	Congested +	...	6 do.
FB.	9-2-25	14-2-25	do. +	Speckled ++	do. +	do. +	...	5 do.
GB.	14-2-25	17-2-25	do. +	do. +	do. +	do. +	...	3 do.
IB.	17-2-25	21-2-25	do. +	do. +	do. +	Slightly congested -	...	4 do.
LB.	21-2-25	24-2-25	Acutely inflamed ++	Congested -	do. -	Congested -	...	3 do.
MB.	24-2-25	26-2-25	do. +	do. -	do. -	do. -	...	2 do.
QB.	26-2-25	1-3-25	Haemorrhagic ++	Speckled +	do. -	do. -	...	3 do.
OB.	1-3-25	4-3-25	do. +	Congested -	do. -	do. -	...	3 do.
SB.	4-3-25	8-3-25	do. +	do. +	do. +	do. +	...	4 do.
UB.	8-3-25	11-3-25	Acutely inflamed ++	do. +	do. +	do. +	...	3 do.
WB.	11-3-25	14-3-25	Haemorrhagic +	do. -	do. -	do. -	...	3 do.
YB.	14-3-25	16-3-25	Acutely inflamed ++	do. -	do. -	do. -	...	2 do.
AC.	16-3-25	20-3-26	Haemorrhagic +	do. +	do. +	do. +	...	4 do.
CC.	20-3-25	28-3-25	Caseous ++	Speckled +	Speckled +	do. +	...	8 do.
EC.	28-3-25	31-3-25	Haemorrhagic +	do. +	Congested -	do. -	...	3 do.
GC.	31-3-25	5-4-25	do. +	do. +	do. -	do. +	...	5 do.
IC.	5-4-25	15-4-25	Caseous +	do. +	do. -	do. +	...	10 do.
LC.	15-4-25	3-5-25	Congested -	do. +	do. -	do. -	...	18 do.
PC.	3-5-25	15-5-25	No signs	Nil - of plague.	Nil -	Nil -	...	12 do.



Series G. to PC. contain the greatest number of acute toxæmic cases.

The two series A. to DB. and ZC. to LD. include the largest number of the more advanced pyæmic cases.

It is a curious fact that in no instance were the kidneys observed to be the site of abscess formation macroscopically.

Four guinea-pigs showed a definite broncho-pneumonia but in many others there was an acutely congested condition of the lungs. In two cases there was an acute inflammatory condition of the bronchial glands although there was no definite consolidation of the lungs. Smears from these glands showed innumerable *B. pestis*. In two cases also there was a fibrinous pleurisy, without obvious hepatisation of the lungs.

Pericarditis with effusion is noted in five animals.

Whilst the experiments have shown that the bacillus recovered from human pneumonic plague is capable of causing bubonic and septicæmic plague in guinea-pigs, they have also shown that a broncho-pneumonic condition can be produced in a guinea-pig, with the organism obtained from a human case of bubonic plague. In these instances, however, the infection was a general one, i.e. implicating the lymph-glands, the liver and the spleen.

#### THE RODENTS OF LAGOS AND THEIR ECTOPARASITES.

The "rat campaign" initiated in August, 1924, has been prosecuted vigorously throughout the present year. In the previous report, details were given concerning 13,147 rodents. The total for 1925 is 154,007, giving a grand total 167,154 in eighteen months.

The identification and dissection have been in the hands of Mr. E. F. Hines and Corporal Bowrey, R.A.M.C., the former working until he proceeded on leave in April, and the latter from then to the end of the year. Most of the Ebute Metta, Iddo and Agege rodents, however, were examined here in Yaba.

The animals dealt with are *Rattus rattus*, *R. norvegicus*, *Mus musculus*, *Cricetomys gambianus*, *Crocidura manni* and *Lemniscomys fasciatus*. For the original identification of the latter two, thanks are due to Mr. Hinton of the British Museum.

Amongst the black rats there were many more or less marked variations in colour, and, to a less extent, in build. Some came near to *R. rattus frugivorus*. With the Agege rats particularly there was evidence of inter-breeding with different species. The scarcity of *C. gambianus* is remarkable as compared with the frequency of its occurrence at Accra, on the Gold Coast.

It will be seen from Table (5) that mice greatly outnumbered all the others. In fact, so numerous were they that from June onwards only a small proportion of them were dissected. Therefore, the number of plague-infected rodents is probably understated.

For the detection of plague-stricken animals, a smear from the spleen was taken. It was found impossible to examine the inguinal, axillary and cervical glands with the small staff available.

Carbol thionin blue was the principal stain used, as by it the bipolarity of the bacillus was best demonstrated. It may be of interest to record, in this connection that in a positive smear the violet tint of the stain is altered to a slate-blue, in practically every instance. It can be said, with some degree of accuracy that if all the slate-blue smears are taken they will be found to contain all the "positives." Some of these, of course, will show organisms other than *B. pestis*. A normal spleen smear has never been observed to give this changed colour.



TABLE (5).

Month.	Rattus, rattus.			Rattus norvegicus.			Mus musculus.			Crocidura mauri.			Lemniscornys fasciatus.			Cricetomys gambianus.			Monthly Total.	Plague infected.			Total.
	Lagos.	Ebute-Metta.	Iddo.	Lagos.	Ebute-Metta.	Iddo.	Lagos.	Ebute-Metta.	Iddo.	Lagos.	Ebute-Metta.	Iddo.	Lagos.	Ebute-Metta.	Iddo.	Lagos.	Ebute-Metta.	Iddo.		R. rattus.	R. norvegicus.	M. musculus.	
January ...	1,042	350	115	55	2	2	3,816	714	35	220	57	76	...	2	1	...	...	...	6,487	7	...	5	12
	1,507			59			4,565			333			3			...							
February	974	290	99	96	...	...	4,547	915	33	243	53	35	...	2	1	...	...	...	7,288	1	...	2	3
	1,363			96			5,465			331			3			...							
March ...	999	286	131	203	...	1	4,942	1,001	43	181	42	20	...	1	2	...	...	...	7,852	...	...	1	1
	1,416			204			5,986			243			3			...							
April ...	1,041	294	120	95	...	...	4,206	1,195	121	158	31	10	...	1	...	...	1	...	7,273	...	...	...	...
	1,455			95			5,522			199			1			...							
May ...	1,387	343	111	186	...	1	6,199	1,337	210	177	22	5	...	...	...	...	1	...	9,979	...	...	1	1
	1,841			187			7,746			204			...			...							
June ...	2,837	420	106	320	...	...	9,986	967	179	261	22	...	...	...	...	...	...	...	15,098	9	...	...	9
	3,363			320			11,132			283			...			...							
July ...	3,405	452	82	456	...	...	10,956	1,164	174	252	17	1	...	...	...	...	...	...	16,369	8	...	...	8
	3,939			456			12,294			270			...			...							
August ...	3,224	386	231	473	1	...	10,385	1,139	120	203	23	7	...	...	...	...	...	...	16,192	5	1	...	6
	3,841			474			11,644			233			...			...							
September	2,872	382	80	535	2	...	10,342	1,036	143	131	14	2	...	...	...	...	...	...	15,489	35	5	...	40
	3,284			537			11,521			147			...			...							
October ...	3,558	306	115	454	...	1	10,957	997	110	174	4	2	...	...	...	...	...	...	16,678	65	8	...	73
	3,979			455			12,064			180			...			...							
November	3,298	188	110	461	5	...	10,897	791	94	120	4	12	...	...	...	...	...	...	15,980	52	6	...	58
	3,596			466			11,782			136			...			...							
December	2,708	129	134	442	10	2	12,861	615	162	118	6	6	...	...	...	...	...	...	17,193	65	6	...	71
	2,971			454			13,638			130			...			...							
Total for Year...	27,295	3,826	1,434	3,776	20	7	100,094	11,871	1,424	2,238	235	176	...	6	4	...	2	...	152,468	247	26	9	282
	32,555			3,803			113,389			2,709			10			2							





TABLE 9

TABLE (6).—AGEGE.

Month.	R. rattus.	M. musculus.	C. manni.	L. fasciatus.	Total.	Plague infected.
March ...	34	11	1	...	46	5 rattus 1 musculus.
April ...	76	32	1	...	109	1 rattus.
May ...	52	27	2	...	81	...
June ...	141	68	...	3	212	...
July ...	182	83	2	4	271	...
August ...	79	14	4	1	98	...
September ...	16	17	1	...	34	...
October ...	25	11	...	...	36	...
Total ...	605	263	11	8	887	6 rattus 1 musculus.

TABLE. (7).—APAPA.

Month.	R. rattus.	R. norvegicus.	M. musculus.	C. manni	Total.
August ...	49	4	...	12	65
September ...	109	7	21	4	141
October ...	64	5	106	17	192
November ...	40	3	88	4	135
December ...	41	6	65	7	119
Total ...	303	25	280	44	652

*Rattus rattus* outnumbered *R. norvegicus* in the proportion of about nine to one. *Crocidura manni* occurred only slightly less frequently than *R. norvegicus*. The other two types of rodent, *L. fasciatus* and *C. gambianus*, were comparatively rare.

Plague-infected rodents were found each month of the year, with the exception of April. In March and May however, the total was only one. October gave the highest number of positive findings (73), and the latter half of the year accounted for 256 in the total of 282 positives. There were many more infected black than infected brown rats (247 to 26), but proportionately there were nine of the former to seven of the latter.

No infected rodents were found either in Ebute Metta or Iddo. The records, indeed, showed that two occurred in Ebute Metta and one in Iddo but this is due in all probability to error on the part of the rat-catchers. As already stated, only a certain number of mice were dissected in the latter half of the year, so that the percentage of these infected cannot be given.

In March, a small outbreak of plague occurred at Agege, a village 15 miles directly inland by rail from Lagos. The rodents obtained showed six black rats and one mouse infected, for March and April.

No specimens were received after October so that, as Table (6) shows, 887 animals were identified and dissected in eight months. The Table gives the details.

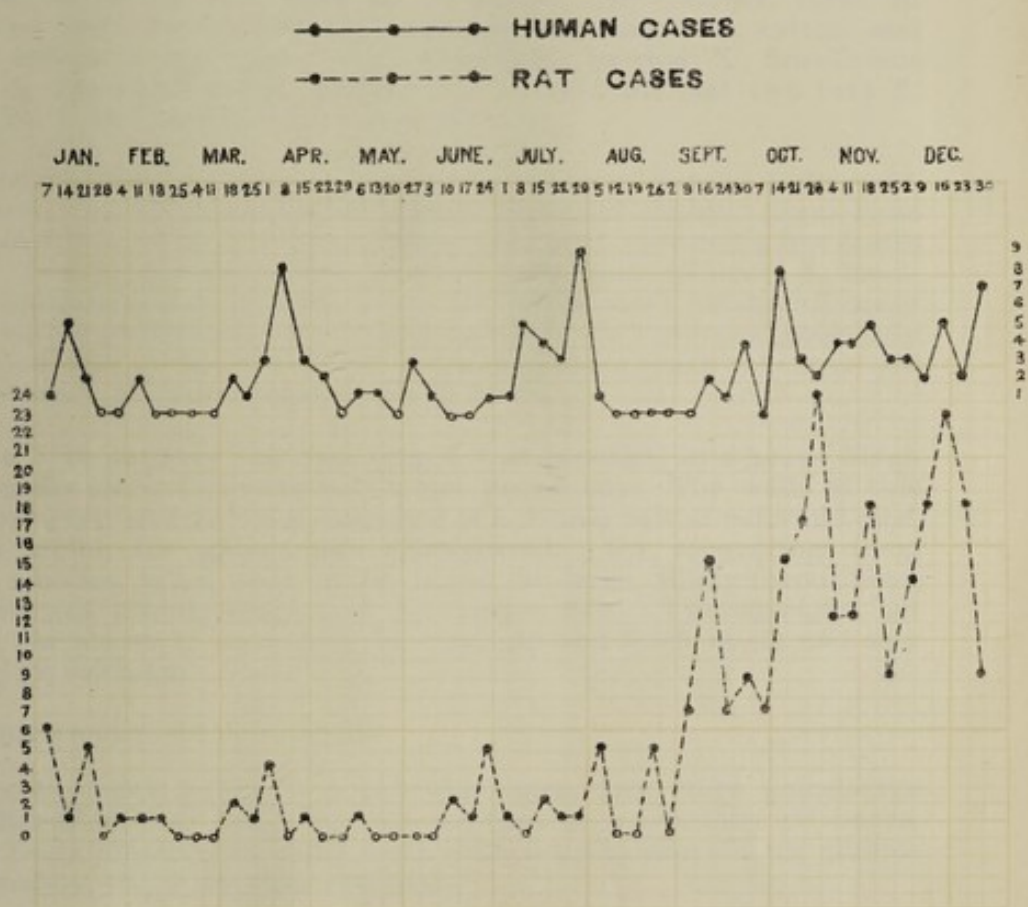
Collecting began at Apapa in August. Table (7) gives the figures from then until the end of the year. There were no positive findings.



TABLE (8).

Month	XENOPSILLA CHEOPIA.				X. BRASILIENSIS.			LELAPS ECHIDNINUS.			Total.
	Lagos.	Ebute Metta.	Agege.		Lagos.	Ebute Metta.	Agege.	Lagos.	Ebute Metta.	Agege.	
	♂   ♀	♂   ♀	♂   ♀		♂   ♀	♂   ♀	♂   ♀				
January ...	6   4	12   16	...		5   8	1   3	...	14	10	...	79
February ..	...	13   11	...		...	12   3	...	...	16	...	55
March ...	4	17   26	2   2		...	7   8	...	...	3	3	72
April ...	...	15   17	2   7		...	7   7	1	...	3	10	69
May ...	...	21   11	...		...	12   7	...	...	19	...	70
June ...	...	18   23	...		...	6   12	...	...	5	2	66
July ...	...	9   26	2		...	3   10	...	...	31	1	82
August ...	...	1   1	...		...	1   3	...	...	5	...	11
September	...	7   25	...		...	13   8	...	...	4	...	57
October...	3   1	3   5	...		...	1   13	...	3	8	...	37
November'	...	...	...		...	...	...	...	...	...	...
December	...	...	...		...	...	...	...	...	...	...
	18	277	15		13	137	1	17	104	16	598

CHART SHOWING ACTUAL NUMBERS  
OF HUMAN AND OF RAT PLAGUE IN  
LAGOS  
DURING 1925.



SURVEY DEPARTMENT, NIGERIA. LITHOGRAPHIC SECTION.



CHART SHOWING ACTUAL NUMBERS

OF HUMAN AND OF RAT PLAGUE IN

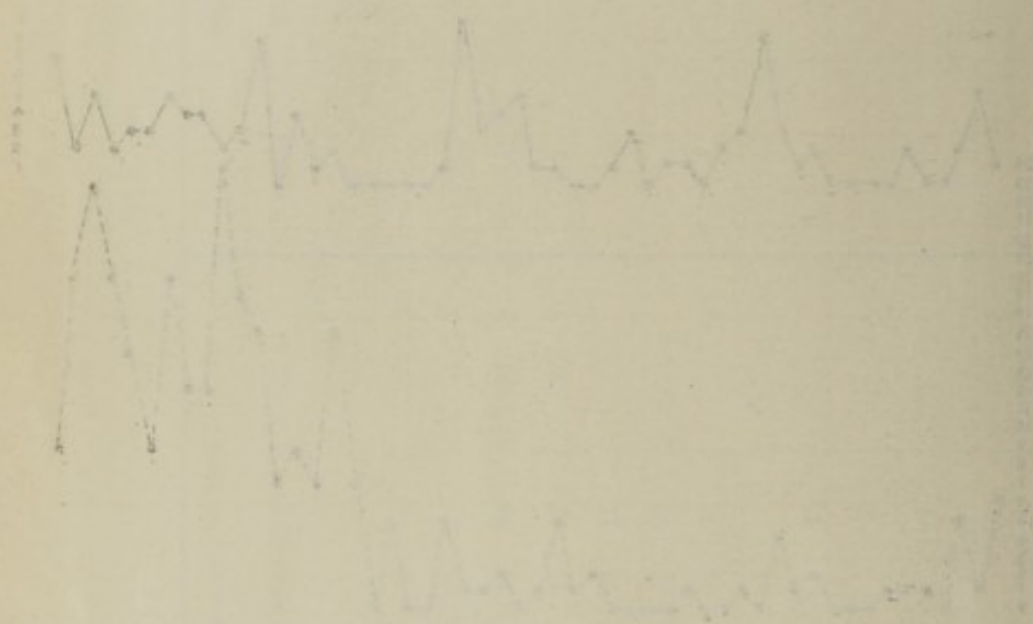
LABOS

DURING 1922

—•— HUMAN CASES

—•— RAT CASES

THE LINE FOR HUMAN CASES IS BASED ON THE NUMBER OF DEATHS REPORTED TO THE HEALTH DEPARTMENT. THE LINE FOR RAT CASES IS BASED ON THE NUMBER OF RATS FOUND DEAD IN THE LABOS.



## ECTOPARASITES.

The ectoparasites of rodents identified during 1925 correspond with those given in the 1924 Annual Report. They are *Xenopsylla cheopis*, *X. brasiliensis* and *Laelaps echidninus*. The method of collecting these insects was the same as that previously employed, namely, filtering the disinfectant fluid, in which the dead rats were brought to the Institute, through a sieve and washing out the retained matter into a white enamelled basin. For various reasons this procedure was not followed out in Lagos, where most of the rats were dissected, so that the figures in Table (8) refer mainly to the combined districts of Ebute Metta and Iddo up till October.

The number of live rats obtained was small. In March two were received in a single cage. They yielded *X. cheopis* 4 ♂♂. Three rats were brought alive in September. One had seventeen fleas, one had four fleas and a *Laelaps* and one had none. They were identified as *X. cheopis* 3 ♀♀, 10 ♂♂ *X. brasiliensis* 4 ♀♀ 4 ♂♂ and *Laelaps echidninus* one. The foregoing rats were all *R. rattus*. In October, three *R. norvegicus* were received in one cage, also one single *R. rattus*, and two *R. rattus* in one cage. The first three carried *X. brasiliensis* 1 ♀ 5 ♂♂, the single rat *X. cheopis* 1 ♀ 1 ♂ and the last two rats *X. cheopis* 2 ♀♀ and *Laelaps echidninus* three.

Some interesting experiments similar to those done in India were carried out. On 8th January, two guinea-pigs were allowed to run loose in a room from which a plague corpse had been removed a few hours earlier. Twenty-one fleas were received from these animals, *X. brasiliensis* nineteen, and *X. cheopis*, two. Of this number nineteen insects had fed on the guinea-pigs within half an hour. In twelve of them only fresh blood was found and in the remaining seven there was some old blood as well. All were negative for *B. pestis*.

On 17th January the experiment was repeated in a house which had been disinfected twenty-four hours previously. The walls of this house, however, on two sides consisted of a double row of palm mid-ribs, between which the guinea-pigs disappeared. On recovering them twenty minutes later, they were found to have thirty-three fleas, *X. brasiliensis* twenty-eight and *X. cheopis* five. Twenty-eight had blood in the stomach, fresh only in nine, old and fresh in six and only old blood in thirteen.

Smears showed no *B. pestis*.

On the same day and in the same area, two other guinea-pigs were allowed to run loose for two minutes in a non-infected house. Several large cracks and holes were stuffed up to prevent the guinea-pigs escaping. No fleas were obtained.

On 19th January, two guinea-pigs were allowed loose for two minutes in a plague house which had been disinfected forty-eight hours previously. The walls and floor showed holes and large cracks. Two fleas were recovered, both *X. cheopis*.

Finally, on 12th February, two guinea-pigs were allowed freedom in a plague room which had been disinfected on the previous day by spraying with kerosene and cyllin. No fleas were obtained. These experiments indicate the inefficiency of gaseous disinfection of the average Lagos native house and point to the efficacy of thorough spraying with an oily compound.

It remains to express thanks to Mr. Jordan for the original identification of the fleas, and to Dr. Guy A. K. Marshall, C.M.G., F.R.S., for the original identification of the *Laelaps*.



## YELLOW FEVER.

Yellow fever was unusually severe in Nigeria and particularly in Lagos. As is usual, when this disease makes its advent, the source of the infection is difficult to trace, and, on looking back one or more cases appear to be suspicious. Such cases, however, although they are borne in mind, are not included in the present report, because the speculative aspect exceeds the probable. For convenience and brevity, the clinical features, the gross post-mortem appearances and the histological findings are recorded in a table (Table (9)).

In addition, a certain number of cases occurred, which were probably more or less mild yellow fever, ending in recovery.

As regards the fatal cases there were fifteen in all. Seven occurred within the Lagos township, four in Ibadan, two in Warri and two in Port Harcourt. All the Lagos cases were in Europeans, one of the victims being a Greek and the others British. Of the four in Ibadan, one was a Syrian, another an African and two were British. Both the Warri cases were British as was one of the Port Harcourt cases. The other Port Harcourt case was a native African. The clinical histories have been supplied by Dr. G. M. Gray, Dr. A. B. Aitken, Dr. O'Keeffe, Dr. Morehead, Dr. Leonard, D.S.O., and Dr. Parkinson, with the kind collaboration of Dr. H. Beeuwkes, Director of the West African Yellow Fever Commission (International Health Board, Rockefeller Foundation).

Blood smears, taken in life, were examined from all the cases. In the two from Warri, the Medical Officer in charge demonstrated subtertian malarial parasites. In none of the others was a parasite seen. Further investigation was done, during life, in the Lagos cases, but this aspect will be considered later.

All the sections were made from tissues preserved in Formalin and stained with Hæmatoxylin and Eosin. In every case, also, pieces of tissue were stained by the Levaditi method. In some of the cases, other methods were used such as freezing and staining by Sudan III or Scharlach R. for fat, van Gieson for fibrous tissue, Pyronin Methyl green for plasma cells, and Giemsa for spirochaetes. Dried smears from organs were also examined after staining by Fontana or Giemsa, and fresh smears were examined under dark ground illumination for *Leptospira*. Dark ground work was uniformly negative as were also the stained smears. In one case only, that of H.L. of Lagos, in a single specimen of section of the liver, two bodies were found in a Levaditi preparation, very like *Leptospira*, but other sections of the same liver failed to show them.

An attempt to isolate *Leptospira icteroides* during life was unsuccessful as the following statements show. The reasons for this failure may be technical, or they may be due to the possibility that the cause of West African Yellow Fever is a more or less different organism than that causing the disease in America.

Case W.N. (fatal) sixth day of illness. Ten cc. blood from vein mixed with citrate and triple centrifuged. Final sediment examined under dark ground, and after fixation and staining by Giemsa and by Fontana, no *Leptospira* seen. 5cc. blood from a vein injected directly into the peritoneal cavity of each of two guinea-pigs. Animals showed no sign of illness.

Case M.N. (fatal) second day of illness. Same procedure, same result.

Case G.R. Recovered. Second day, same procedure, same result.

Case R.T. (fatal) third day, same procedure, same result.

Case M.L. Recovered. Second day, as before.



Case R.G. (fatal) Third day. guinea-pigs as before, neither showing signs of yellow fever.

Amounts of blood from 0.2cc. to 2cc. put into suitable tubes of locally prepared Noguchi medium and also into Wenyon's medium, twenty-two tubes in all. Result, no *Leptospira* seen, within one week. A few tubes contaminated.

Case K.T. Recovered. Third day. Guinea-pigs inoculated, as described and remained healthy.

Amounts of blood varying from 0.5 to 3cc. into six tubes Noguchi medium and six tubes Wenyon's medium. Results negative.

Case N.G. Recovered. Third day. Same procedure, same results.  
 „ C.R. „ Second day „ „ „ „

Blood smears taken on the day of admission to Hospital and others on succeeding days were examined, from all the cases. The malaria parasite was not seen in any. Differential leucocyte counts were done in most cases.

The figures of these are:—

Case.	Day of illness.	Poly.	Sm. lymph.	L. lymph.	Mono.	Eos.	Trans.	Mycho.	Mast.
G.R.	1st	74.2	5	1	15.4	0.6	3.6	0.2	—
M.N.	2nd	75.6	5.8	2.2	10.8	1.4	3.8	—	0.4
R.T.	3rd	81.6	9.6	1.6	5.6	0.4	1.2	—	—
S.L.	6th	40.8	13.6	3.2	28	10	4.4	—	—
R.G.	2nd	71.2	9.2	2	16.8	—	0.8	—	—
K.T.	2nd	73.2	6.8	2	15.6	0.8	1.6	—	—
N.G.	2nd	53.6	19.2	7.2	17.6	—	2.4	—	—
C.R.	2nd	70.8	7.6	2	17.6	—	2	—	—

The above counts are very similar except in Case S.L. a Syrian woman and Case N.G. a doubtful diagnosis. Examination of the urine revealed granular casts in all the cases. Dark ground examination of the sediment after rapid centrifugation, failed to reveal spirochaetes. Details of four feeding experiments with *Aedes argenteus* on four of the cases, are given under the heading "Entomological."

It will be noted that the epidemic was most severe in Lagos during April and May. During July, a few suspicious cases occurred. They all recovered and they were all thoroughly investigated by the West African Yellow Fever Commission.

### BLACKWATER FEVER.

Reports of twenty cases have been furnished and they form the basis of the present analysis.

*Nationality.* British seventeen, Syrian one, West Indian one, Indian one.

*Occupation.* Officials eleven, non-officials nine. In the last group, in three cases patient was the wife of an official. Of the officials, six belonged to the Railway, two Engine Drivers, a Foreman-Platelayer, and Drill Foreman, a Workshop Artisan, and a Clerk. There were two in the Public Works Department, an Inspector and a Foreman. There were two also in the Marine Department, an Engineer and a Beach-master. The last was an Inspector in the Education Department.

*Sex.* Male seventeen, female three.

*Age.* There were five cases in the age-period 20-29 (22, 22, 25, 26, 28), four in period 30-39 (32, 32, 34, 34) and ten in period 40-49 (40, 40, 40, 42, 42, 44, 44, 45, 48, 49). The age of one patient is not stated.

*Time of Year.* January three, March two, May one, June two, July two, August four, September two, November one, and December three.



*Locality.*—The Southern Provinces provided eleven cases and the Northern Provinces supplied nine.

The actual stations are Kaduna two cases, Lagos two cases, Port Harcourt two cases and one case at each of the following, Aba, Afikpo Road, Badagry, Benin, Brass, Degema, Ebute Metta, Kano, Jos, Lokoja, Minna, Offa, Yola and Zaria.

*Mortality.*—There was a fatal issue in three cases, in all of which the patient was aged 40 years or over. The illness was an acute one in each instance death occurring within three days of the onset of hæmoglobinuria.

*Previous Tropical Experience.*—This is noted in fifteen cases.

Case (1) East Africa two years. Case (2) Singapore two years. Case (3) India and Mesopotamia three years. Case (4) Costa Rica three years, West Africa three and half years. Case (5) Nigeria ten years. Case (7) Nigeria two and half years. Case (12) Nigeria one year. Case (13) "Tropics" twenty-five years including five years in Nigeria. Case (14) "Some years." Case (16) Dahomey two and half years, Nigeria two and half years. Case (18) Nigeria two years. Case (19) India and Kenya fourteen years. Case (20) Nigeria six years.

*Length of present Tour.*—This is noted in nine cases.

Case (4) five months. Case (5) five months. Case (7) six months. Case (12) twelve months. Case (13) eight months. Case (14) three years. Case (16) five years. Case (18) nine months. Case (20) thirteen months.

*Quinine Prophylaxis.*—Case (1) took a five grain tabloid about once a week. Case (2) fifteen grains in tabloid form daily for ten months. Case (3) irregular. Case (4) five grains Bisulphate thrice weekly or more seldom. Case (5) two and half grains daily. Case (6) five grains Hydrochloride daily. Case (7) five grains daily. Case (8) took no quinine. Cases (9) and (10) irregular. Case (11) five grains daily. Case (12) Sometimes missed the daily dose. Case (13) irregular. Case (14) non-taker. Case (15) non-taker. Case (16) took quinine only when fever present. Case (17) five grains regularly. Cases (18) and (19) irregular. Case (20) misses quinine at times.

*Previous Malarial attacks.*—These vary from "none for seven years" Case (5), through "slight attacks" to "frequent attacks" except in Case (1) who stated he has had no malaria, and in Case (20) who stated he had no attacks recently.

The association of the subtertian malarial parasite with the actual condition of blackwater fever is demonstrated in ten cases.

*Case 1.*—Subtertian rings on third day. Quinine given in increasing doses appeared to hasten recovery.

*Case 3.*—Subtertian rings on second day. Improved under quinine.

*Case 4.*—Subtertian rings three days before onset of hæmoglobinuria.

*Case 6.*—Pigmented mononuclears on second day.

*Case 8* is of considerable interest. She arrived in Nigeria in December, 1924. The patient took no quinine and for six weeks before coming under observation on 18th June, 1925. There had been repeated attacks of malaria for which no quinine had been given. On admission to Hospital on 18th June, the patient was nearly comatose, in a condition of extreme exhaustion. The Medical Officer in charge pointed out to the husband that if patient's life was to be saved, quinine must be given, but that in all probability blackwater fever would ensue. The drug was given in one-grain doses on 18th June, thrice in the day. The dose was increased to two grains and given four times on June 19th. On June 20th, three grains were given three times, similarly on 21st



TABLE (9).

Case.	Clinical History.	Post-mortem findings.	Liver.	Spleen.	Kidney.	Other organs.
G.B. A.	Illness began evening of 22.4.25 with headache and vomiting and fever. 24.4.25. Fever. Drowsy. Hiccough. Convulsive seizure. Coma. Death early morning 25.4.25.	Slight general icterus. Liver enlarged, yellow. Kidneys, congested. Spleen, congested. Stomach, no erosions.	Marked round-cell infiltration of Glisson's capsule, with some proliferation of bile ducts. Diffuse fatty degeneration of liver cells. Capsule thickened, with islands of lymphocytes lying directly under it.	General congestion, some polymorphic and lymphocytic infiltration. Endothelial cells of sinuses swollen.	A sub-acute condition. Tubular epithelium low, and tubules widely dilated. Granular contents with cast formation. Slight lymphocytic infiltration of stroma and glomeruli. Capsular thickening.	
W.N. L.	Illness began, evening of 22.4.25, with fever, headache and vomiting. On 27.4.25 Epigastric discomfort. On 28.4.25 Icterus and albuminuria. On 1.5.25 Epistaxis. Hiccough. Petechiae on neck. Death 3.5.25.	General lemon-yellow tint. Petechiae on forehead and chest. Submucous hemorrhages in stomach. Liver enlarged and yellow. Kidneys acutely congested. Spleen congested.	Round-cell infiltration of Glisson's capsule. Extensive degeneration and necrosis of hepatic cells, most marked centrally. Capsular thickening and sub-capsular infiltration.	Considerable congestion, with swelling of the endothelial cells. Capsular thickening.	Tubular epithelium high in type and apparently well-preserved.	
M.N. L.	Illness began evening of 29.4.25, with rigor, headache and fever. On 2.5.25 Vomiting. On 3.5.25 Albuminuria, slight icterus. On 4.5.25 Definite icterus. Epigastric discomfort. Hematemesis. Hepatic enlargement. 5.5.25 Death.	General lemon-yellow tint. Petechiae, chest and abdomen. Hemorrhagic erosions, stomach. Liver enlarged, yellowish. Spleen congested. Kidneys inflamed.	Infiltration around Glisson's capsule, mainly lymphocytic but with some polymorphs. Proliferation of bile ducts. Complete central degeneration of hepatic cells with hemorrhages. Slight capsular thickening.	Congestion. The normal appearance is considerably distorted by the lymphocytic infiltration and the endothelial hypertrophy.	Very high tubular epithelium. Lumina almost closed. Slightly granular contents. Cell protoplasm granular and vacuolated but nuclear staining good.	
R.T. L.	Pyrexia evening of 2.5.25. 3.5.25 Suffusion of eyes, Headache, albuminuria. 5.5.25 Slight icterus. Slow pulse. Hiccough. Vomiting of altered blood. 6.5.25 Petechiae head and neck. 7.5.25, Death.	Faint yellow tinge. Petechiae chest and abdomen. Hemorrhagic erosions, stomach and duodenum. Liver enlarged, yellow. Spleen congested. Kidneys congested.	Impossible to make out normal structure clearly owing to the diffuse hemorrhages and necrosis of liver cells. Capillaries distended, hypertrophy of the endothelial cells. Lymphocytic infiltration around Glisson's capsule. Some regenerative attempts on part of liver cells.	Congested and lymphocytic infiltration.	Epithelium rather high in type. Lumina open. Colloid or granular contents. Nucleation good. Congestion of glomeruli marked, with hemorrhages.	
S.L. L.	Illness began 25.4.25. On 30.4.25, bleeding gums, delirium, fever. Icterus. Hematemesis. 1.5.25 Albuminuria. 3.5.25 Suppression of urine, Black vomit. Melena, coma. Death in evening.	Liver enlarged and yellow. Ecchymosis, stomach. Spleen slightly enlarged. Kidneys congested.	Portal tracts picked out by the round-cell infiltration. Lobulation obliterated by hemorrhagic areas and fatty degeneration of liver cells. The nuclei of the intact cells vary greatly in size and show various mitotic changes.	Hemorrhages. Infiltration by lymphocytes, and hypertrophy of endothelial cells.	Low epithelium. Nucleation fair. Granular and colloid contents.	
R.G. L.	Illness began evening of 16.5.25 with Headache, vomiting and fever. 16.5.25, Albuminuria. 18.5.25, Bleeding from gums. Dark vomit. On 20.5.25, Icterus general. Melena. Died.	General orange yellow tint. Hemorrhagic erosions in stomach. Liver enlarged, yellow. Spleen congested. Kidneys acutely congested.	Mixed polymorphic and lymphocytic infiltration of Glisson's capsule. Diffuse degenerative changes in liver cells. Capillary congestion. Cell nuclei show variation in size.	Intense congestion, the Malpighian bodies appearing as cell islands surrounded by masses of red blood cells. Endothelial hypertrophy and mixed polymorphic and lymphocytic infiltration.	Epithelium ragged and lumina contain granular material with here and there, hemorrhages. Intense vascular congestion. Patchy infiltrative areas composed of polymorphs and lymphocytes.	





TABLE (9)—continued.

Case.	Clinical History.	Post-mortem Findings.	Liver.	Spleen.	Kidney.	Other Organs.
B.L. P.H.	Not yet available.	Not yet available.	Marked infiltration of tracts. Here an area of intact lobules, with their component cells separated by distended capillaries and exuded cells, there an area of lobules whose cells are almost entirely replaced by vacuoles (fatty). A small zone of intact cells remains around each tract. No increase of fibrous tissue.	Congestion and hemorrhage with marked dilatation of sinuses. The organ in places resembles lung tissue. Endothelial hypertrophy.	Epithelium high in type and ragged. Granular protoplasm. Vascular congestion.	
H.L. L.	28/7/25, Fever, malaise, headache. 31/7/25, Nausea. Headache. Sclerae icteric. Albuminuria. Melena. Hematemesis. Nausea. Hiccough. Epigastric tenderness. Death.	General lemon yellow colour. Stomach and duodenum ecchymotic. Liver, enlarged, boxwood spleen congested. Kidneys congested.	Tracts sharply defined owing to halos of round cells with some polymorphs. A zonal appearance, relatively healthy cells with large nuclei around the tracts. Near central vein the cells become more and more degenerated (fatty), many of them being foamy owing to fine fatty droplets. Centrally the liver cells are entirely replaced by hemorrhages and necrotic tissue. Round cells and polymorphs form small groups in the subcapsular region. Distended bile-ducts visible. Many hepatic cells show a stippled appearance owing to bile pigment as do Kupfer cells also. Some attempt at regeneration is present.	Marked congestion. Some fibrosis. Hypertrophy of endothelium, some of these cells assuming a cubical shape. Numerous plasma cells present.	Low epithelium. Tubules separated by a delicate oedematous granulation tissue. Tubular contents mainly granular, with some colloid casts, showing evidence of calcification. Small hemorrhages in the stroma. Congestion of vessels generally, including the glomerular capillaries.	Stomach. Congestion, superficial hemorrhage and exudate forming a sort of membrane. Duodenum. Very marked congestion with hemorrhage on surface. Pancreas. Endothelial hypertrophy. Lungs. Marked congestion and oedema, with diffuse hemorrhages. In these hemorrhages masses of organisms are present. Bronchi. Lining epithelium is replaced by a hemorrhagic exudate. Many of the bronchi contain masses of organisms.
T.L. L.	8/9/25, Rigor and Fever. 10/9/25, Bilious vomit. Injected sclerae. Epigastric tenderness. Black vomit. Albuminuria. 11/9/25, Delirium. Melena.	General lemon yellow tint. Petechiae on face. Ecchymose in stomach. Liver, enlarged, congested. Kidneys, congested.	Infiltration of tracts. This liver does not show much differentiation into zones. The cells appear diffusely degenerated and necrotic. Around some of the portal tracts there are hepatic cells in a better state of preservation.	Marked congestion. Infiltration of Malpighian bodies.	High epithelium and granular material in many of the lumina. Acute vascular congestion including the glomerular capillaries.	Duodenum. Congestion and superficial necrosis of the mucous layer, with here and there membrane formation of fibrinous material. Lung. Congestion and hemorrhages into alveoli. Peribronchial infiltration with some desquamation of the lining epithelium. Pancreas. Well preserved. Brain. Congestion with diffuse round-cell infiltration.





Case	Clinical History	Investigation	Diagnosis	Remarks
1	Patient, male, 45 years, with long-standing rheumatism, admitted to hospital on 12th Dec. 1926. Complaints of stiffness and pain in the joints, particularly the knees and hips. No fever, no weight loss.	Examination: Joints swollen, tender, and stiff. No deformities. Blood count: Normal. ESR: 15 mm/hr. X-rays: Mild degenerative changes in the knees.	Rheumatoid arthritis.	Patient improved with salicylates and rest.
2	Patient, female, 35 years, with long-standing rheumatism, admitted to hospital on 15th Dec. 1926. Complaints of stiffness and pain in the joints, particularly the hands and wrists. No fever, no weight loss.	Examination: Joints swollen, tender, and stiff. No deformities. Blood count: Normal. ESR: 18 mm/hr. X-rays: Mild degenerative changes in the hands.	Rheumatoid arthritis.	Patient improved with salicylates and rest.
3	Patient, male, 55 years, with long-standing rheumatism, admitted to hospital on 18th Dec. 1926. Complaints of stiffness and pain in the joints, particularly the knees and hips. No fever, no weight loss.	Examination: Joints swollen, tender, and stiff. No deformities. Blood count: Normal. ESR: 12 mm/hr. X-rays: Mild degenerative changes in the knees.	Rheumatoid arthritis.	Patient improved with salicylates and rest.
4	Patient, female, 40 years, with long-standing rheumatism, admitted to hospital on 21st Dec. 1926. Complaints of stiffness and pain in the joints, particularly the hands and wrists. No fever, no weight loss.	Examination: Joints swollen, tender, and stiff. No deformities. Blood count: Normal. ESR: 16 mm/hr. X-rays: Mild degenerative changes in the hands.	Rheumatoid arthritis.	Patient improved with salicylates and rest.
5	Patient, male, 60 years, with long-standing rheumatism, admitted to hospital on 24th Dec. 1926. Complaints of stiffness and pain in the joints, particularly the knees and hips. No fever, no weight loss.	Examination: Joints swollen, tender, and stiff. No deformities. Blood count: Normal. ESR: 14 mm/hr. X-rays: Mild degenerative changes in the knees.	Rheumatoid arthritis.	Patient improved with salicylates and rest.
6	Patient, female, 30 years, with long-standing rheumatism, admitted to hospital on 27th Dec. 1926. Complaints of stiffness and pain in the joints, particularly the hands and wrists. No fever, no weight loss.	Examination: Joints swollen, tender, and stiff. No deformities. Blood count: Normal. ESR: 17 mm/hr. X-rays: Mild degenerative changes in the hands.	Rheumatoid arthritis.	Patient improved with salicylates and rest.

TABLE (9)—continued.

Case.	Clinical History.	Post-mortem Findings.	Liver.	Spleen.	Kidney.	Other Organs.
P.R. W.	10/7/25 Rigors and headache, 11/7/25 Photophobia, nausea and bilious vomiting, Albuminuria, Fever, 12/7/25 Haematemesis, 13/7/25 Haematuria and epigastralgia, 13/7/25 Sclerae yellowish. Melæna, 15/7/25 Bleeding gums, 16/7/25 Hiccough, Anuria, 17/7/25 Coma, Death.	General yellow tint. Echymoses, scrotum, stomach shows hemorrhages, also small intestine, Liver enlarged, pale yellow boxwood, Spleen dark colour, Kidneys enlarged, congested.	Slight infiltration of Glisson's capsule, marked degeneration of hepatic cells, with hemorrhages. Zone of well-preserved cells around Glisson's capsule.	Diffuse infiltration and fibrosis	Low epithelium, tubules granular contents. Glomerular congestion.	Small Intestine. Diffuse round cell infiltration of mucous membrane. Large Intestine. Similar condition with superficial hemorrhage.
B.L. W.	15/7/25 Headache, 16/7/25 Fever, 17/7/25 Nausea and vomiting, 18/7/25 Injected conjunctiva, Epigastralgia, 19/7/25 Albuminuria, 20/7/25 Scleral jaundice, 21/7/25 Black vomiting, Melæna, Petechiae face, thorax, abdomen, legs, Bleeding gums, General icterus, Coma, Death.	Skin yellow, Petechiae general, stomach shows small patches of hemorrhage, Duodenum small hemorrhages, Liver yellowish brown, Spleen dark, Kidneys congested.	Lymphocytic infiltration of Glisson's capsule. Relatively well-preserved layer of cells around each portal tract, producing a net-like appearance, the meshes of which contain broken down liver cells, with cellular infiltration and hemorrhage.	Infiltration of Malpighian bodies. Pulp congested and slightly fibrotic.	High epithelium, lumina mostly obliterated. Here and there, granular contents. The glomeruli completely fill up Bowman's capsule. Vascular congestion. No capsular thickening.	
V.N. P.H.	5/6/25 Fever, slow pulse, Albuminuria appeared to improve until 9/6/25 when mild delirium appeared, suffusion of eyes and epigastric tenderness, with slight jaundice. Later black vomit and Haematuria, death in evening.	Not yet available.	Infiltration of Glisson's capsule. Marked necrosis with hemorrhages in centre of each lobule. The liver cells surrounding portal tracts are better preserved and show some attempt at regeneration.	Congestion of pulp and marked dilatation of sinuses. Diffuse fibrosis.	Epithelium low in type some glomerular congestion.	Pancreas apparently normal. Stomach. Nothing of note.
D.M. I.	Admitted 9/6/25 with fever and headache, died on 11/6/25 just after black vomit set in.	Liver enlarged, yellow, Stomach, ecchymotic, Spleen slightly enlarged, Kidneys congested.	Infiltration of portal tracts. Central degenerative changes.	Markedly congested.	High type of epithelium with granular material in lumina of tubules. Glomeruli congested and a granular oedematous exudate between tuft and capsule. Vascular congestion.	Small Intestine. Diffuse lymphocytic infiltration of submucous and mucous coat.
P.R.N. I.	Illness began 15/8/25, with chill, headache, and body pains, 18/8/25 conjunctival suffusion, Nausea, Albuminuria, Haematemesis, 19/8/25 Sclerae yellow, Hiccough, vomiting, Epigastric tenderness, 20/8/25 Petechiae, shoulder, 21/8/25 General icterus, 22/8/25 Delirium, Coma, Death.	Icterus general, Liver, yellowish brown, Stomach, hemorrhagic areas, Spleen congested, Kidneys congested.	Infiltration of portal tracts. Marked zonal appearance in each lobule. Around each portal tract is a band of intact liver cells, then an area of fatty degenerated hepatic cells and in the centre a mass of extravasated red blood cells and necrotic liver cells.	Marked congestion with dilatation of sinuses.	Marked acute condition. Epithelium high, and granular. Glomeruli show marked capillary congestion. Infiltration and oedema of stroma tissue, mainly about the glomeruli. Component cells are mixed round and polymorphic. Capsule thickened and oedematous.	
T.R. I.	9/10/25 Headache, fever and vomiting, 10/10/25 Albuminuria, 12/10/25 Bloody vomit, 13/10/25 Jaundice, Melæna, Death.	Liver enlarged, yellow, Haemorrhages, stomach, Spleen not enlarged, Kidneys congested.	Diffuse and almost complete necrosis of hepatic cells. Impossible to make out any structure apart from the tracts.	Congestion.	Moderately high granular epithelium. Lumina contain a granular material. Marked congestion.	





and 22nd June. On 23rd June five grains were given three times. On 24th June five grains were given at 11 a.m. and hæmoglobinuria was observed four and half hours later. The attack lasted just under two days, and was a mild one. The Medical Officer believes that with even more cautious dosage the hæmoglobinuric condition might have been avoided, for the reason that the destruction of parasites would have been more slow and therefore the liberation of toxic products proportionately delayed and lessened. This belief must appeal to those who have studied and treated cases of blackwater fever.

*Case 11.*—Subtertian rings appeared, on a rise of temperature on the day the urine cleared up, the hæmoglobinuria having set in three days previously.

*Case 12.*—Subtertian rings present on second day.

*Case 16.*—Subtertian rings on 1st day.

*Case 18.*—Subtertian rings on 1st day.

*Case 20.*—Pigmented mononuclears 1st day.

When it is considered that in many of the other cases the patient was not seen until late in the disease, these facts are the most striking yet obtained in the series of Annual Reports presented from this Colony.

#### QUININE ADMINISTRATION PRIOR TO ATTACK OF HÆMOGLOBINURIA.

*Case 1,* who took five grains of quinine about once a week, had that dose sixty hours before blackwater appeared.

*Case 2* had been taking fifteen grains daily in a single dose for ten months previously. Four hours elapsed between the last dose of quinine and the onset of hæmoglobinuria.

*Case 3* had been taking ten grains daily for "some days" before, his habit having been irregular previously. His last dose however, was over forty-eight hours before the onset of "blackwater."

*Case 4.*—He took five grains Bisulphate perhaps thrice weekly. On 5th March he took ten grains in solution. On 6th March he took fifteen grains in solution. On 7th March in two doses of ten grains, one in the morning and the other in evening he took twenty grains. On 8th March he took ten grains in solution at 9 a.m. At 2.30 p.m. he noticed "black urine."

*Case 5.*—For nine years had been taking two and half grains quinine in liquid form, daily. For a week previous to the appearance of blackwater he had been taking ten to twenty grains in ten grain doses daily. There was an interval of six hours between the last dose of quinine and the passing of blackwater.

*Case 6.*—Stated he took "five grains daily." On 24th May, took five grains in tabloid form by mouth four times. Again on 25th took five grains in solution four times, last dose at 1 p.m., hæmoglobinuria observed two hours latter.

*Case 7.*—Took five grains Hydrochloride daily and on one occasion a week before the appearance of blackwater, took ten grains. There was an interval of four and half hours between the last five grains of quinine and the passing of typical urine.

*Case 8.*—The full history of this case, as regards quinine, has already been given.

*Case 9.*—"Sometimes took five grains daily." Ten grains were taken at 6.30 a.m. 4th July. Blackwater was passed at 1.30 p.m. on the same day.

*Case 10.*—Took five grains quinine occasionally. Took ten grains Hydrochloride on 5th July, 1925 and next day passed blackwater.



*Case 11*, was accustomed to take five grains daily as a prophylactic. He had five grains Hydrochloride at 6 p.m. on 2nd August and sixteen hours later blackwater appeared.

*Case 12*.—From August 1924 until January 1925 took two and half grains daily. Thereafter took five grains daily Hydrochloride until evening of 16th August, 1925, when she took ten grains Hydrochloride. An interval of seven hours elapsed before the voiding of blackwater.

*Case 13*.—Took five grains Hydrochloride in tabloid form, but not regularly. On the evening before the appearance of blackwater he took five grains in solution, but vomited the dose immediately.

*Case 14*.—Took no quinine.

*Case 15*.—Took no quinine.

*Case 16*.—His usual custom was to take quinine only when he had fever. However, on the present occasion he had taken no quinine for three months, when after having had fever for two days, he developed blackwater.

*Case 17*.—Took five grains regularly. On 27th October he took fifteen grains in tabloid form. Thereafter he took five grains daily until 30th October. The last dose in the form of a tabloid, grains five, was taken at 7 p.m. Patient passed blackwater thirty-six hours later.

*Case 18*.—Took quinine Hydrochloride not very regularly. Two hours before appearance of blackwater, took fifteen grains Hydrochloride.

*Case 19*.—"Perhaps missed twice a week taking five grains daily in solution." Took five grains Hydrochloride on each of two mornings previous to onset of hæmoglobinuria. Interval between last dose and passing of blackwater twenty-four hours.

*Case 20*.—Did not take quinine regularly but on 28th December took the following, 3.30 a.m. five grain tabloid Hydrochloride, 2 p.m. two tabloids ditto, 7.30 p.m. five grains in solution; dark urine six hours later.

TABLE (10).

Case.	I. Quinine.	Interval.	P. Quinine.	Total Quinine 48 hours.
1	5 grains	60 hours	—	—
2	15 do.	4 do.	15 grains	30 grains
3	10 do.	48 do.	—	10 do.
4	10 do.	5½ do.	50 grains	30 do.
5	10-20 do.	6 do.	10-20 do.	20-40 do.
6	20 do.	2 do.	20 do.	40 do.
7	5 do.	4½ do.	5 do.	10 do.
8	5 do.	4½ do.	15 do.	20 do.
9	10 do.	7 do.	—	10 do.
10	10 do.	24 do.	—	10 do.
11	5 do.	16 do.	5 grains	10 do.
12	10 do.	7 do.	5 do.	15 do.
13	5 do. (vom- ited).	12 do.	nil.	—
14	none.	—	nil.	—
15	none.	—	nil.	—
16	none.	—	nil.	—
17	5 grains	36 hours	nil.	5 grains
18	15 do.	2 do.	nil.	15 do.
19	5 do.	24 do.	5 grains	10 do.
20	20 do.	6½ do.	nil.	20 do.



Table (10) puts the facts shortly. The column "I. Quinine" gives the dosage of quinine last administered. "Interval" refers to the time elapsed between this last dose and the voiding of black urine. "P. Quinine" is the amount taken in the twenty-four hours previous to the last dose. In cases (1), (13), (14), (15) and (16) the onset of hæmoglobinuria cannot be attributed to quinine.

A previous history of blackwater fever is given in three cases, Case (9) (West Indian) in 1922, Case (10) (Indian) in 1906 and 1921, and Case (11) twice previously.

A remission occurred in three cases. Case (2) showed alternately red and clear urine from the 2nd to the 5th day, Case (3) on the 5th day and Case (7) on the 3rd and 5th day.

A relapse occurred in three cases, Case (6) cleared on the 4th day, relapsed on the 5th and cleared on the 6th day, Case (15) cleared on the 2nd day, became red on the 3rd and cleared on the same evening, Case (16) cleared in two days, remained clear for eight days and was red again for one day.

The total duration of hæmoglobinuria in the cases which recovered was twelve hours in two cases, one day in two cases, two days in three cases, four days in one case, five days in two cases, six days in two cases and seven days in one case. There was no information in one case. In the three fatal cases, the hæmoglobinuria was present throughout the three days' illness of each.

As regards the signs and symptoms during the attack a perusal of the reports brings no unusual features to light.

A number of differential leucocyte counts and Arneth counts were made. These are given in Table (II).

#### LEPROSY.

In the previous year's report eight patients were under treatment by Moogrol intravenously. This was continued in each until the 1st of June by which time all were obtaining their maximum dose of 4 to 6cc. Early in January, a former inmate who had disappeared, returned and asked for treatment and in March a recent prisoner also asked "for the medicine". From June until October Moogrol was suspended and each patient was given Copper Sulphate by the mouth in half-grain doses daily. At the end of that period, seven patients had seriously retrogressed and three showed no improvement. Accordingly, a new line of treatment was adopted. On Monday of each week, Sodium Morrhuate was given subcutaneously and on Thursday of each week Ethyl Hydnocarpate by the same route.

The initial dose of Sodium Morrhuate was 0.5cc. of a 3% solution rising at each injection by 0.5cc. until an amount of 2.5cc. was reached. The initial dose and the increase were the same with the Hydnocarpate. When the Sodium Morrhuate had reached 2½cc., it was discontinued and Hydnocarpate was given twice weekly. All the patients have willingly undergone the treatment. During the year the prisoner was released and volunteered to return as an inmate. A female patient also asked for treatment so that the number of cases is now eleven. Some few signs of improvement are evident but the main consideration is that all the patients come forward for their twice weekly injections.

#### ENTOMOLOGICAL.

The most important investigation undertaken was an examination of the markings of *Aedes (Stegomyia) argenteus*, a much harassed insect both in nomenclature and in practice. One thousand males and one thousand females have been examined. They were not specially selected but were taken as they hatched out from the collections of larvæ sent to the Institute by the Medical Officer of Health.



TABLE (II).

Case.	Day of disease.	Parasites.	Pigment.	Polymorph.	Sm. lymph.	L. lymph.	Monoc.	Eos.	Trans.	Mast.	Myelo.	Nucl. red.	Ery.	Vac.	I.	II.	III.	IV.
6	2nd ...	...	+	61.6	13.8	5	17.6	0.4	1.6	...	...	...	2	28	75.2	20	4.8	...
9	2nd ...	...	...	72.8	12	2	11.2	...	1.6	0.2	0.2	...	...	...	69.6	25.2	4.8	0.4
13	1st ...	...	...	58	9.6	2.2	26	...	3.4	0.8	...	...	...	...	62	27	9	2
14	1st ...	...	...	64.6	11.2	3.6	19.2	...	1.4	...	...	...	...	...	62.4	30.4	6.4	0.8
16	1st ...	+	+	78.4	6.8	1.6	11.6	0.4	1.2	...	...	...	...	...	88	10	2	...
	2nd ...	+	+	78	12	1.6	7.6	...	0.8	...	...	...	...	...	66	27	7	...
	3rd ...	...	...	81.2	13.6	2	7.2	...	...	...	0.4	...	...	...	67	24	8	1
	4th ...	...	...	71.6	8.4	3.2	15.6	...	0.8	...	0.4	...	...	...	58	29	13	...
	5th ...	...	...	70.4	8	1.6	12.4	2.4	3.2	0.4	1.6	2	...	...	69	26	5	...
	6th ...	...	...	73.6	10.4	2	9.2	...	3.2	...	1.6	2	...	...	69	26	4	1
	7th ...	...	...	76	8.8	3.2	9.6	...	1.2	...	1.2	3	...	...	64	29	6	1
18	1st ...	+	+	68.8	6	2	20.8	...	1.6	0.2	0.6	...	...	...	78.4	18	3.6	...
20	1st ...	-	+	64.2	9.8	2.2	18.6	0.6	0.4	...	4.2	1	...	5	64	26.4	8.8	0.8
	2nd ...	...	...	59.6	11.2	5.2	22	...	0.4	...	1.6	1	...	13	58	27	10	5

Ery=Erythrocytes. Vac=Vacuolated Mononuclears. Roman figures refer to Arneith's classification.

Many micro-photographs were taken, to show variations in the marking of the abdomen.

The work of tabulation and sorting is still in progress so that a complete account cannot be given. It may be stated, however, that the characteristic lyre on the thorax is the feature least liable to variation as regards its shape. As regards the markings on the legs and the colour and the markings on the abdomen a very wide variation has been found to exist. A great many specimens have been obtained more worthy of varietal rank than any already given that status. The object of the work, however, is to lessen, not increase the number of varieties.

#### CROSS-BREEDING EXPERIMENTS.

In addition to a number of cross-breeding work with differently marked *Aedes argenteus*, the following two experiments were done:—

8th July. Two *Aedes luteocephalus* ♂♂ and many *Aedes argenteus* ♀♀ all newly hatched, let loose in a bell-jar, containing fresh water and a lump of sugar. The females each had two feeds of blood.

26th July. All insects dead. No eggs laid. On dissection of females no eggs found.

23rd July. One *Aedes longipalpis* ♂ and one *Aedes luteocephalus* ♀ put in tube. Both freshly hatched. Male fed on sugar, female on human blood.

25th July. Male dead.

26th July. Female again fed on human blood.

Two *Aedes longipalpis* ♂♂ put in tube.

30th July. All insects dead. No eggs laid and none found on dissection of *Aedes luteocephalus*.

An attempt to obtain the eggs of *Eretomopodites chrysogaster* failed, by the following method.

23rd May. *Eretomopodites chrysogaster* 2♀♀ 1♂ bred from larvæ, put into a bell-jar containing fresh water, various flowers, a dish of sugar-water and a banana.

24th May. Fresh flowers supplied.

25th May. Fresh banana given.

26th May. Fresh flowers.

27th May. „ „

28th May. „ „

29th May. Fresh water, flowers, banana and a piece of sugar given. The fresh supplies were kept up regularly.

6th June. One ♀ dead. No eggs. (Dissected).

18th June. The ♂ dead.

23rd June. Second ♀ dead. No eggs. (Dissected).

#### DISSECTIONS.

The following wild biting insects were dissected in a search for parasites.

*Taeniorhynchus* (*Mansonioides*) *africanus* 72 ♀♀.

Spirochaetes in stomach contents 2.

Oocysts, stomach wall ... 2.

amoebæ in stomach contents ... 1.

sporozoite-like structures, in

salivary glands ... 1.

microfilariae in stomach contents 1.

negative ... 65.



Anopheles (Pyretophorus) costalis	32 ♀ ♀.
Oocysts, stomach wall ...	1.
negative ...	31.
Culiciomyia nebulosa	10 ♀ ♀.
Innumerable minute nematodes in stomach contents	1.
negative ...	9.
Culex thalassius	5 ♀ ♀.
Spirochaetes in stomach contents	1.
negative ...	4.
Glossina palpalis	5 ♀ ♀.
Trypanosomes (? vivax) in proboscis	1.
negative ...	4.
Fannia sp. 5 ♀ ♀. E. histolytica cysts in stomach	1.
negative ...	4.
Anopheles funestus 1 ♀, A. maculipalpis 1 ♀ Taeniorhynchus annetti 1 ♀. Aedes irritans, 1 ♀ all negative.	
A supply of mosquitoes came from the yellow fever areas in Lagos and Apapa.	
Culiciomyia nebulosa 58 ♀ ♀. One had crithidia in stomach contents.	
Aedes argenteus 53 ♀ ♀. One had spirochaetes in stomach contents.	
Culex thalassius 42 ♀ ♀. One showed spirochaetes, another crithidia in stomach contents.	
Anopheles costalis 21 ♀ ♀, all negative.	
Aedes irritans 9 ♀ ♀ „ „	
Taeniorhynchus annetti 7 ♀ ♀, one had spirochaetes in stomach contents.	
Aedes nigricephalus ...	5 ♀ ♀
Culex fatigans ...	5 ♀ ♀
Taeniorhynchus africanus ...	3 ♀ ♀
Lutzia tigripes ...	2 ♀ ♀
} all negative.	

## FLEAS.

These have been described under the heading of "The Rodents of Lagos and their Ectoparasites."

It has to be added, however, that in the fleas collected from guinea pigs which were allowed to run loose in plague houses the following showed an encysted nematode in the abdomen:

Xenopsylla cheopis 3 ♀ ♀ 1 ♂.

X. brasiliensis 3 ♀ ♀ 2 ♂ ♂.

## FEEDING EXPERIMENTS WITH AEDES ARGENTEUS IN CASES OF YELLOW FEVER.

In the first experiment three Aedes argenteus were fed on a yellow fever patient in the third day of his disease. One was killed on the 9th another on the 13th and the last on the 23rd day after the initial feed. All were preserved and embedded in paraffin. They await sectioning.

In the second experiment four *Aedes argenteus* were fed on a patient in the third day of the disease. One was killed on the 11th, another on the 13th, a third on the 15th and the last on the 25th day after the infective meal. They were all preserved and embedded in paraffin.

In the third experiment three *Aedes argenteus* were fed on a patient in the second day of the disease. Two were killed on the 5th day and the last on the 28th day. They also were embedded.

In the fourth experiment seven *Aedes argenteus* were fed on a patient in the third day of illness. Two were killed on the 6th day, one on the 21st, one on the 23rd, two on the 30th and the last on the 32nd day after the infective feed.

All the insects were bred from larvæ, and they were kept alive with blood meals from guinea-pigs. One guinea-pig was reserved for each batch. None of the four guinea-pigs developed any febrile disturbance.

In a fifth experiment three *Aedes argenteus* caught in the bedroom of the patient in the second experiment were kept alive by feeding on a guinea-pig. One was killed two days later.

On the 10th day both of the remaining mosquitoes had laid eggs in a dry test tube. On the 15th day each had again laid eggs. One was killed on the 16th day and the third survived sixty-six days. All were preserved for section.

The guinea-pig on which they fed remained healthy.

#### SPECIMENS SENT FOR IDENTIFICATION.

The Medical Officer of Health, Lagos, sent the following:—

<i>Aedes nigricephalus</i>	...	...	19 ♀ ♀	1 ♂
<i>Aedes irritans</i>	...	...	10 ♀ ♀	1 ♂
<i>Culiciomyia nebulosa</i>	...	...	2 ♀ ♀	1 ♂
<i>Culex insignis</i>	...	...	2 ♀ ♀	
<i>Aedes argenteus</i>	...	...	2 ♂ ♂	
<i>Anopheles costalis</i>	...	...	2 ♀ ♀	
<i>Aedes argenteopunctatus</i>	...	...	1 ♀	
<i>Culex decens</i>	...	...	1 ♂	

Also the larvæ of a Dermestid beetle, obtained from stockfish.

Dr. Dyce-Sharp sent from Sokoto.

<i>Taeniorhynchus africanus</i>	...	...	1 ♀	
<i>Anopheles costalis</i>	...	...	2 ♂ ♂	

Dr. Bauvallet sent from Kotonu

<i>Culiciomyia nebulosa</i>	...	...	12 ♀ ♀	37 ♂ ♂
<i>Anopheles costalis</i>	...	...	4 ♀ ♀	4 ♂ ♂
<i>Taeniorhynchus africanus</i>	...	...	3 ♀ ♀	
<i>Culex grahami</i>	...	...	3 ♀ ♀	
<i>Aedes argenteus</i>	...	...	1 ♀	
<i>Lutzia tigripes</i>	...	...	1 ♀	

#### LARVÆ RECEIVED FROM MEDICAL OFFICER OF HEALTH.

Six thousand five hundred and twenty-seven collections were received. The identifications are set out in Table (12) under headings of month, receptacle and mosquito.



Larvæ of eighteen species were found, namely :—

<i>Aedes argenteus</i>	in 3,700 collections of larvæ.
<i>Culiciomyia nebulosa</i>	in 2,059 collections of larvæ.
<i>Anopheles costalis</i>	„ 443 „ „ „
<i>Culex fatigans</i>	„ 196 „ „ „
<i>Culex duttoni</i>	„ 86 „ „ „
<i>Aedes irritans</i>	„ 58 „ „ „
<i>Aedes luteocephalus</i>	„ 55 „ „ „
<i>Culex decens</i>	„ 46 „ „ „
<i>Culex insignis</i>	„ 13 „ „ „
<i>Uranotænia annulata</i>	„ 12 „ „ „
<i>Lutzia tigripes</i>	„ 7 „ „ „
<i>Culex decens</i> var <i>invidiosus</i>	in 5 collections of larvæ.
<i>Aedes apicoargenteus</i>	in 4 collections of larvæ.
<i>Culex thalassius</i>	in 3 collections of larvæ.
<i>Aedes apicoannulatus</i>	in 2 collections of larvæ.
<i>Aedes nigricephalus</i>	in 1 collection of larvæ.
<i>Eretmopodites chrysogaster</i>	in 1 collection of larvæ.
<i>Aedes africanus</i>	in 1 collection of larvæ.

The collections from "Marine boats" and "Barges" came from the Port Health Officer and the remainder from the Medical Officer of Health.

*Aedes argenteus*, as usual, predominated and the commonest receptacle for breeding is the familiar "household" pot, an earthenware vessel for holding water.

#### INVESTIGATION OF THE SKIN LESIONS PREVALENT IN LAGOS.

Dermatological histology, though one of the most fascinating and important branches of pathology, particularly in the tropics, has, up to the present, attracted few workers in West Africa. French observers, particularly in Senegambia and in Dahomey and Macfie in the Gold Coast have published results of investigations, but no systematic attempt has yet been made to investigate and classify the numerous skin lesions.

Too much credence has been generally placed in the belief that syphilis is the cause of the majority of conditions met with, and although it is claimed that a large percentage of native Africans give a positive Wassermann reaction, it should not be assumed that in every case the lesions present are of spirochaetal origin. A thorough investigation of the dermal condition, both bacteriological and histological, in the present state of our knowledge, is necessary for a correct diagnosis.

Similarly the term "craw craw" may be said to cover a multitude of irritant eruptions.

With the object of determining with some degree of accuracy, the nature and variety of skin lesions prevalent among the African inhabitants of Lagos, an examination of all patients presenting themselves at the African Hospital, was commenced in August.

At the outset, it is necessary to express gratitude to the Resident Medical Officers and to the Nursing Staff for their active and ungrudging efforts, both in producing cases and in assisting the examination.

Upwards of one hundred cases have, in these five months been investigated more or less fully. It is pleasant to record, that with few exceptions, the patients take a keen interest in their own particular case and readily submit to examination and treatment.

TABLE (12).

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>Agbo Pots.</i> <i>Culicomyia nebulosa</i> ...	2	3	4	6	0	4	11	4	11	6	12	1	64
<i>Aedes argenteus</i> ...	...	...	1	...	1	...	2	...	...	...	...	...	4
<i>Culex duttoni</i> ...	...	...	...	...	...	...	...	...	...	...	1	...	1
<i>Culex fatigans</i> and <i>Culicomyia nebulosa</i> ...	...	...	...	...	...	...	...	1	...	...	...	...	1
<i>Cul. neb.</i> , <i>Aedes arg.</i> , and <i>Culex</i> ...	...	...	...	...	...	...	...	...	1	...	...	...	1
<i>decens</i> ...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Culicomyia nebulosa</i> and <i>Aedes argenteus</i> ...	...	...	...	...	...	...	...	...	1	...	...	...	1
<i>Barrel.</i> <i>Aedes argenteus</i> ...	...	1	6	3	18	60	33	19	8	11	12	5	176
<i>Culicomyia nebulosa</i> ...	...	1	1	...	2	6	13	10	9	5	15	4	66
<i>Anopheles costalis</i> ...	...	...	...	...	1	10	5	...	...	...	...	...	16
<i>Culex fatigans</i> ...	...	...	...	...	...	3	2	2	1	...	...	1	9
<i>Culex duttoni</i> ...	...	...	...	...	...	1	...	...	1	...	1	...	3
<i>Aedes argenteus</i> and <i>Cul. fat.</i> ...	...	...	...	...	...	1	...	...	1	...	...	...	2
<i>Aedes argenteus</i> and <i>Anopheles costalis</i> ...	...	...	...	...	...	1	1	...	1	...	...	...	3
<i>Aedes argenteus</i> and <i>Cul. decens</i> ...	...	...	...	...	...	...	1	...	1	...	1	...	3
<i>Culicomyia nebulosa</i> and <i>Culex fatigans</i> ...	...	...	...	...	...	...	1	1	1	...	...	...	3
<i>Culex fatigans</i> and <i>Culex inv.</i> ...	...	...	...	...	...	...	...	1	...	...	...	...	1
<i>Culex decens</i> ...	...	...	...	...	...	...	...	1	...	1	2	...	3
<i>Aedes argenteus</i> and <i>Aed. lut.</i> ...	...	...	...	...	...	...	...	...	1	...	...	...	1
<i>Bottle.</i> <i>Aedes argenteus</i> ...	...	...	...	...	3	6	5	3	2	4	2	3	28
<i>Lutz. tigr.</i> ...	...	...	...	...	1	...	...	...	...	...	...	...	1
<i>Cul. dec.</i> ...	...	...	...	...	1	...	...	...	...	...	...	...	1
<i>Cul. neb.</i> ...	...	...	...	...	1	...	1	...	...	5	3	2	12
<i>An. cost.</i> ...	...	...	...	...	...	1	...	...	...	...	...	...	1
<i>Aed. lut.</i> ...	...	...	...	...	...	...	1	...	...	...	...	...	1
<i>Cul. dutt.</i> ...	...	...	...	...	...	...	...	...	1	...	...	...	1



TABLE (12)—continued.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>Bucket.</i> Aed. arg. ...	...	1	2	...	4	5	4	...	1	7	1	2	27
Cul. fat. ...	...	...	...	...	1	...	...	...	...	...	...	...	1
Cul. neb. ...	...	...	...	...	...	1	3	1	2	3	3	2	15
An. cost. ...	...	...	...	...	...	1	...	...	...	...	...	1	2
Aed. arg. and Cul. fat. ...	...	...	...	...	...	...	...	...	1	...	...	...	1
<i>Calabash.</i> Cul. neb. ...	...	...	...	...	1	2	2	3	...	1	1	...	10
Aed. arg. ...	...	...	...	...	1	4	...	2	...	1	1	1	10
<i>Canoe.</i> Cul. thal. ...	...	1	...	...	...	...	...	...	...	...	...	...	1
Aed. arg. ...	...	...	...	1	...	...	...	...	...	...	...	...	1
Cul. thal. and An. cost. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
Cul. neb. ...	...	...	...	...	...	...	...	...	...	...	...	1	1
An. cost. ...	...	...	...	...	...	...	...	...	1	...	...	...	1
<i>Car.</i> Aed. arg. ...	...	...	...	...	...	2	...	...	...	...	...	...	2
<i>Casting.</i> Aed. arg. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
An. cost. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
<i>Catchpit.</i> Lutz. tigr. and Cul. neb. ...	1	...	...	...	...	...	...	...	...	...	...	...	1
Cul. neb. ...	1	...	1	1	2	3	13	17	30	27	43	25	163
Cul. neb. and An. cost. ...	...	...	...	...	...	...	...	...	1	...	...	...	1
Cul. fat. and Aed. arg. ...	...	1	1	...	...	1	...	...	4	...	...	...	7
Aed. arg. ...	...	...	1	...	4	16	13	7	10	14	6	11	82
Cul. fat. ...	...	...	3	...	1	4	9	3	6	4	1	...	31
An. cost. ...	...	...	...	...	1	...	2	...	...	1	1	...	4
Cul. dec. ...	...	...	...	...	...	...	2	...	1	1	...	...	5
Cul. dutt. ...	...	...	...	...	...	...	2	...	1	...	...	...	3
An. cost. and Cul. fat. ...	...	...	...	...	...	...	1	...	...	...	...	...	1
Aed. lut. ...	...	...	...	...	...	...	...	1	1	...	...	...	2
Aed. arg. and Cul. neb. ...	...	...	...	...	...	...	...	...	1	4	1	...	6
<i>Cooler.</i> Cul. neb. ...	...	...	...	1	...	...	...	...	1	1	2	...	5
Aed. arg. ...	...	...	...	...	1	2	1	...	2	1	...	1	8
Cul. dec. ...	...	...	...	...	...	...	...	...	...	1	...	...	1

TABLE (12)—continued.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>Crab-holes.</i> Aed. irr. ...	...	...	...	...	...	1	...	...	...	...	30	25	56
Aed. arg. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
Cul. fat. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
An. cost. ...	...	...	...	...	...	...	...	...	...	...	...	...	1
Cul. insign. ...	...	...	...	...	...	...	...	...	...	...	...	5	12
Ur. ann. ...	...	...	...	...	...	...	...	...	...	...	6	5	11
Aed. nigr. ...	...	...	...	...	...	...	...	...	...	...	1	...	1
Aed. irr. and Ur. ann. ...	...	...	...	...	...	...	...	...	...	...	1	...	1
Aed. irr. and Cul. insign. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
Cul. fat. and Cul. neb. ...	...	...	...	...	...	...	...	...	...	...	1	...	1
<i>Drain.</i> Aed. arg. ...	...	...	...	...	2	3	4	...	1	5	3	...	18
Cul. fat. ...	...	...	...	...	3	3	1	...	...	1	...	...	8
Cul. neb. ...	...	...	...	...	...	1	1	1	1	6	3	9	22
An. cost. ...	...	...	...	...	...	...	1	...	...	...	1	...	3
An. cost. and Cul. fat. ...	...	...	...	...	...	1	5	2	1	...	...	...	9
Cul. dec. ...	...	...	...	...	...	...	...	...	...	...	...	1	1
<i>Drum.</i> Cul. neb. ...	...	1	2	...	4	5	5	4	5	10	10	12	58
Aed. arg. ...	...	...	...	1	16	25	15	5	13	20	7	6	108
An. cost. ...	...	...	...	...	...	7	...	...	...	...	2	...	9
Cul. fat. ...	...	...	...	...	...	1	...	...	1	...	1	...	3
Culex duttoni ...	...	...	...	...	...	...	1	1	...	...	...	...	2
<i>Dye-pot.</i> Aedes argenteus ...	1	...	...	...	...	...	...	...	...	...	...	...	1
Cul. neb. ...	...	...	...	...	...	1	...	...	2	2	...	...	5
<i>Filter.</i> Cul. neb. ...	...	...	...	...	...	...	1	...	...	...	...	...	1
<i>Flower-pot.</i> Cul. neb. ...	...	...	...	...	1	...	...	...	...	...	...	...	1
Aed. arg. ...	...	...	...	...	6	2	...	...	2	1	...	...	11
Cul. fat. ...	...	...	...	...	...	1	...	...	...	1	...	...	2
Aed. arg. and Cul. fat. ...	...	...	...	...	...	...	...	...	...	...	...	...	1
<i>Go-cart.</i> An. cost. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
Cul. neb. ...	...	...	...	...	...	...	1	...	...	...	...	...	1



TABLE (12) --continued.

	January	February	March	April	May	June	July	August	September	October	November	December	Total
<i>Grind-stone.</i> Aed. arg. ...	...	...	...	...	1	...	1	...	...	...	...	...	2
Cul. neb. ...	...	...	...	...	...	...	...	...	...	1	...	...	1
<i>Gutters.</i> Aed. arg. ...	...	...	...	...	...	1	1	...	...	...	...	...	2
<i>Ice-chest.</i> Aed. arg. ...	...	...	...	...	1	1	1	...	...	...	...	...	3
<i>Jug.</i> Aed. arg. ...	...	...	...	...	1	2	1	...	4	4	...	...	12
An. cost. ...	...	...	...	...	...	...	1	...	...	1	...	...	2
Cul. neb. ...	...	...	...	...	...	...	...	...	1	2	2	3	8
<i>Kettle.</i> Aed. arg. ...	...	2	...	...	...	4	1	...	2	1	1	2	13
Cul. dec. ...	...	...	...	...	...	...	1	...	...	...	...	...	1
Cul. neb. ...	...	...	...	...	...	...	...	...	...	...	1	3	4
Cul. fat. and An. cost. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
<i>Life-boat.</i> Aed. arg. ...	...	...	...	...	1	...	...	...	...	...	...	...	1
<i>Mortar.</i> Cul. neb. ...	...	...	...	...	...	2	...	...	...	...	...	...	2
<i>Pail.</i> Aed. arg. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
<i>Pan.</i> Aed. arg. ...	...	...	...	...	...	6	1	...	...	...	...	...	7
<i>Piping.</i> Aed. arg. ...	...	...	...	...	1	...	...	...	...	...	...	...	1
<i>Pit.</i> An. cost. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
Cul. dec. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
Aed. arg. ...	...	...	...	...	...	1	2	...	...	...	...	...	3
Cul. neb. ...	...	...	...	...	...	...	2	...	...	...	...	...	2
<i>Pools.</i> An. cost. ...	...	...	...	...	51	74	25	4	25	18	12	...	209
Aed. arg. ...	...	...	...	...	20	37	10	...	...	5	1	...	73
Cul. fat. ...	...	...	...	...	4	3	1	...	...	...	...	...	8
An. cost. and Cul. dec. ...	...	...	...	...	1	...	...	...	...	...	...	...	1
An. cost. and Aed. arg. ...	...	...	...	...	1	3	...	...	...	...	1	...	5
Cul. neb. ...	...	...	...	...	...	6	3	...	...	12	3	...	24
Cul. dec. ...	...	...	...	...	...	...	1	...	...	...	...	...	1
Cul. fat. and Cul. dec. ...	...	...	...	...	...	...	1	...	...	...	...	...	1

TABLE (12)—continued.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Pots. Aed. arg.	7	63	74	46	271	656	380	325	290	174	106	182	2,574
Cul. neb.	8	14	29	22	48	117	113	171	280	203	179	164	1,348
Aed. arg. and Cul. neb.	1	...	...	1	2	3	2	2	11	3	5	1	31
Cul. neb. and Cul. dutt.	...	...	...	...	...	...	...	...	1	2	...	...	3
Lutz. tigr.	...	...	1	...	...	1	...	2	...	...	...	1	5
Cul. fat.	...	...	...	1	7	13	6	10	15	6	3	2	63
Aed. apicoarg.	...	...	...	1	1	...	...	...	2	...	...	...	4
An. cost. Aed. arg. and Cul. thal.	...	...	...	...	...	1	...	...	...	...	...	...	1
An. cost.	...	...	...	...	...	108	12	6	3	...	3	...	132
An. cost. Aed. arg. and Cul. dec.	...	...	...	...	...	1	...	1	...	...	...	...	1
Cul. fat. and Cul. neb.	...	...	...	...	...	2	...	...	4	...	...	...	7
An. cost. and Psych.	...	...	...	...	...	1	...	...	...	...	...	...	1
An. cost. and Aed. arg.	...	...	...	...	1	3	5	...	...	...	...	...	9
An. cost. and Cul. neb.	...	...	...	...	...	1	...	...	1	...	...	...	2
Cul. fat. Cul. dec. and Aed. arg.	...	...	...	...	...	1	...	...	...	...	...	...	1
Aed. arg. and Cul. dec.	...	...	...	...	...	1	...	...	1	...	...	...	2
Cul. dutt.	...	...	...	...	...	7	...	2	38	7	5	...	59
Aed. arg. and Cul. dutt.	...	...	...	...	...	...	2	3	5	...	...	...	10
Aed. irr.	...	...	...	...	...	...	...	...	...	...	...	1	1
Cul. inv.	...	...	...	...	...	...	1	1	...	...	...	...	2
Cul. inv. and Cul. dutt.	...	...	...	...	...	...	...	1	...	...	...	...	1
Cul. dec.	...	...	...	...	...	...	...	4	3	1	1	...	9
Aed. arg. and Aed. lut.	...	...	...	...	...	...	...	1	2	...	...	...	3
Cul. dec. and Aed. lut.	...	...	...	...	...	...	...	...	1	...	...	...	1
Aed. lut. ....	...	...	...	...	...	...	...	...	...	1	...	...	1
Aed. arg. and Cul. fat.	...	...	...	...	2	5	1	1	5	...	1	...	15
Aed. apicoarg.	...	...	...	...	...	...	...	...	1	...	...	...	1
Snail shell. Aed. arg.	...	...	...	...	...	...	...	...	...	...	1	...	1
Cul. neb.	...	...	...	...	...	...	...	...	...	...	1	...	1
Tank. Aed. arg.	...	...	...	...	5	2	2	...	...	2	1	...	15
Tarpaulin. Aed. arg.	...	...	...	...	...	1	...	...	...	...	...	...	1
Tea-pot. Aed. arg.	...	...	...	...	...	1	1	...	...	...	...	...	2



TABLE (12)—continued.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>Tin.</i>													
Cul. neb.	—	1	—	—	7	19	10	3	30	22	25	13	130
Aed. arg.	—	—	2	2	30	70	32	10	14	19	15	10	204
Aed. arg. and Cul. neb.	—	—	1	—	...	1	—	—	1	—	1	—	4
Eret. chrys.	—	—	—	—	1	—	—	—	—	—	—	—	1
Cul. fat. and Aed. arg.	—	—	—	—	—	—	—	—	—	—	—	—	1
Cul. fat.	—	—	—	—	—	—	—	—	—	—	—	—	1
Aed. arg. and Aed. lut.	—	—	—	—	—	2	—	1	—	2	—	—	5
An. cost.	—	—	—	—	—	1	4	—	—	—	—	—	5
Aed. arg. and Cul. dec...	—	—	—	—	—	15	1	1	—	1	—	—	18
Cul. dult.	—	—	—	—	—	1	—	—	—	—	—	—	1
Cul. inv.	—	—	—	—	—	—	2	—	—	—	—	—	2
Cul. dec. and Cul. neb.	—	—	—	—	—	—	1	—	—	—	—	—	1
Cul. dec.	—	—	—	—	—	—	—	—	—	—	—	—	1
Aed. lut.	—	—	—	—	—	—	—	1	1	—	1	—	2
<i>Trees, Paupaw.</i>													
Cul. neb.	—	—	—	—	4	—	7	—	—	—	—	—	11
Aed. arg.	—	—	—	—	5	—	2	—	—	—	—	—	7
Aed. lut.	—	—	—	—	1	—	1	—	—	—	—	—	2
An. cost.	—	—	—	—	1	—	—	—	—	—	—	—	1
<i>Banana.</i>													
Aed. arg.	—	—	—	—	5	10	26	—	—	—	—	—	41
Cul. neb.	—	—	—	—	1	1	2	—	—	—	—	—	4
Cul. fat.	—	—	—	—	—	—	1	—	—	—	—	—	1
Aed. lut.	—	—	—	—	—	—	1	—	—	—	—	—	1
Aed. arg. and Aed. lut.	—	—	—	—	1	—	—	—	—	—	—	—	1
<i>Mango.</i>													
Aed. lut.	—	—	—	—	2	1	1	—	—	—	—	—	4
Aed. arg.	—	—	—	—	2	—	—	—	—	—	—	—	2
Aed. apicoan. and Aed. lut.	—	—	—	—	1	—	—	—	—	—	—	—	1
<i>Breadfruit.</i>													
Aed. lut.	—	—	—	—	2	1	3	—	—	—	—	—	6
Aed. arg.	—	—	—	—	—	—	2	—	—	—	—	—	2
<i>"Fruit tree."</i>													
Aed. lut...	—	—	—	—	2	—	—	—	—	—	—	—	2
Aed. afric.	—	—	—	—	1	—	—	—	—	—	—	—	1
Aed. arg.	—	—	—	—	—	1	—	—	—	—	—	—	1

TABLE (12)—continued.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>Cashew tree.</i> Aed. lut. ...	...	...	...	...	...	2	...	...	...	...	...	...	2
<i>Unnamed trees.</i> Aed. lut. ...	...	...	...	...	3	4	11	...	...	...	...	...	18
Aed. arg. ...	...	...	...	...	3	10	10	...	...	...	...	...	23
Cul. neb. ...	...	...	...	...	...	3	6	...	...	...	...	...	9
Cul. fat. ...	...	...	...	...	2	...	2	...	...	...	...	...	2
Aed. arg. and Cul. neb. ...	...	...	...	...	1	...	...	...	...	...	...	...	2
Aed. arg. and Aed. lut. ...	...	...	...	...	5	10	4	...	2	1	1	...	23
<i>Tyre.</i> Aed. arg. ...	...	...	...	...	...	3	5	...	...	2	1	...	11
Cul. neb. ...	...	...	...	...	...	1	...	...	...	...	...	...	1
An. cost. ...	...	...	...	...	11	9	10	5	6	1	2	5	51
<i>Well.</i> Aed. arg. ...	...	1	1	...	2	...	...	...	1	...	...	...	3
Cul. fat. ...	...	...	...	...	...	2	2	...	...	2	5	3	14
Cul. neb. ...	...	...	...	...	...	...	1	...	2	...	...	...	3
An. cost. ...	...	...	...	...	...	...	...	...	...	...	2	...	2
Cul. dec. ...	...	...	...	...	...	...	...	...	...	1	...	...	1
Cul. dutt. ...	...	...	...	...	2	...	...	...	...	...	...	...	2
Cul. fat. and Cul. neb. ...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Marine Boats and Barges.</i>													
Aed. arg. ...	...	...	...	...	...	...	...	...	19	2	11	4	36
Cul. fat. ...	...	...	...	...	...	...	...	...	1	...	...	...	1
An. cost. ...	...	...	...	...	...	...	...	...	2	...	...	...	2
Cul. dec. ...	...	...	...	...	...	...	...	...	2	...	2	...	4
Cul. neb. ...	...	...	...	...	...	...	...	...	...	...	1	...	1
Cul. dec. and Cul. fat. ...	...	...	...	...	...	...	...	...	2	...	...	...	2
Cul. fat. and Aed. arg. ...	...	...	...	...	...	...	...	...	...	...	1	...	1
Totals ...	21	90	130	86	591	1,431	889	645	908	642	577	517	6,527



Each case is considered first from a clinical view-point, and the appearance, extent and probable duration of the lesion are noted. If thought necessary, cultures are made, the media employed being Sabouraud's maltose agar, glucose agar, and glucose hydrocele broth. Finally, a biopsy is made, unless the patient refuses. Freezing the part with Anestile is adopted as being the method least damaging to the tissues and most comfortable for the patient. Little difficulty has been experienced in gaining consent for this most important step in the examination, and the small wound, if kept clean, heals rapidly.

Photographs are also taken, whenever possible.

The patients are kept under observation, subsequent to their first appearance and the effect of treatment is noted. At the present stage of the investigation, it is not possible to give a classification or state conclusions. It is hoped, however, that when a sufficient number of lesions have been examined, enough experience will have been gained and a sufficiency of data gathered to allow of a grouping of similar types.

The various forms of ulcer promise in themselves an extensive field for study. So far two varieties have been identified and separated from the remainder. To one class belong those ulcers of a tubercular or lupoid character, in which sections show the presence of tubercles with giant cells and acid-fast bacilli. In another category are placed those of a mycotic origin. From the lesions in this type a yeast-like fungus has been recovered which has shown a certain amount of virulence to guinea-pigs. Other conditions such as Lichen pilaris, various forms of Tinea, Psoriasis and Impetigo have been diagnosed on histological and cultural findings.

#### HISTOLOGICAL.

Apart from specimens connected with yellow fever, which are considered under their appropriate heading, a considerable number of interesting tissues were received.

The specimens consisted mainly of tumours or parts of tumours. Malignant growths numbered twelve, comprising seven carcinomata and five sarcomata.

Details are as follows:—

Squamous carcinoma	...	...	Back.
"	"	...	Leg.
"	"	...	Gland.
Adeno carcinoma	...	...	Liver (two).
"	"	...	Ovary.
Papilloma	...	...	Skin.
Sarcoma round celled	...	...	Leg.
"	"	"	Hand.
"	"	"	Liver.
"	"	"	Eye-ball.
"	"	"	Testes.

Simple tumours numbered fourteen, as follows:—

Adenoma	...	...	Lip.
Fibroma	...	...	Foot.
Mixed tumour	...	...	Parotid.
Lymphangioma	...	...	Face.
Fibromyoma	...	...	Uterus.
Gumma	...	...	Abdomen.
Granuloma	...	...	Eye-ball (two).
Onchocerca	...	...	Abdomen.
Keloid	...	...	Neck.
Chronic Inflammatory	...	...	Finger.
"	"	...	Gland.
"	"	...	Scrotum.



Six specimens of spleen were received. Two showed cirrhosis, the spironema of relapsing fever was demonstrated in two, and tubercular changes were present in one.

There were also six specimens of liver. Cirrhotic changes were present in three, these being associated with the presence of encysted *Porocephalus* larvæ in one.

Four specimens of brain were examined. There was a large intraventricular hæmorrhage in one, and in another, from a native child, the capillaries showed numerous sporulating subtertian parasites.

Four specimens of kidney, two of stomach, one of skin and one of spinal cord showed nothing noteworthy.

There were four specimens of lung. Tubercular disease was present in two and gangrene in one.

Two specimens of bowel were received. One showed extensive ulceration due to *E. histolytica* and the other showed a perforation due to a foreign body.

The brain, or parts thereof, from three dogs was examined. Negri bodies were demonstrated in one animal, which had been shot at Warri. This last case forms the subject of a paper which awaits publication.

#### EXAMINATION OF DRIED SMEARS.

Ninety-three smears were received. Details are as follows:—

Bubo ... ..	24.	Bacillus pestis in	13.
Spleen ... ..	13.	" " "	2.
Lung ... ..	13.	" " "	2.
Liver ... ..	12.	" " "	2.
Heart ... ..	11.	" " "	1.
Penile sores...	8.	Spirochaetes	4.
Skin sores ...	4.	No Leishmania.	
Nasal ... ..	4.	No <i>B. leprae</i> .	
Throat ... ..	3.		
Prostatic ...	2.	Intra-cellular gram-negative diplococci.	
Cerebrospinal fluid	2.	One Pneumococcal.	One meningococcal.
Vaginal ... ..	1.		
Gland ... ..	1.	No tryps:	
Conjunctival ...	1.		
Abscess ... ..	1.		

#### EXAMINATION OF URINE.

Thirty samples were examined microscopically. Tube casts were found in nine. Pus occurred in one, and Schistosome ova in another. One sample was quantitatively analysed for sugar.

#### EXAMINATION OF SPUTUM.

Twenty-five specimens were examined for tubercle bacilli. These were present in three samples from Europeans and in two samples from Native Africans.

In addition to these, however, a number of sputa were examined for the presence of plague bacilli.

#### SEROLOGICAL.

Thirty-five Sachs-Georgi reactions were carried out. There was a positive result in five.



The Widal test was performed in twenty-two cases. There was a positive result with *Bacillus paratyphosus* B. in two cases, and to *Bacillus paratyphosus* C. in three cases.

#### MISCELLANEOUS.

A number of Vaccines were prepared for various diseases. A routine bacteriological analysis of the Lagos Water Supply was also done.

In addition to these, the blood of a certain number of horses was examined and trypanosomes were found in a small proportion.

The faeces of a number of dogs was examined and *Ankylostome* ova were found in practically all.

#### EXAMINATION OF FÆCES.

Rarely are specimens of faeces sent to the Research Institute from outstations.

Practically all samples came from Lagos and its environs, namely Ikoyi, Apapa, Iddo and Ebute Metta. The nearest of these to the Institute is three miles and the farthest is eight miles. Such distances mean time lost in transit, and the longer the period after voiding, the greater is the difficulty in obtaining correct findings from an examination of the stools. This was one of the strongest reasons for the establishment of a clinical laboratory within the precincts of the Hospital at Lagos.

During 1925, however, except in the first and the last quarters of the year, the clinical laboratory was without a pathologist, so that the number of examinations of faeces was restricted. Such specimens as were of diagnostic importance were sent to the Research Institute at Yaba.

The period covered by this review, therefore, is roughly eight months, during which 189 specimens were received.

As in previous Reports, a table has been constructed classifying the results, and on this occasion it is limited to samples from European sources, which numbered one hundred and sixty-one.

The stools, as received at the Research Institute were referred to three main groups, (i) Formed, (ii) Pultaceous and (iii) Liquid.

Each of these was again sub-divided according as mucus was present or absent.

Column I in the Table (Table 13) refers to formed stools. These amounted to thirty-two, a proportion of 19·87 per cent. Mucus was present in twelve and was not observed in twenty; there were positive findings in nine of the former and in only one of the latter.

Column II concerns pultaceous stools. Of this class there were seventy-eight, a proportion of 48·44 per cent. Mucus was noted in eight and was not seen in seventy; there was one negative finding in the former group and forty-nine in the latter.

Column III deals with liquid stools, which numbered fifty-one, a proportion of 31·67 per cent. All the specimens containing mucus, namely seventeen, gave positive findings contrasting with thirty-four showing no mucus, of which thirteen gave positive findings. It will be gathered, from these data that the stools of Europeans in Lagos are usually pultaceous.

It will also be observed that the presence of mucus is practically always indicative of a diseased condition of the large intestine.

Another interesting feature is the large proportion of negative findings in liquid motions which contain no mucus. In most of these



cases the bowel condition is an irritative one due to dietetic and other indiscretions, to unscud food and to a variety of other causes, and it clears up rapidly.

The absence of helminth ova was remarkable. In one case only were they found, and they were noted as *Taenia*.

*Entamoeba histolytica* either in the free or in the encysted stage was demonstrated in twenty-three cases; in sixteen instances the stools in which they occurred contained mucus.

It is necessary to consider the occurrence of twenty-seven cases which showed no pathogenic protozoa but which contained one or more of the following: red blood cells, pus cells, epithelial cells or Charcot-Leyden crystals. It is obvious that the length of time before the specimen came to the microscope, in many of these cases would allow of sufficient degeneration in the pathogenic *entamoeba* to render it unrecognisable or at least doubtful.

Again, in occasional instances the finding of only epithelial cells is not necessarily an indication of an ulcerated condition of the lower bowel. It has happened on several occasions that mucus is found in a stool from a case in which there was a previous history of dysentery, the mucus seemingly being the result of a simple irritative process imposed on a bowel which had not completely recovered its function.

But there remain cases in which the bacillary form of dysentery must be considered. With a view to determining whether the Flexner and the Shiga bacilli play an etiological role in the local form of dysentery, thirteen cases were selected, in which amoebae were not definitely identified, but all of which showed evidence of ulceration in the form of red-blood cells and pus cells. Mucus and blood were noted macroscopically in ten and in the remaining three the microscope showed the presence of pus and epithelial cells.

A small piece of blood-tinged mucus or a drop of the liquid faeces, freshly passed, was picked up on a platinum loop and transferred to a tube of nutrient broth. Three or four hours later four McConkey plates were inoculated from the broth.

A non-lactose fermenter was recovered from five cases, in all of which there was blood and mucus in the stool.

A full history of one of these cases has already been published, (*Journal of Tropical Medicine and Hygiene*, Volume XXVIII, No. 21, November 2nd, 1925, pages 379-381).

This was the only case in which death occurred. All the others in the series improved rapidly while being treated with Emetine.

The sugar reactions and other characteristics of the non-lactose fermenting organisms are seen in Table 14.

It is difficult to state to what type or types the organisms belong. The important features are, the non-fermentation of lactose (even after several weeks), the absence of gas-formation, and the lack of motility.

In no case did a known type Flexner or type Shiga serum agglutinate the organism.

Further work requires to be done on these and on similar cases.

In pursuing this research one must bear in mind the conception of Dobell and O'Connor ("The Intestinal Protozoa of Man," London, 1921, page 41) that a state of equilibrium between *E. histolytica* and its human host must be regarded as a "normal" or "typical" condition, and that only when they do not live in harmony does a pathological condition result.

An invasion by bacilli, such as those isolated in the present series of cases, may be the determining factor in the onset of dysentery.



TABLE (13).

	Formed mucus.		Pulsacons mucus.		Liquid mucus.		Total.
	+	-	+	-	+	-	
E. histolytica, pus, epithelial and red blood cells	...	...	...	...	8	...	10
E. histolytica, pus and epithelial cells	...	...	2	1	2	...	8
E. histolytica, Trichomonas and Blastocystis	...	...	2	...	1	...	1
E. histolytica, and Charcot-Leyden crystals	...	...	...	1	...	...	1
E. histolytica, cysts, and Trichomonas	...	...	...	1	...	...	1
E. histolytica cysts and Blastocystis...	...	1	...	...	...	...	1
E. histolytica cysts	...	...	...	1	...	...	1
Charcot-Leyden crystals	...	...	...	1	...	...	1
Charcot-Leyden crystals and epithelial cells	...	...	1	...	...	...	1
Charcot-Leyden crystals, pus and epithelial cells	...	...	...	...	...	1	1
Pus, epithelial and red blood cells	...	...	...	...	2	...	4
Pus and epithelial cells	3	...	2	...	...	...	11
Epithelial cells	5	...	...	...	4	...	7
Blastocystis	...	...	...	...	...	3	6
Iodamoeba butschlii and Blastocystis	...	...	...	...	...	...	1
Cercomonas and Blastocystis	...	...	...	...	...	...	2
Iodamoeba butschlii, spirochaetes and Cercomonas	...	...	...	...	...	...	1
Iodamoeba butschlii, Cercomonas and epithelial cells	...	...	...	...	...	...	1
Chilomastix	...	...	...	...	...	1	2
E. coli and E. nana	...	...	...	...	...	...	1
E. nana and Blastocystis	...	...	...	...	...	...	1
E. coli	...	...	...	...	...	...	1
Chilomastix and Blastocystis	...	...	...	...	...	1	1
Negative	3	19	1	49	...	21	93
Total	12	20	8	70	17	34	161

TABLE (14).

	Mannite.	Glucose.	Maltose.	Saccharose.	Galactose.	Arabinose.	Raffinose.	Sorbitol.	Indol.	Motility.
O.	A	A	—	—	—	—	—	—	—	—
S.	—	A	—	—	—	—	—	—	—	—
E.	—	A	—	—	—	—	—	—	—	—
T.	—	A	—	—	—	—	—	—	—	—
C.	—	A	—	A	A	—	—	—	—	—

## EXAMINATION OF BLOOD SMEARS.

A certain amount of routine clinical work which had to be done at different times during the year included one hundred and eighty blood smears. In addition ninety-four smears were received from outstations. No parasites were found in two hundred and thirty-six. Subtertian rings were present in twenty.

The spirochete of relapsing fever was found in fifteen, all of these slides coming from outstations, principally in the north.

Trypanosomes were present in one smear sent from Cameroons. Embryos of *Filaria loa* were found in one specimen.

Pigmented mononuclears were noted in a smear which showed no malarial parasites.

The subtertian parasites were, with one exception, found in smears from Europeans. All the other parasites were found in smears from Africans, except in the case of *Filaria loa*.

There were two cases of Leukaemia in natives, an occurrence sufficiently unusual to merit record. The predominant leucocyte in one was polymorph and in the other the lymphocyte. In the latter instance Cancrum oris was present and a description of this case will appear in the Transactions of the Royal Society of Tropical Medicine, London.

Forty-five differential leucocyte counts were made, and the Arneeth formula was ascertained in seventeen smears. These are detailed under the heading of "Blackwater Fever" and "Yellow Fever."

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A. CONNAL,

*Director, Medical Research Institute.*





APPENDIX B.

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REPORT OF GOVERNMENT ANALYST,

BY

MR. A. B. HOBSON, M.Sc., A.I.C.



APPENDIX B

---

REPORT OF GOVERNMENT ANALYST

BY

MR. A. R. HOBBS, M. C., A. G.

## ANNUAL REPORT BY GOVERNMENT ANALYST.

The Analyst returned from leave on February 5th, 1925. Up to the beginning of December 1925, all heating was carried out by means of "Primus" stoves and methylated spirit burners, but during that month electrical still, air oven, water bath, etc., were installed; a decided improvement in the laboratory equipment. During the twelve months covered by this report, the number of samples received for analysis amounted to 302, their nature being as below:—

Waters and Aerated Waters (for all reasons except arsenic)	84
Beers, Wines, Spirits and other beverages	43
Pharmaceutical Preparations	67
Perfumes	2
Foodstuffs	9
Toxicological and Stains	38
Miscellaneous Police	6
Urine	11
Disinfectants	3
Mineral Deposits	4
Boiler Scale Deposits	3
Chemicals (Commercial)	14
Petrol	6
Samples in connection with arsenical contamination of wells	9
Miscellaneous	3
Total	302

Investigations have also been carried out involving work not included in the above.

- (1) Experiments carried out in connection with tile manufacture for the Town Engineer, Lagos.

Various samples of raw material were analysed, as a preliminary to these experiments and all were satisfactory. Finally it was found that the trouble which had been experienced, was due to the cement used for the tiles, not having had time to set thoroughly, (a point not unconnected with the visit of His Royal Highness the Prince of Wales), and further experience confirmed this.

- (2) Some research work has been carried out on the degree and rate of absorption and excretion of quinine after a five grains daily oral dose, with the final idea of investigating the connection (if any) between the rate of excretion and the concentration of quinine in the blood.

The results so far obtained appear later in the report. Experience during the past twelve months has shown that the time available for research work is very small and that the purely analytical work of the laboratory requires the whole time of the staff, which consists of the Analyst and one native laboratory assistant on the scale of £48—6—78.

## WATER.

(1) *Lagos Water Supply*.—The normal purity of this supply was maintained until the month of August, 1925, when some changes appear to have been made in the beds at the Iju Waterworks. The analytical data showed a marked increase in the figures obtained for the albuminoid ammonia, and oxygen absorbed about this time.

Otherwise only the usual seasonal variation was noted, a change visible to the naked eye, as after a spell of rain the yellow colour is always deeper.



It is probable that the figures shown in the Table at the end of this Report for Lagos Water during January 1926, about mark the maximum degree of chemical purity. At that date the water was practically colourless, and no rain had fallen for more than two months previously.

(2) *Kano*.—The work done in connection with the proposed Kano Supply has been confined to an examination of the water from the Morashi River. The analytical data as regards potability are quoted in the Table attached. It will be noted that the figures for the saline and albuminoid ammonia and oxygen absorbed, are unusually high, so much so that the water does not appear to be suitable for human consumption without a very drastic scheme of purification.

The acidity of this water was estimated as equal to 1.3 parts per 100,000 free carbonic acid gas. The use of concrete lined mains in preference to steel mains was therefore recommended.

The Morashi River water as received in the laboratory was markedly turbid, partly due to the iron present (0.4 parts per 100,000) but chiefly to the presence of ordinary clay silt. Consequently a process of aeration could only partly assist clarification.

A simple filtration removed 5.6 parts per 100,000 of suspended matter and the suspended matter could be completely flocculated and removed by the use of 2.11 parts per 100,000 aluminium sulphate.

(3) *Kaduna*.—The samples of Kaduna River water received in the laboratory were markedly opalescent the turbidity being due mainly to clay. Apart from the turbidity, the results obtained indicated a water of fair purity chemically, but probably at its very best, as there had been very little rain for some time before sampling.

Experiments were made on the subject of chlorination, using a suspension of bleaching powder of known available chlorine content.

It was found that less than 1 p.p.m. was sufficient for sterilization. The detection of free chlorine by means of starch and potassium iodide was found to lose in delicacy when carried out in an opalescent water.

The amount of aluminium sulphate necessary for flocculation was about 2 lb. 2 oz. per 10,000 gallons.

(4) *Abeokuta*.—In connection with the proposed alum precipitation and filtration plant, it was found that 5 parts per 100,000 aluminium sulphate were necessary for flocculation. The water really needs chlorination.

#### PHARMACEUTICAL PREPARATIONS.

The number and variety of these preparations examined in the laboratory, shows a distinct increase over the previous year, and probably indicates an increased sale of patent medicines in Nigeria.

It is singular that Nigeria allows importation of all proprietary patent medicines, without any declaration of formulæ, free of special duty. Most of the manufacturers of such proprietary medicines are sufficiently aware of the Customs Duties on spirituous mixtures to put up a "non-alcoholic" preparation, and as long as the mixture does not contain any substance mentioned in the Second Schedule, it can enter the country with impunity on the 15% ad valorem rate, under its trade name.

Even the onus of detection and estimation of injurious substances such as morphine, colchicine, etc., is on the Analyst.

During the year *cannabis indica* has been placed in the Second Schedule, this was detected in a greenish coloured fatty preparation originating in India. It is the first time that hashish has been noted by the present Analyst, in Nigeria.



There is a very obvious increase in the number of aphrodisiacal preparations imported into this country, and it would seem desirable to limit this trade in some way. The inclusion of the alkaloid Yohimbine in the Second Schedule would limit the trade to some extent.

It must be pointed out that the final supervision of this patent medicine trade at present depends on the Analyst, and that if the trade increases, some legislation will be needed to compel declaration of formulæ so that the work of analysis may be considerably reduced, and confined to the examination of such mixtures, for the presence and estimation of dangerous drugs.

### TOXICOLOGICAL AND STAINS.

*Toxicological.*—The usual assortment of mixtures coming under the heading of "juju," and supposed to have been administered with intent to poison, were received at the laboratory.

Powdered charcoal of plant origin was again the favourite, and native lime and washing soda were also in evidence.

In one case a gummy substance had been moulded into a disc about the size of a half penny, and a boy attempted to swallow it, with the inevitable result that it stuck in his throat, and only by violent retching could it be brought up again. The disc was found to be made upon the lines of a sweet, pieces of groundnut were embedded in the gum, and a guinea-pig consumed a very useful proportion of the disc with obvious enjoyment.

In only one case was an alkaloid isolated viz., two centigrammes of morphine from the stomach contents of a native. The history of the case is unknown.

*Stains.*—Eighteen specimens of clothing and weapons were received at various dates for the presence or absence of blood stains, eleven gave positive results.

Up to date, the biological test for human blood has not been employed, but it is hoped that arrangements can be made for the maintenance of a rabbit and its periodical inoculation with human blood, so that a supply of anti-human serum may be always available.

At present it is of little use legally, to certify stains as due to blood, when even one's own houseboys are frequently engaged in decapitating chickens, etc.

*Police.*—The only criminal case in which the Analyst has figured during the past twelve months, was in connection with a theft of gasoline from a launch.

The prisoner was accused of stealing the gasoline from the launch, filling it into ordinary petrol tins, sealing and recasing them, and offering it for sale.

Determination of the physical constants of various samples, and fractional distillation, showed that the prisoner's petrol was identical with the launch gasoline, and of a much inferior quality to the ordinary automobile petrol imported into Nigeria.

### ARSENICAL CONTAMINATION OF WELLS.

The investigation was due to the suspected arsenical poisoning of a European engaged in the process of fellmongering.

A specimen of six fluid ounces of urine forwarded, yielded 0.1 milligrammes of arsenious oxide.



The water of the wells in the fellmongering compound was suspected as the cause of the trouble, and analysis showed that the water of one well contained 0.037 grains per gallon arsenious oxide, whilst water of another well contained 0.01 grains arsenious oxide per gallon.

Two samples of soil from the compound were also received for examination, and as they were taken at the surface, the percentages of arsenic present are high. The total arsenic present in the samples was 0.48% and 0.42%, and the soluble arsenic 0.20% and 0.15% respectively (as arsenious oxide.)

A previous investigation into the possibility of arsenic filtration through the soil into the wells, had shown complete fixation of arsenic to take place, and the use of dirty vessels was suspected as the cause of this contamination.

An enquiry held by the firm in question, discovered that unwashed arsenic drums were commonly used for drawing water. The wells were cleaned out, and a later examination of the waters showed them to be practically arsenic free (1 in 77,000,000 and 1 in 38,500,000), and it is expected that a later examination will show them to be entirely free of arsenic.

## INVESTIGATION ON ABSORPTION AND SECRETION OF QUININE.

### INTRODUCTORY.

Although the average European resident in West Africa is taking quinine daily, conversations held with various Medical Officers revealed a considerable degree of uncertainty as to the degree and rate of absorption and excretion of quinine.

It was suggested by the Analyst that some light might be thrown on this subject, by quantitative analysis of the urinary and bowel excretions.

Consultation of the literature available in Lagos showed that the workers in this field had obtained varying results.

Ramsden, Lipkin and Whiteley (1918) showed that the excretion period of quinine by the urine differs greatly in individuals varying from forty-one hours after a single dose by the mouth to 7½ days after the last of a succession of large doses.

Hartman and Zila found a maximum excretion after an oral dose from the fourth to the eighth hour.

Hele (1921) found the maximum excretion in the urine after oral quinine, in the second hour, and that after a single dose of quinine most of the drug is excreted in the first twenty-four hours, though traces were found three to seven days after the cessation of a course.

The percentage of administered quinine recovered from the urine varies:—

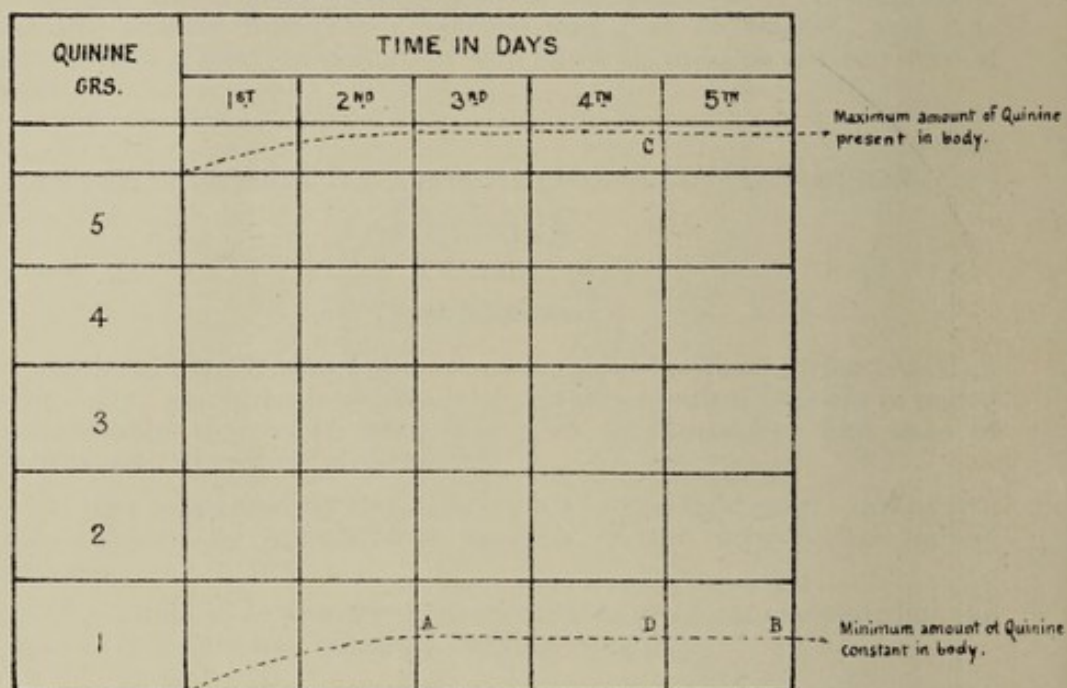
Nierenstein finds 28% to 57%, Ramsden and Lipkin that after large doses the percentage recovered is low, about 6.7 to 10.6%, but when smaller doses are taken orally, 23% is recoverable. The percentage found by Hele varied from 10% to 21%.

After consideration of the above results, it was decided to investigate the rate of absorption and excretion of a small oral dose (5 grains) of the monohydrochloride and bihydrochloride of quinine, as usually taken daily by the European resident in Nigeria.





DIAGRAM ROUGHLY ILLUSTRATING  
FOREGOING PARAGRAPHS.



AB - Minimum constant amount of Quinine present in body  
CD - Constant excretion - regular daily dose

## THEORETICAL.

If a single dose of five grains of a quinine salt was found to take more than twenty-four hours for excretion, it might be presumed that a regular taker of quinine would gradually build up a blood concentration of quinine greater than that attainable by a single oral dose. Further, after a certain time he would always have a minimum blood concentration of quinine twenty-four hours after the last dose, i.e. the blood would always contain some prophylactic quinine.

This would seem a reasonable theory of the "daily dose," and account for the fact that the regular taker of quinine is found by experience to keep freer from malaria than the irregular taker. If so, it would seem possible that in malarial subjects who take their quinine regularly, that the necessary minimum blood concentration for the assurance of prophylaxis is not maintained. As the concentration of quinine attained in the blood is the all important factor, the writer's work has been towards this end.

The urinary excretion of quinine is a measure of the amount absorbed by the blood, and the concentration of quinine in the blood should show a direct relationship to the *rate* of urinary excretion, and after a number of regular daily doses should remain constant between certain limits. Also the amount of quinine excreted daily in the urine should become constant and the total urinary and bowel excretion of quinine should be equal to the administered dose unless decomposition of quinine takes place. (See diagram opposite).

## EXPERIMENTAL.

*(a) Estimation of Quinine in Urine.*

The method first employed for the estimation of quinine in urine was that of Cockburn and Black, in which the quinine is precipitated by sodium hydroxide and extracted with ether, the ether extracts washed, and the ether evaporated, and the residue dried. The dried residue is extracted with anhydrous ether, the ethereal extract filtered, and the quinine precipitated from ethereal solution as citrate by a saturated solution of citric acid in ether.

This method was afterwards discarded in favour of the method of Ramsden and Lipkin (*Annals of Tropical Medicine and Parasitology* Vol. IX. page 455,) in which the urine is first defæcated with lead acetate and ammonium sulphate and a known volume of the filtrate concentrated in an enamel bowl. The liquid is then acidified and kieselguhr added, and the quinine precipitated with Wagner's reagent, and filtered. The residue on the filter is then treated with 0.5% HCl and sufficient sodium bisulphate solution to decolourise it, the filtrate saturated with ammonium sulphate, and extracted with purified ether to remove urinary pigment. Finally the quinine is precipitated by ammonia, extracted with purified ether, the ether evaporated and the residue dried and weighed.

*(b) Estimation of Quinine in Fæces.*

The method adopted was primarily that of Ramsden and Lipkin as described above. The fæces were broken up and shaken with five successive portions of 200cc. of 5% acetic acid solution, and the extracts decanted off into a filter; this part of the operation taking about one working day.

The filtered acetic acid extracts were mixed, and defæcated with lead acetate and ammonium sulphate and the quinine then extracted and estimated.

Up to date difficulty has been experienced in obtaining a pure enough final product for accurate quantitative estimation.



## EXPERIMENTAL RESULTS.

## Series I.

In this series subject A. ceased to take quinine, until no trace of quinine could be detected in the urine. A five grain tablet (B.W. & Co.) (a) of quinine monohydrochloride, (b) quinine bihydrochloride, and (c) quinine hydrobromide (H. & Co.) was the form in which the quinine was then taken orally.

It was found by experience in the case of subject A., who was in the habit of taking a five grain tablet of quinine hydrochloride about 8.30 a.m. daily, that the day could be divided into three urination periods about 8.30 a.m. to 2 p.m., 2 p.m. to 10.0 p.m. and 10 p.m. to 8.30 a.m., and as it was not found possible to examine more than three samples per day, these periods were adhered to as far as possible throughout this work.

All urine passed during these times was collected, so that an estimation of the rate of absorption and excretion could be obtained, and also the total daily excretion.

(a) A five grain tablet of quinine monohydrochloride was taken after the urine had been found to be free of quinine.

1st. Day After.	Volume of Urine passed cc.	Anhydrous Quinine found mg.	Average Hourly Rate of Excretion mg. per hr.	% of Administered Quinine Excreted.
Urine passed period 5½ hrs.	684	9.7	1.8	3.7
" " " 5½-13½ hrs.	500	11.2	1.4	4.3
" " " 15½-24 "	420	25.0	2.4	9.5
2nd Day.				
Urine passed period 24-27½ hrs.	280	4.0	1.1	1.5
" " " 27½-30½ "	250	1.2	0.4	0.5
" " " 30½-36 "	320	trace	—	—
" " " 36-38½ "	150	minute trace	—	—
" " " 38½-48 "	340	not detected	—	—
Total		51.1		19.5

## Series II.

In this series the subject A. ceased to take quinine until no trace of the alkaloid could be detected in the urine. A regular course of five grain tablets of (a) quinine monohydrochloride, (b) quinine bihydrochloride, (c) quinine hydrobromide was then commenced. All urine passed during the course was collected.

(a)

Day.	Time.	Volume of Urine passed cc.	Anhydrous Quinine found mg.	Average Hourly Rate of Excretion.	% of Administered Quinine Excreted.
1.	0-5½ hours	325	3.0	0.56	13.7
	5½-13 "	250	17.5	2.3	
	13-24 "	340	15.3	1.4	
Total of			35.8		
2.	0-7 "	235	29.4	4.2	28.6
	7-13 "	270	16.7	2.8	
	13-24 "	275	28.9	2.6	
Total of			75.0		
3.	0-7½ "	575	21.5	2.9	24.6
	7½-13½ "	250	16.5	2.7	
	13½-24 "	330	26.4	2.5	
Total of			64.4		

Day.	Time.	Volume of Urine passed cc.	Anhydrous Quinine found mg.	Average Hourly Rate of Excretion.	% of Adminis- tered Quinine Excreted.
4.	0-7 "	550	20.7	3.0	
	7-13 "	220	19.8	3.3	
	13-24 "	330	27.7	2.5	
	Total of		68.2		26.0
5.	0-5½ "	500	16.0	2.9	
	5½-17½ "	270	17.8	1.5	
	17½-24 "	170	7.5	1.2	
	Total of		41.3		15.8

10 grains Aspirin taken.

(b) Quinine bihydrochloride.

1.	0-7½ hours	900	10.5	1.4	
	7½-14 "	350	14.0	2.2	
	14-24 "	280	11.0	1.1	
	Total of		35.5		13.6
2.	0-5½ "	720	13.2	2.4	
	5½-13½ "	900	28.0	3.5	
	13½-24 "	415	21.4	2.0	
	Total of		62.6		23.9
3.	0-6 "	970	14.5	2.4	
	6-11½ "	650	17.5	3.2	
	11½-14 "	280	5.6	2.2	
	Sunday 14-24½ "	290	16.5	1.6	
	Total of		54.1		20.6

(c) Quinine hydrobromide.

1.	0-5½ hours	900	5.4	1.0	
	5½-13½ "	1,000	16.0	2.0	
	13½-24 "	350	6.5	0.6	
	Total of		27.9		11.5
2.	0-5½ "	1,000	12.5	2.3	
	5½-12½ "	775	11.7	1.7	
	12½-17 "	350	5.3	1.2	
	17-24 "	Sample inadvertently thrown away.			
	Total of more than	29.5	and more than		12.1

Subject B.—five grains quinine sulphate daily.

1.	0-5½ hours	550cc.	8.9	1.6	
	5½-12 "	630cc.	11.6	1.8	
	12-24 "	1,350cc.	15.9	1.3	
	Total of		36.4		15.3
2.	0-5½ "	460cc.	15.3	2.8	
	5½-16½ "	590cc.	21.1	1.9	
	16½-24 "	630cc.	9.2	1.2	
	Total of		45.6		19.2
3.	0-5½ "	450cc.	10.2	1.9	
	5½-12 "	730cc.	23.5	3.6	
	12-24 "	430cc.	23.2	1.9	
	Total of		56.9		23.9



## INDICATIONS FROM DATA OBTAINED.

1. That a single oral dose of five grains quinine hydrochloride taken by Subject A, when the system was apparently free of quinine, 19% was absorbed, and about 17% had been excreted at the end of twenty-four hours, 2% remaining unabsorbed at the end of that time.

That complete excretion of this dose took about thirty-eight and a half hours.

2. During a regular oral course of five grains quinine hydrochloride, the amount of quinine absorbed rises to a maximum on the second or third day, and that the maximum amount of quinine absorbed is round about 25% of the dose taken.

3. That this maximum percentage absorption appears to be the same for quinine monohydrochloride, quinine bihydrochloride and quinine sulphate.

4. The amount of quinine excreted in the urine becomes roughly constant and so it may be presumed that the total excretion remains constant (and it is possibly equal to the daily oral dose).

5. During this work it was found that Subject A, excreted as much as 1,500cc. of water through the skin.

If any excretion of quinine took place through the skin, the evaporation of such a quantity of perspiration would leave a residue recognisable by its bitter taste. It may be presumed therefore that there is no excretion of quinine through the skin.

Also that any quinine not excreted in the urine, is excreted by the bowel.

6. It was found that after a regular course of five grains quinine salt, that quinine could be detected in the urine ninety-six hours after the cessation of the course.

A. B. HOBSON, M.Sc., A.I.C.,  
Government Analyst.

TABLE OF WATER ANALYSIS.

Date.	Nitrogen as		Nitrite.	Nitrate.	Oxygen absorbed, 3 hrs. lab. temp.	Total Solids dried @ 120° C. or 180° C.	Total Hardness to Soap Solution.	Chlorine as Chloride.	P. H.	Remarks.
	Saline Ammonia.	Albuminoid Ammonia.								
LAGOS WATER (YABA TAP).										
March, 1925 (Yaba Tap) ...	Nil	0.0030	Nil	Not determined	0.072	3.5	1.0	0.8	...	Acidity = 1.1 p.p. 100'000.
May " " ...	"	0.0032	"	"	0.078	3.5	1.0	0.8	...	
July " " ...	"	0.0066	"	"	0.093	3.9	1.0	0.8	...	
August " (Standpipe) ...	"	0.0026	"	0.08	0.055	3.5	1.5	0.8	...	
Sept. " " ...	"	0.0058	"	Not determined	0.123	4.3	1.3	0.8	...	Loss on ignition of solids = 2.0 p.p. 100'000.
KANO: MORASHI RIVER.										
4th June, 1925. Rocky Pool near Source	0.04	0.038	"	"	0.49	12.5	Not determined	0.2	...	Loss on ignition of solids = 3.7 p.p. 100'000.
Six miles down River ...	0.08	0.06	"	"	0.42	30.1	"	0.2	...	Loss on ignition of solids = 6.6 p.p. 100'000.
26th June, 1925. Taken at New dam	0.06	0.058	"	0.2	0.41	18.5	8.0	0.2	6.5	Loss on ignition of solids = 6.2 p.p. 100'000.
IBADAN.										
1st October, 1925 ...	0.0010	0.0124	"	...	0.202	11.6	4.0	0.4	...	Loss on ignition of solids = 3.7 p.p. 100'000.
KADUNA.										
25th November, 1925 ...	Nil	0.0023	"	0.12	0.041	8.4	2.0	0.3	7.3-7.4	Silted and opalescent.
20th January, 1926 ...	0.0024	0.0029	"	0.10	0.027	8.8	2.0	0.5	7.2-7.3	" " "



TABLE OF WATER ANALYSIS.

Date	Lagos Supply.	NITROGEN AS		Nitrite.	Nitrate.	Oxygen absorbed 3 hrs. lab. temp. (82-86°C.).	Total Solids dried @ 127°C. or 180°C.	Total Hardness to Soap Solution.	Chlorine.	P.H. Value.	REMARKS.
		Saline Ammonia.	Albuminoid Ammonia.								
August	14th.	Iju Water Source	...	Nil	0.15	0.222	3.7	2.5	0.8		
	28th.	Engine Room Effluent	...	do.	0.1	0.084	3.2	1.5	0.8		
September	14th.	Source	...	do.	0.1	0.131	4.3	2.5	0.8		
	26th.	Engine Room Effluent	...	do.	0.13	0.092	3.9	1.5	0.8		
October	8th.	Source	...	do.	0.12	0.210	4.1	1.5	0.8		
	22nd.	Engine Room Effluent	...	do.	Not determined.	0.160	4.0	2.3	0.8		
November	19th.	Source	...	do.	—	0.149	3.9	1.5	0.8		
	4th.	Engine Room Effluent	...	do.	do.	0.139	3.9	1.5	0.8		
December	17th.	Source	...	do.	do.	0.123	3.6	1.0	0.8		
	19th.	Engine Room Effluent	...	do.	do.	0.064	4.5	1.0	0.9		
January	14th.	Source	...	do.	do.	0.395	3.9	1.0	0.9		
	28th.	Engine Room Effluent	...	do.	do.	0.051	4.0	1.0	0.85		
February	14th.	Source	...	do.	do.	0.141	3.8	0.5	0.85		
	28th.	Engine Room Effluent	...	do.	do.	0.107	3.8	1.0	0.85		
March	14th.	Source	...	do.	do.	0.106	3.7	0.5	0.85		
	28th.	Engine Room Effluent	...	do.	do.	0.055	4.0	5.0	0.85		
April	14th.	Source	...	do.	do.	0.111	3.9	0.5	0.85		
	28th.	Engine Room Effluent	...	do.	do.	0.058	2.8	0.5	0.85	6.7	
May	14th.	Source	...	do.	do.	0.095	2.8	0.5	0.85	6.7	
	28th.	Engine Room Effluent	...	do.	do.	0.048	3.3	0.5	0.85	6.7	
June	14th.	Source	...	do.	0.054	0.127	3.3	0.5	0.85	6.7	
	28th.	Engine Room Effluent	...	do.	0.06	0.064	3.3	0.5	0.85	6.7	

APPENDIX C.

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ANNUAL DENTAL REPORT FOR THE YEAR, 1925.

BY

C. N. PEARSON, GOVERNMENT DENTIST.



ANNUAL DENTAL REPORT FOR THE YEAR 1926



## ANNUAL REPORT BY GOVERNMENT DENTIST.

1. Owing to my having been on leave during the last months of the year 1924, no Annual Report has been submitted for the year 1924, and for convenience statistical comparisons will therefore be made with the figures printed for the year 1923. In this connection it must be remembered that so long as there is only one Government Dentist in Nigeria, at the expiration of every eighteen months there comes a period of approximately six months during which no statistics are available and Government Officials are forced to obtain the assistance of such Dentists as may be practising in Nigeria. The Medical Register shows there are only six Dentists registered in Nigeria. One practises in Lagos, one in Calabar, one travels more or less sporadically through Nigeria, one is a Missionary attached to his Mission, the other has not practised in Nigeria since the War.

2. In my report for the year 1923 I pointed out the necessity for officers to have their teeth examined every six months and scaled. The importance of this operation cannot be urged too strongly. The deposit of salivary salts around the necks of the teeth, especially the lower incisors, forms a breeding ground for bacteria. This is the forerunner to general cervical gingivitis, recession of the gums, and finally leads to a general suppurative cervical periodontitis, commonly known as Pyorrhoea. This is one of the most common complaints in Nigeria. Moreover early attention and dental treatment enable conservative treatment to be carried out rather than radical.

3. During the year under review I have been able to visit the following centres in the Northern Provinces:—

Jos, Kano, Zaria, Kaduna, Ibadan.

The postponed tour to the Eastern Provinces to the following centres, Calabar, Port Harcourt, Enugu, Onitsha, Benin City, and Oshogbo will immediately be undertaken.

These tours have been advantageous to Officials and economic to the Government and many have benefitted.

4. Of general interest I would mention the following cases which have come to my notice.

A native patient who had six premolars present in the maxilla and five in the mandible. Generally there are only four premolars in each jaw.

Again there have been a few cases showing the presence of four molars in each jaw.

It is a generally accepted dictum that the jaws of man are becoming smaller owing to the fact that the softer diet of the present day does not require the same amount of mastication as in earlier days. Thus the jaws of man are growing smaller and as a rule there is insufficient room for the third molar to erupt.

As a contrast to this among the African patients there have been some cases of the presence of one or two milk teeth (deciduous teeth) as well as the permanent teeth.

## DENTAL REPORT.

## FIGURES OF THE WORK DONE.

*Patients.*

European Officials...	...	...	...	...	400
Native Officials	...	...	...	...	190
Women and children and others	...	...	...	...	197



*Conservative Work.*

Synthetic fillings (white porcelain) ... ..	110
Amalgams ... ..	300
Copper Amalgams ... ..	70
Gutta Percha (temporary fillings) ... ..	416
Root fillings and dressings ... ..	51
Gutta Percha, Permanent (Permanent fillings)	25
Scalings ... ..	600
Extractions ... ..	635
Pyorrhoea Alveolaris (General Suppurative Cervical Periodontitis) and other cases	232
Dentures and repairs ... ..	150

It will be noted from the above figures that the number of European Officials treated has greatly increased from those treated during the year 1923. But on the other hand there is a slight decrease in the number of African Officials attending for dental treatment. This shows that further propaganda is necessary to bring to their notice the benefits resulting from a systematic examination and treatment of their teeth.

The old-fashioned demand for gold crowns to cover sound teeth, particularly the incisors, is gradually dying out.

The increase in the number of cases of pyorrhoea is chiefly among the Natives.

It is remarkable that in the whole of Nigeria there is not one Native born qualified dentist.

C. N. PEARSON,

*Government Dentist.*

APPENDIX D.

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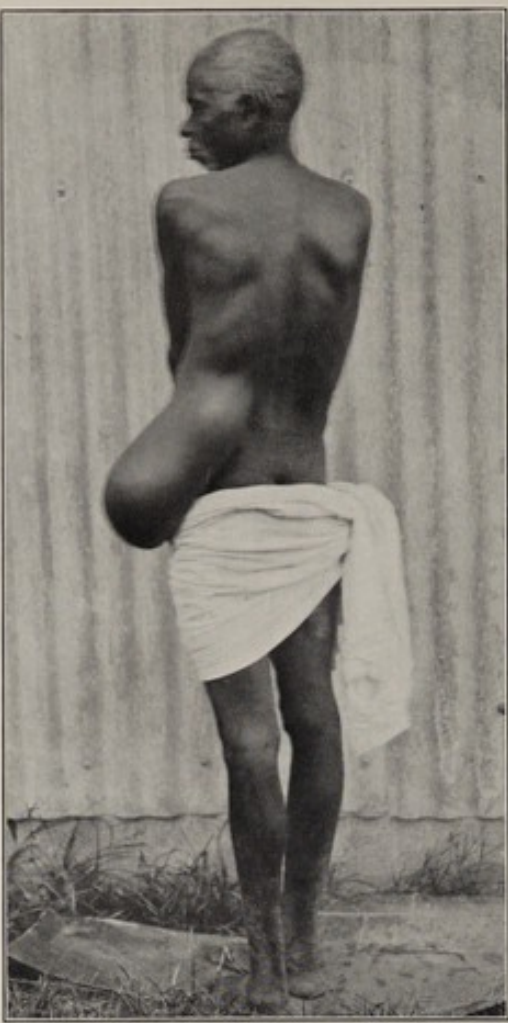
SCIENTIFIC PAPERS.



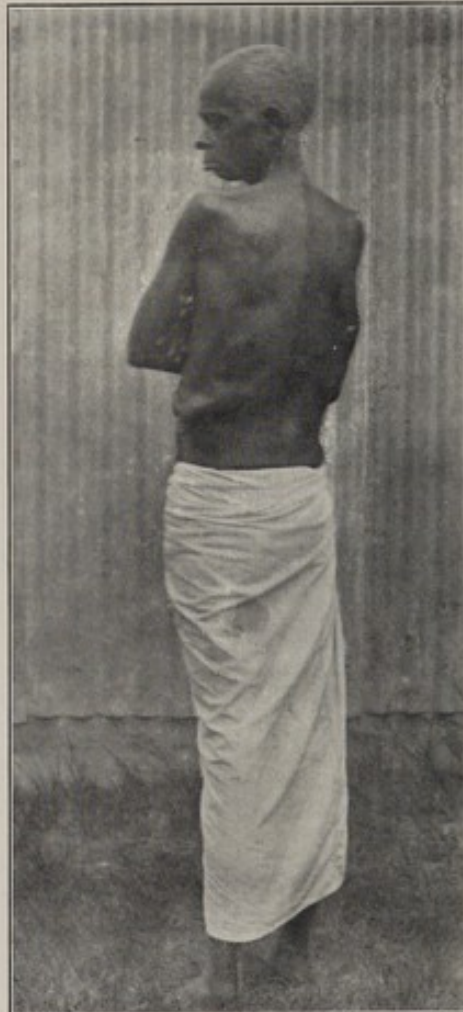








Before Operation.



After Operation.

Fig. 1.—LUMBAR HERNIA.



## SCIENTIFIC PAPERS.

DR. E. E. MAPLES—SPECIALIST SURGEON.

## CASE OF LUMBAR HERNIA.

Lumbar Hernia appears to be a very rare condition, and many authors disregard it entirely—both Jacobson and Bickham in their standard works on operative surgery make no mention of it—Rose and Carless say:—

“Lumbar Hernia is a condition of considerable rarity in which the abdominal viscera protrude by the side of the erector spinæ, coming to a surface between the latissimus dorsi and the external oblique, in the space known as Petit's triangle. It is perhaps seen most frequently after operations on the kidney where suppuration has occurred, and the deep stitches have had to be removed. The ordinary signs of a hernia are present, and with a little care the condition is readily distinguished from a Lumbar abscess. Treatment may be conducted along the same lines as for a ventral hernia.”

Brief references are also made to it both in Choyce's and in Thompson and Miles' Surgery.

A patient O.U. case No. 626/25 with a very large irreducible lumbar hernia presented himself for operation in 1925. He had a large swelling hanging over the left iliac crest which reached in front almost to the middle line and behind as far back as anterior border of the left erector spinæ muscle while upwards it reached to the lower margin of the thorax, and below descended to the level of the hip joint. On palpation it evidently contained a mass of bowel while behind at its upper section was a harder mass which felt like the kidney, and, as a matter of fact, was the kidney. The photographs attached of the patient before operation show the extent of the hernia, while the bulging at its posterior superior angle marks the position of the prolapsed left kidney.

The patient was an elderly man about fifty-five to sixty years of age, and was most anxious to get rid of the swelling.

He was operated on under chloroform on the 8th December, a diagonal incision being made over the swelling from below and in front, upwards and backwards. The skin flaps were dissected back, front and behind, and the hernia was seen to contain a very large mass of intestine. The sac was opened and the prolapsed bowel found to consist of many feet of the ileum, together with a sliding hernia of the cæcum, appendix, and the greater part of the ascending colon. Considerable time was then consumed in reducing the free portion of the bowel (*i.e.*, the ileum) through the opening in the muscle into the abdomen. When this was done several plugs of gauze were placed in the hernial opening to keep the ileum from returning, while the sliding portion of the bowel was dealt with.

The cæcum and the ascending colon were then freed from the surrounding tissues by gauze stripping, and blunt dissection. The tumour at the posterior superior angle was then explored and found to be the right kidney and it was freed by stripping and blunt dissection from its surroundings in the same manner as the large bowel. By this means the free sac, and the portion of the sac which was formed by the prolapsed kidney and sliding large intestine, were freed right up to the edge of the opening in the abdominal muscles. The gauze plugs were then removed and the incision in free sac sewn and the whole of the unreduced sliding portion of the hernia together with the free sac reduced “*en masse*” and quite easily.

The muscles were then sewn together by interrupted catgut sutures in two layers, the superficial layer consisting of the external oblique and



Latissimus Dorsi being plicated. After this the redundant skin was excised and the wound closed by interrupted deep fishing gut and continuous superficial catgut sutures.

The patient stood the operation quite well but suffered for several days from considerable distension of the abdomen, due to the large mass of bowel restored. However, the distension gradually disappeared, and the abdominal walls and contents mutually adapted themselves to one another. Apart from a little superficial stitch suppuration, the patient made an uninterrupted recovery.

Photographs are attached showing the conditions before and after operation. The little swelling seen after the operation in the photograph is redundant skin, which the patient refused to have excised. (See Fig. 1).

Upon discharge the patient appeared thoroughly cured, and no bulging was apparent even upon coughing.

#### DR. D. G. FITZGERALD MOORE—MEDICAL OFFICER.

##### CASE OF GOUNDOU.

The small boy whose photo is attached (Fig. 2) attended hospital with Serpiginous yaws ulceration and bony nodes on the tibiae which were and still are of typical sabre like formation. He also complained of rheumatoid pains in the bones most marked at night. In other words he seemed to be a generalised case of yaws of which Goundou appeared as one of the manifestations. He was operated on for the Goundou and did well. His general condition improved after a lengthy course of salvarsan.

#### DR. F. ROSS—MEDICAL OFFICER.

##### CASE OF UTERINE FIBROMYOMA AND ECTOPIC GESTATION.

A woman aged about thirty was brought to hospital in an extremely weak state. The only history obtainable was a miscarriage seven months previously and amenorrhoea since. A hard mass was felt above the pubis apparently in connection with the uterus, and percussion was dull; all over the lower part of the abdomen was very tender and the bowels had not moved for a few days. Vaginal examination showed the os uteri to be drawn up behind the pubis and a copious purulent discharge issuing from it. The hollow of the sacrum was occupied by a baggy mass but a head could be felt through it on bi-manual examination which caused great pain. The patient's condition did not permit of any surgical procedure.

*Post-Mortem.*—A fibroid tumour the size of two fists was situated in the anterior wall of the uterus and was undergoing septic degeneration. In connection with the right tube there was an extra-uterine pregnancy of seven to seven and a half months duration. There was also present pelvic peritonitis which was the immediate cause of death.

##### MALIGNANT DISEASE.

In view of the opinions that have been expressed as to the rarity of malignant disease in Nigeria, it may be of interest to record that during the year, thirteen cases of malignant tumours have been met with, and four cases of sarcoma of testicle.

In the last seven weeks of the year, I have seen one case of sarcoma of the superior maxilla and orbit extending into the mouth as far as the Tonsil (photograph attached), and one case of sarcoma affecting the foot. Specimens of the latter case were sent to Yaba and the diagnosis confirmed. (Fig. 3).

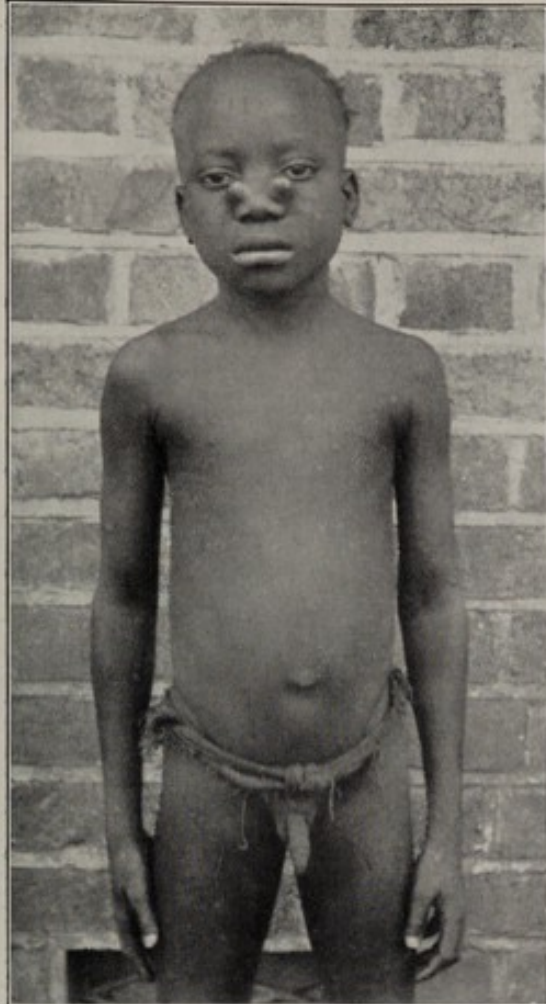


Fig. 2.—CASE OF GOUNDOU.



Fig. 3.—SARCOMA OF THE SUPERIOR MAXILLA  
AND ORBIT.





The history in the former case is four months duration. It was quite inoperable and certainly during the patient's three weeks stay in hospital was growing very rapidly.

I regret that further data on the subject are not available, but it would appear that in a large centre where sufficient numbers of patients are seen, there will be encountered a corresponding number of cases of Malignant disease.

DR. H. R. MOREHEAD—SENIOR MEDICAL OFFICER.

#### BLACKWATER FEVER AND QUININE.

The occurrence of six cases of blackwater fever gave an opportunity of studying the disease from the point of view of the effects of quinine administration before, during and after the illness, and observing whether the distinction that is sometimes drawn between quinine hæmoglobinuria and other forms of blackwater fever could be supported by clinical differences.

I have not observed any such differences, the disease with its numerous complications, always running the same course clinically.

In all cases there is reason to believe that it is a malarial manifestation, and even though quinine undoubtedly precipitates an attack in certain cases, in my opinion it does not do so as a direct chemical hæmolytic acting on an unstable condition of the blood, but through its destructive action on the malarial parasites and consequent liberation of toxins, the products of this destruction, the toxins in such cases being the hæmolytic agent.

I suggest that a somewhat parallel case exists in the severe reaction and constitutional disturbance which follow the administration of salvarsan in syphilis when the disease has reached the secondary stage before treatment. This, which may occur in spite of faultless technique and materials, is due according to Ehrlich, to liberation of spirochaetal endotoxins, and necessitates great caution in beginning treatment in some cases.

In both cases there is a powerfully germicidal drug acting on the large number of parasites incidental to a generalised disease, small graduated doses may be given with safety, though not always, and tolerance to the drug in both cases is acquired as the disease comes under control. That a hæmolytic substance should occur in the one case does not seem improbable, bearing in mind the life history of the malarial parasite within the body.

It has previously been suggested (Dr. W. A. Young) that blackwater is ordinarily produced by a toxin formed by the malarial parasite. I agree, but would ascribe the contributory action of quinine to its effect on the malarial parasite as described above, and not to hæmolytic action on red cells, or otherwise acting as a protoplasmic poison.

It may be contended that it is immaterial how quinine acts if the result is the same, but anything that narrows down the line of research must at the same time facilitate it. For example, one standard text book describes three separate forms of blackwater.

1. Malarial H. 2. Quinine H. 3. Acute Specific H.

My experience of the disease during the past year, and others, has shown nothing clinically to support this distinction.

My views as to the way in which quinine acts would automatically combine Nos. 1 and 2 and there is abundant evidence outside the scope of these remarks to exclude the existence of hæmoglobinuria in the tropics without antecedent malaria.



## MALIGNANT DISEASE IN EUROPEAN.

A case of malignant disease, occurring in a European was treated during the year by Dr. G. F. Forde.

A young assistant at one of the factories came for treatment suffering from a swelling of the left testicle which he said came on gradually after a fall from a motor cycle.

There was no glandular enlargement and the skin was not involved. Hæmatoma was at first suspected but the swelling gradually increased in size and there was no pain.

An operation was performed by Dr. H. R. M. Ferguson and the testicle substance found invaded by a tumour of fibrous consistence. The testicle and structures of the cord were removed and a report on the specimen by the Medical Research Institute, Yaba, stated that it consisted of a fibro-sarcoma.

The patient made apparently a good recovery and was invalided home but a recurrence of the disease took place and I am informed that he died six months later.

## DR. I. G. CUMMINGS—AFRICAN MEDICAL OFFICER.

## LABORATORY WORK—PORT HARCOURT.

Microscopic examinations were made of materials sent from out-patients and in-patients Departments of both Native and European Hospitals, Prison Department, post-mortem, etc., and comprised stools, sputum, blood, smears, urine, etc., with the following results:—

Examinations.	Ankylostome	...	...	28.4%
	Ascaris lum	...	...	20.3%
840 Stools.	Trichocephalus	...	...	9.9%
	Ent. histolytica	...	...	1.6%
	" " Cysts	...	...	15.5%
	Strongylus	...	...	1.6%
	T. solium	...	...	.012%
	T. saginata	...	...	.624%
	Balantidium coli	...	...	.012%
	Lambliia intest	...	...	.024%
58 Sputum for				
T.B.—	Positive Findings	...	...	17.2%
16 Blood Films	Subtertian parasites	...	...	68.8%
	Lymphatic Leukaemia	...	...	6.3%
35 Smears	Gonococci	...	...	40%
	B. pestis	...	...	2.8%
	T. pallida	...	...	11.4%

I may mention by way of special interest that a post-mortem examination of a cadaver ex s.s. *Lokoja* in October last (death having occurred during the voyage) revealed septicæmic plague.

Smears were made of the principal organs and the blood and these were found teeming with the plague bacilli—these findings were confirmed by Yaba. Due precautions and timely preventive measures prevented spread of the disease to this port.

A case of Lymphatic Leukæmia seems to me of sufficiently rare occurrence in the Tropics as to warrant a special mention.

This occurred in a prisoner. His clinical history unfortunately was abruptly terminated by his release from prison and refusal to continue treatment in the Native Hospital.





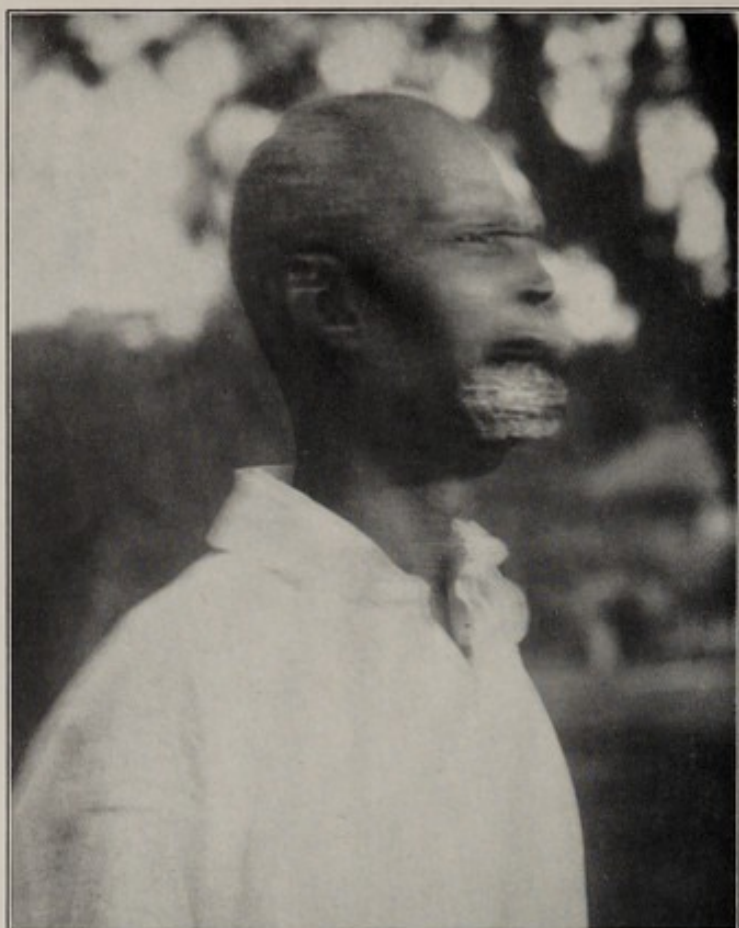


Fig. 4.—EPITHELIOMA OF LIP.



Fig. 5.—CARCINOMA OF THE BREAST.

## DR. E. C. BRAITHWAITE—SPECIALIST SURGEON.

## CARCINOMATA IN NATIVES OF AFRICA.

In view of the discussions which have been carried on in medical journals on this subject at intervals during the past few years it may not be out of place to record three cases of the disease which have come under my care and treatment at Warri during 1924.

They had some points in common. All occurred in people well past middle age. Two were confirmed by microscopic section of the growth. In the third the diagnosis was never in doubt and it was upheld by the subsequent history. Two of the patients were women and the other a man. One was an Epithelioma originating in the lower lip and invading the lower jaw. Another was an Adeno-carcinoma of the breast and the third was probably an Adeno-carcinoma of the cæcum. There was no doubt of it being a malignant growth. The details of the cases are appended.

## (a) EPITHELIOMA OF LIP.

*Name*—Kokori.

*Sex*—Male.

*Age*—Fifty-eight years.

*Nationality*—Sobo.

*Occupation*—Farmer.

He was admitted with an extensive Epithelioma of the lower lip which had been present for over one year. It had spread to the angle of the mouth on the right side and was also involving the upper lip to a lesser extent. The lower jaw on the right side was invaded. There were some enlarged, hard, discrete glands in the right sub-maxillary triangle but none were felt enlarged along the carotid sheath. There was constant salivation dripping on to the neck. After a preliminary period of five days spent in getting the mouth into as clean a condition as possible the growth was excised under chloroform, an initial injection of morphia and atropine being administered hypodermically first, with a margin of one inch of healthy tissue all round. The lower jaw was split in the middle line and the right half removed as far as the last molar tooth and the sub-maxillary triangle was cleared of all lymphatic glands. The cut edges of the incisions were approximated as well as possible the cheek being split a little to allow this.

Recovery was uneventful and he underwent two subsequent plastic operations, the first on 24/10/24 and the second one on 21/11/24, to prevent the dribbling of saliva.

He left hospital on 10/12/24 well pleased with himself. The report of the Pathologist on a section was:—

“ Epithelioma of Lip ”.

A photograph (fig. 4) is attached showing the condition of the patient on admission to hospital.

## (b) CARCINOMA OF BREAST.

*Name*—Leyibo.

*Sex*—Female.

*Age*—Fifty years.

*Nationality*—Jekri.

*Occupation*—Petty trader.

An elderly woman admitted with a large septic foul-smelling, fungating tumour of the right breast which began as a small lump about four years ago. It had steadily got bigger and about eighteen months ago broke down and had been discharging since then.



Pain had been conspicuously absent. The edges of the growth were hard. The lymphatic glands in the right axilla were enlarged and hard. No enlarged glands were felt in the right posterior triangle. The opposite breast was not involved nor was the liver. The growth was not adherent to the ribs but it was firmly fixed to the pectoral muscles. There was no reason to suspect the mediastinal glands of being involved.

The woman desired operation. After a few days spent in getting the breast into as clean a condition as possible this was performed on 7/10/24. The whole of the breast was removed together with both pectoral muscles as far as their insertions. The costocoracoid membrane was cleared and all glands were removed from the axilla together with those along the axillary vein. The wound was closed as far as possible by undermining the flaps and the rest left to granulate. Convalescence was complicated by some œdema of the right arm which was treated by posture. Healing was slow but satisfactory and the patient left hospital on 2/12/24.

The report of the Pathologist on a section was:—

“ Adeno-carcinoma ”.

A photograph is attached. (Fig. 5).

(c) CARCINOMA OF CÆCUM.

*Name*—Auweye.

*Sex*—Female.

*Age*—Fifty years.

*Nationality*—Jekri.

*Occupation*—Petty trader.

The patient was admitted with a lump in the right side of the abdomen which she first noticed about three years ago. The tumour has steadily got bigger. Latterly she has experienced a good deal of pain. Her general condition is very poor. No abdominal distension. The patient states she has never had attacks of diarrhœa alternating with constipation. Never noticed any blood in the stools. She desired operation as her life recently had been a misery. No secondary deposits could be made out in the liver or in the pouch of Douglas.

After a few days spent in getting the patient into as good a condition as possible the abdomen was opened by an eight inch incision over the tumour. The cæcum was found to be extensively involved in a growth which was firmly adherent to the posterior abdominal wall. The lower end of the ileum was not involved. In view of the fixity of the tumour and the poor general condition of the patient no attempt at removal was made but a lateral anastomosis was made between the lower ileum, six inches from the ileocæcal orifice, and the most dependent part of the transverse colon by simple suture. The abdomen was then closed. The patient recovered well from the operation and left hospital on 17/11/24.

The subsequent history obtained from relatives was that she improved for a time and then her condition relapsed. She gradually got weaker and died just before the end of the year.

This history is considered to uphold the clinical diagnosis as no specimen of the growth was removed for sectioning.

(d) CASE OF MELANOTIC SARCOMA.

*Name*—Ukpaiyibo.

*Sex*—Male.

*Age*—Forty years.

*Nationality*—Ijaw.

*Occupation*—Fisherman.

Admitted for operation with a fungating tumour in the left groin. He stated that it began about one year ago and gradually increased in size, breaking down about three months ago. The tumour is in Scarpa's triangle and entirely below Poupart's ligament.



The growth was removed on 6/12/24 with some difficulty as it was adherent to the anterior layer of the femoral sheath; on section the tumour was interspersed with black deposits. The wound was closed by undermining the edges and a small drain inserted.

A careful search revealed no other growth in the leg or on the buttocks or on the scrotum or penis.

His leg was kept elevated during the healing of the wound and he left hospital on 29/12/24 well pleased with himself.

The Pathologist's report was:—

“The growth is a Melanotic Sarcoma.”

(e) FOREIGN BODIES IMPACTED IN THE SMALL INTESTINE.

*Name*—Onovughe.

*Sex*—Female.

*Age*—Thirty years.

*Nationality*—Sobo.

This woman was brought by her husband on account of a lump in the right side of the lower abdomen. Her history was that two months before coming to hospital she had a miscarriage in the sixth month of her first pregnancy. They connected the tumour with the miscarriage and imagined that all had not come away.

On examination there was a tumour in the right iliac fossa the size of an ostrich's egg. It was freely moveable and neither tender nor painful. The surface was nodular and imparted a peculiar sensation to the fingers just as if it was a bag of bones.

Per vaginam the uterus felt normal. The A.D.M.S. saw the patient with me and the diagnosis was left open after discussing the question of a dermoid cyst and a lithopædion.

The woman was anxious for operation. The abdomen was opened on 20/11/24 through a medium subumbilical incision extending from the symphysis pubis to the umbilicus and subsequently extended for two inches upward.

The tumour was found to be the greatly distended lower end of the ileum which was dilated to four times its natural size. On opening this no fewer than sixty-two seeds, each the size of a small mussel shell, were removed. To reach those at the bottom of the pouch it was necessary to employ a sterilised dessert spoon. One of the seeds was impacted in the ileo-cæcal valve but did not completely close the opening. The seeds were identified as those of the fruit of a tree known locally as “OTIEN” and in Yorubaland as “OSANAGALUMO”, the fruit of which is edible.

It was a matter of some difficulty to remove all the seeds and some of the intestinal contents unfortunately escaped into the abdominal cavity. The opening into the pouch was closed with three layers of superimposed sutures and after cleansing the abdomen it was closed without drainage.

The patient's condition was satisfactory for two days and then signs of Peritonitis supervened and she died on the 26th. The post-mortem disclosed no leakage at the suture line.

(f) CASE OF BILHARZIA OF THE BLADDER.

*Name*—Convict No. W. 432, Atigharin.

*Sex*—Male.

*Age*—Thirty years.

*Nationality*—Sobo.

The prisoner was admitted to the Prison hospital suffering from Hæmaturia. His urine was centrifuged and the deposit examined when the terminal spined eggs of the *Schistosomum hæmatobium* were



found in numbers. He was given a course of intravenous injections of Antimony tartrate, beginning with one grain and gradually increasing the dose up to two and a half grains twice a week. His urine was clear on the 9th November when he was discharged from hospital. His treatment was continued until a course of twenty grains had been given. His urine was examined on three subsequent occasions and no eggs were found.

#### TREATMENT OF LEPROSY.

There have been three prisoners suffering from leprosy under treatment for six months and as they have been under constant observation it is possible to record the results of treatment. They have been kept in a small compound inside the prison with a wire fence to keep away the other prisoners. Their diet has been good and they have been well housed and had no work to do. They attended the Native Hospital regularly twice a week for their injections.

The first case is a man with a sentence of two years imprisonment due for release in September 25th, with anæsthetic leprosy; he had partial paralysis of the left anterior tibial nerve with foot drop and ulceration on the big toe and over the external malleolus. The other two were of the mixed type.

Treatment has consisted in bi-weekly intramuscular injections of Heisser's solution of Chaulmoogra oil with Resorcin. The dose has been increased up to 5 c.c. In all cases there has been marked improvement, ulcers healing, nodules disappearing and a certain amount of return of sensation.

There have been no complications during treatment.

#### A CASE OF LIVER ABSCESS TREATED BY ASPIRATION AND INJECTIONS OF EMETINE.

*Name*—Emeyemi.

*Sex*—Male.

*Age*—About forty years.

*Nationality*—Sobo.

This patient was admitted to the African Hospital, Warri, on the 5th January, 1925, complaining of a large swelling in the upper part of the abdomen on the right side.

His history was that he first noticed a lump about four months previously which had gradually increased in size. He had had attacks of diarrhoea at irregular intervals and had suffered from "fever". More recently he had noticed himself getting weaker and thinner.

On admission he was a somewhat emaciated man with a temperature of 99.6 F. His anterior abdominal wall in the right hypochondrium was bulged forward by a tumour, dull on percussion and continuous with the liver dullness. The tumour moved somewhat with respiration. It was tender on firm palpation but there was no rigidity of the overlying muscles. The heart was displaced slightly to the left. No signs of congestion at the base of the right lung. No albuminuria. The stools were well formed and contained no trace of blood or mucus. No thickening of the large bowel could be detected.

A diagnosis of liver abscess was made and intramuscular injections of one grain of Emetine Hydrochlor. daily were prescribed.

Three days after admission, under anæsthesia the needle of an aspirating syringe was inserted into the most prominent part of the tumour and twenty-two ounces of typical tropical liver abscess pus were withdrawn.



His subsequent progress was satisfactory, the temperature which had previously shown an evening rise to nearly 100.F. dropping to normal and remaining steady at that level. His general condition began to improve almost at once.

Emetine injections were kept up until a total of twelve grains had been given.

He left hospital fourteen days after admission well, being given a supply of Alcresta Ipecac. tablets to take in daily doses of ten grains, for one month.

#### A CASE OF URIC ACID CALCULUS REMOVED FROM THE URETHRA OF A BOY.

Late on the evening of the 2nd June, 1925, a Sobo boy named Magbayikpome was brought by his mother to the Warri Hospital as he had been unable to pass his urine since the early morning.

He had had no previous difficulty in or pain on urination.

Attention was called to a swelling near the end of the penis and on examination a hard oval body was felt lying in the fossa navicularis. Owing to the narrowness of the meatus extraction was impossible until the meatus had been slit for a quarter of an inch in a downward direction.

Removal was then easy and an examination of the body showed that it was a urinary calculus of the Uric Acid variety.

Urinary calculi are rare in these parts.

#### A CASE OF DUODENAL ULCERATION AND SEPTIC PERITONITIS ASSOCIATED WITH EXTENSIVE BURNS.

This condition was discovered after death.

The body of a male child Omokpadiola by name, aged about four years was brought to Warri for post-mortem examination on the 27th of February, 1925, case No. 8/1925.

Death had taken place within twenty-four hours.

There was extensive ulceration of both legs and buttocks which was very septic and extended well into the subcutaneous tissue.

The general nutrition was poor.

A history was obtained of the child having sustained severe burns eight days previously.

On opening the abdomen which was more than usually distended a condition of acute general peritonitis with an extensive purulent exudate, most marked in the upper part of the abdomen on the right side, was found.

A track of lymph led to a small perforation on the anterior surface of the second part of the duodenum and on further examination an acute perforating ulcer was found almost opposite the Ampulla of Vater.

DR. T. L. CRAIG—SENIOR MEDICAL OFFICER.

#### DIABETES AND CATARACT.

A woman aged about twenty years was admitted on 2nd June completely blind from double cataract.

Both eyes were in good condition, no attempt at local treatment having been made. The opaque lens made a very striking contrast with the dark coloured iris. The patient was very thin and her husband



said she always wanted to drink water. An examination of the urine showed a Sp. Gr. of 1030 and a copious brown precipitate with Fehlings test.

Having read in the British Medical Journal that raw pancreas had been successfully used as a substitute for insulin it was decided to give the method a trial. Pancreas from a sheep was obtained personally at the Slaughter House for several days and then inspected afterwards so that no other gland could be used by mistake. The gland was chopped up and given twice a day with rice, usually two glands each day. The patient made no objection to the diet but naturally wanted yam instead of rice. Rough quantitative tests of the urine were made twice weekly during the administration of raw pancreas for a month but no change could be observed in the amount of sugar present. Her general condition did improve but this was probably due to being under good conditions and not being treated by native medicine. Insulin was obtained and given in three minim doses daily and after a few days there was a decided improvement in the patient's condition, her thirst abated and she felt very well.

The lens was removed from the right eye without any trouble and after two weeks the patient was able to get about and look after herself.

There were no complications after the operation except a painful redness in the left eye with some increase in tension which I could not account for.

After four weeks on insulin it was stopped and raw pancreas tried again but it apparently had no influence at all on the diabetes.

The patient left the hospital at the end of August because she would not have the cataract removed from the left eye. She had practically normal vision in the eye operated on but she objected to the appearance of the left eye. It would have been easy to keep a diabetic patient in good health if raw pancreas had been of any use but in this severe case it was useless.

Reference British Medical Journal 11th July, 1925, and previous articles.

DR. G. F. FORDE—SENIOR MEDICAL OFFICER.

#### THREE CASES OF YAWS TREATED WITH STOVARSOL.

Three children, two aged about seven, and one aged ten, in the acute stage of the disease appeared for treatment as out-patients.

One case was of exceptional severity, the child being literally covered with the lesions. They were all given the same treatment, *viz.*: Grs. IV 1st day, Grs. VI 2nd day, Grs. VIII 3rd day, nil 4th day, Grs. VIII 5th day, Grs. VI 6th day, Grs. IV 7th day.

The result was the same in each case.

On the 4th day of the treatment the patches appeared to have dried up and shrunk slightly and at the end of the 7th day they were roughly about half the size. Seen about six weeks later all trace of the disease had disappeared.

The advantages of this treatment are:—

1. Ease of administration.
2. Cheapness, roughly one-sixth of the cost of N.A.B.
3. Same treatment is claimed to be specific for Amœbiasis and Lambliasis.
4. Preparation appears to act as a general tonic.

The disadvantage is that attendance is necessary daily for one week.

Reference the Lancet 19th September, 1925.



DR. T. M. R. LEONARD, D.S.O., ASSISTANT DIRECTOR OF  
MEDICAL SERVICE.

HEPATIC ABSCESS (BOTH LOBES) AMOEBIC ORIGIN. RECOVERY WITHOUT  
ANY SURGICAL INTERFERENCE.

J. H. A Sierra Leone Creole aged fifty-three years was admitted into Warri Hospital on July 27th, 1925. He was brought into hospital on a stretcher, with a history of having been ill for two months.

*Examination.*—Patient appeared very ill, with pronounced weakness and anæmia, complexion a dirty muddy colour, conjunctivæ tinged with yellow. Tongue very furred and dry, breath extremely offensive. Temperature ninety-eight degrees, pulse seventy. Respirations twenty. Limbs emaciated, abdomen distended and tympanitic, no rigidity of walls, dullness in both flanks. Liver enlarged, the left lobe being distinct and forming a tumour-like swelling in the epigastrium below the Ensiform cartilage; the margin of right lobe being about one inch below costal margin. Deep seated pain elicited by heavy percussion.

On auscultation, pleuritic friction over both bases with crepitations, decreased breath sounds, complete dorsal decubitus only.

*History.*—Patient stated he had been ill for over two months, illness began with dysentery—passing of blood and mucus which he did not have treated and which gradually became less acute. He then noticed a sense of weight and fullness in the right side, followed later by a dry cough and evening pyrexia with rheumatic-like pains in both sides and shoulders. Later he noticed loss of flesh and general weakness with heavy night sweats and gradual loss of appetite. Bowels are loose, with blood and mucus, and tenesmus was present.

Finally he could not get up from his bed and was brought to the hospital by friends. He also stated that he had a severe attack of dysentery six months previously. Stools were loose and feculent—with blood and mucus in large quantities.

Microscopic examination showed presence of ova of ankylostomes, ascaridæ and also cysts and a few active amœbæ—Charcot Leyden crystals also present.

*Blood Examination.*—Hæmoglobin—seventy *per cent.* Crescent forms subtertian malaria present. Well marked leucocytosis, polymorphonuclear increase.

*Urine Examination.*—Urine dark yellow in colour and clear, Sp. Gravity 1025. Reaction acid. No albumen or sugar present.

*Diagnosis.*—Hepatic Abscess—both lobes.

*Treatment.*—No surgical treatment was attempted at all, patient was put on intramuscular Emetine gr. 1 daily, with gr. 4 Stovarsol, twice a day. The lower bowel and rectum were washed out daily, with a 1 in 500 quinine Hydrochlor solution run in as high as possible, and allowed to be retained as long as patient could keep it. Diet, milk, soups, agidi, porridge, boiled fish.

On the 10th August, that is fourteen days of treatment, patient had considerably improved, temperature down, stools normal, no mucus or blood. Sleeps well, no night sweats, appetite improved and tongue clean. Enlargement of liver considerably lessened, no pain or cough, and patient is able to turn on his sides.

On the 15th August, Emetine was stopped, Stovarsol continued, diet increased to full. Patient able to sit up, no pain or discomfort over liver area, left lobe very much reduced and just palpable. Emetine was then given again on the 20th, 21st and 22nd with the Stovarsol and then discontinued as stools were normal and showed no blood, mucus or



cysts. Progress was uninterrupted, patient was placed on a mixture of Syrup Ferri Iodide on the 24th. As ankylostome ova had been found in the stools, a course of Carbon Tetrachloride was given the patient from the 1st September. He was discharged—completely cured—on the 5th September, a new man. I saw the patient four months later and he was fit and well and at his work.

#### ACUTE GANGRENOUS APPENDICITIS.

The following case is of interest from the unusual situation of the appendix, which, while being the actual cause of illness, was masked by symptoms simulating a strangulated inguinal hernia. Unfortunately the patient was brought too late to the hospital and death supervened shortly after operation.

The patient, an old African native, was brought to the hospital on the night of the 17th December with the following history. A right inguinal hernia of fourteen years standing which up to four years ago was easily reducible by himself and caused no inconvenience or pain.

Four years ago, the hernia became irreducible and apparently adherent to its sac, still causing no pain or inconvenience, bowels being opened regularly. Seven days ago he experienced sudden pain in the swelling which was accompanied by vomiting, bowels were moved, loose, watery motions.

Pain persisted for three days, swelling in the scrotum becoming tense and painful to the touch. Pain then apparently passed off and he was brought into hospital to have the swelling removed.

*Examination.*—Patient appeared very ill, face drawn and anxious, skin cold and clammy. Temperature 97.8, pulse soft and weak seventy-six, respirations twenty. Tongue furred and dry, breath offensive; abdomen distended and tympanitic except in the flanks, where there was shifting dullness. Abdominal walls hard and rigid. Right half of scrotum enlarged, tense and slightly tympanitic on percussion. Contents irreducible.

*Diagnosis.*—Strangulated inguinal hernia with acute peritonitis. Operation advised and agreed to.

Operation showed the hernia sac with very thick walls, the cæcum and portion of the ascending colon completely adherent to the sac, the appendix was gangrenous with a portion of the great omentum folded round it, enclosing a large abscess; the omentum had apparently only come down when the inflammatory condition had occurred as it was not adherent except to the gangrenous appendix.

A large quantity of fluid with a pronounced odour escaped from the abdominal cavity; the cæcum itself was a deep plum colour. The actually inflamed portion of the omentum and the gangrenous appendix were removed, the abscess cavity and surroundings thoroughly cleaned and washed out, a large drain placed in and the parts just dressed, no attempt being made to detach the adherent cæcum owing to its condition, or to close the wound. The patient came out of the anæsthetic and appeared to be easier, pulse improved after saline infusion. No vomiting, bowels moved four hours after operation, loose, jaeculent stool, improvement was not maintained and patient died sixteen hours after the operation. The delay in being brought to the hospital was undoubtedly contributory to his death, as an earlier operation would have been successful.

DR. W. B. JOHNSON, F.R.C.S.—SPECIALIST SURGEON.

#### CASE OF HUMAN INFECTION WITH COENURUS.

Cases of human infection with the polycephalous scolex of *Coenurus* are exceedingly rare. Infection with *Coenurus cerebralis*, the *Coenurus* scolex infecting sheep, have been recorded, and a few

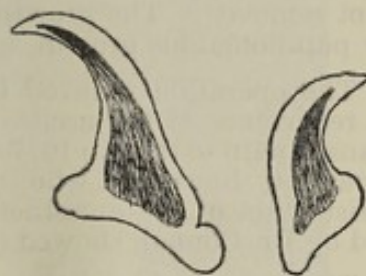


years ago Prof. R. T. Leiper described a case of human infection with *Coenurus glomeratus*—a scolex which had previously been found in the gerbil in N. Africa. This latter case was described from a cyst removed by myself from the intercostal muscles of a native at Kaduna.

In January of this year I removed a cyst of a similar nature from the intercostal muscles of an Asaba child aged fifteen months who had lived at Kaduna since birth. The swelling, about the size of a thrush's egg, had been noticed for ten months. The cyst had a fibrous wall, the inner wall showing caseous patches. It contained a loose membrane which on clearing and mounting showed the numerous heads of *Coenurus*. The heads showed a double line of hooks and the shape of these indicated that the infection was a new species of *Coenurus*. The hooks corresponded more closely to *Coenurus glomeratus* than to those of *C. cerebralis* or allied species but in this case both the "handle" and "guard" were more pronounced. The host of the adult tape worm is probably a carnivorous animal.



Hooks of new case



Hooks of *Coenurus glomeratus*.

#### TWO CASES OF GRANULOMATOUS ABDOMINAL TUMOURS.

(a) A Hausa woman aged about thirty. History of six years more or less continuous abdominal pain. On examination the woman was emaciated; a hard fixed mass was present in the right iliac fossa and above and internal to this was a moveable mass about the size of a goose's egg which could be moved freely laterally but had restricted up and down movement, thus suggesting a growth involving the colon. Sachs-Georgi test was weakly positive, but no improvement followed a course of salvarsan and Pot. Iodide.

Upon exploration the moveable tumour was found to involve the wall of the ascending colon on its inner side above the ileocaecal valve. The growth was adherent to omentum and the muscle wall of the colon had to be divided to remove the mass. The fixed mass, probably consisting of retro-caecal glands, was fixed firmly to the posterior abdominal wall and to the lower two inches of the ileum. The caecum had to be mobilised in order to remove it, and the ileum dissected free. Both masses proved to be the thick walled cysts containing amorphous caseous material. Dr. Connal kindly examined them and reported that they were probably syphilitic, no spirochaetes, tubercle bacilli or streptothrix being found. The fibrous wall was infiltrated with small cells. Recovery was uneventful.

(b) A coast woman aged thirty-five years. Had had one child nine years ago, one abortion since. Complained of dysmenorrhoea and general lower abdominal pain. The uterus was anteflexed and there was a thick cervical discharge with inflammation of the lips of the os. A moveable mass was felt high up on the right side on pelvic examination. Sachs-Georgi test was negative. A course of douching and intra-uterine injections cleared up the endometritis but had no effect upon the abdominal pain.

Abdominal exploration revealed a growth, the size of a tangerine, in the terminal part of the great omentum. The mass was not adherent and was removed without difficulty by merely ligaturing the omentum



above it and cutting it away. On section the mass showed fibrous tissue with caseous areas. Dr. Connal kindly examined it and reported that it was a granuloma; no streptothrix was found in it. Recovery was uneventful.

#### CASE OF ADENO-CARCINOMA OF BOTH OVARIES.

A Hausa-Fulani woman aged about thirty-five. Four years history of abdominal swelling. Ascites tapped at frequent intervals by Dr. Miller, C.M.S., who finally sent me the case. On admission to Kaduna hospital on 24/3/25 the abdomen was tapped, the cells in the ascitic fluid being red blood corpuscles and endothelial cells. A hard mass filled the pelvis and extended into both iliac fossæ. There was extensive œdema of the pudenda and legs. Sachs-Georgi test was positive but no improvement followed treatment with Pot. Iodide and neokharsivan. On 24/4/25 laparotomy was performed. A large growth mass was shelled out of both broad ligaments, the masses pressing upon the common iliac vessels and giving rise to the œdema. Scattered patches of growth were present over the peritoneum but the liver was not involved. The sigmoid was adherent to a mass of pelvic growth which was not removed. The growth removed consisted of partly cystic and partly papillomatous growth.

The operation relieved the œdema entirely and there was only slight recurrence of the ascites but the pelvic growth increased in size and caused pain so that on 16/7/25 a further operation was decided upon. The patient, however, who was much emaciated died during the administration of the anæsthetic. Section of the tumour, kindly performed by Dr. Connal, showed typical adeno-carcinoma.

The occurrence of a true carcinoma in an indigenous native of the Northern Provinces is sufficiently rare to be recorded.

#### CASE OF SUB-MAXILLARY CYST.

An Asaba native aged thirty-eight. Several years history of swelling in the left side of neck which increased in size during meals. The swelling was about the size of a grape fruit and it projected also into the floor of the mouth. No obstruction of the sub-maxillary duct could be made out. On 5th May the cyst was excised, drainage by a Kocher's tube being made for two days afterwards. The swelling reformed and on 4th June the whole left sub-maxillary salivary gland was removed. It was found at this operation that salivary juice had filled the left side of the neck from the angle of the jaw to the clavicle. Uneventful recovery and no recurrence of swelling.

#### CASE OF LYMPHANGEIOMA OF FACE

A Yoruba boy, aged twelve, kindly sent me by Dr. J. R. C. Stephens. The growth involved the right cheek and upper lip, forming a pendulous growth which gave a remarkable appearance to the patient (see photo, fig. 6). The skin was hypertrophied, and the growth extended to the mucous membrane lining the cheek and upper lip. On 15th May the growth was partially excised and on 11th June a further excision, including the upper lip extension of the growth, was made. Section, kindly made by Dr. Connal, confirmed the diagnosis of the nature of the growth.

#### RUPTURE AND EXTRUSION OF THE CERVIC UTERI.

A Gold Coast woman aged eighteen. I was called in owing to the placenta failing to come away after the birth of a full term living child, the first confinement. A mass of tissue was protruding some six inches outside the vulva which proved to be the cervix and part of the body of the uterus. The cervix had been ruptured completely on both sides for three inches from the os. This had been forcibly pulled down by the native mid-wife under the impression that it was the placenta. Under anæsthesia the placenta was removed, the ruptured cervix was sutured with catgut and the uterus was replaced in position after irrigation. Recovery without complication.



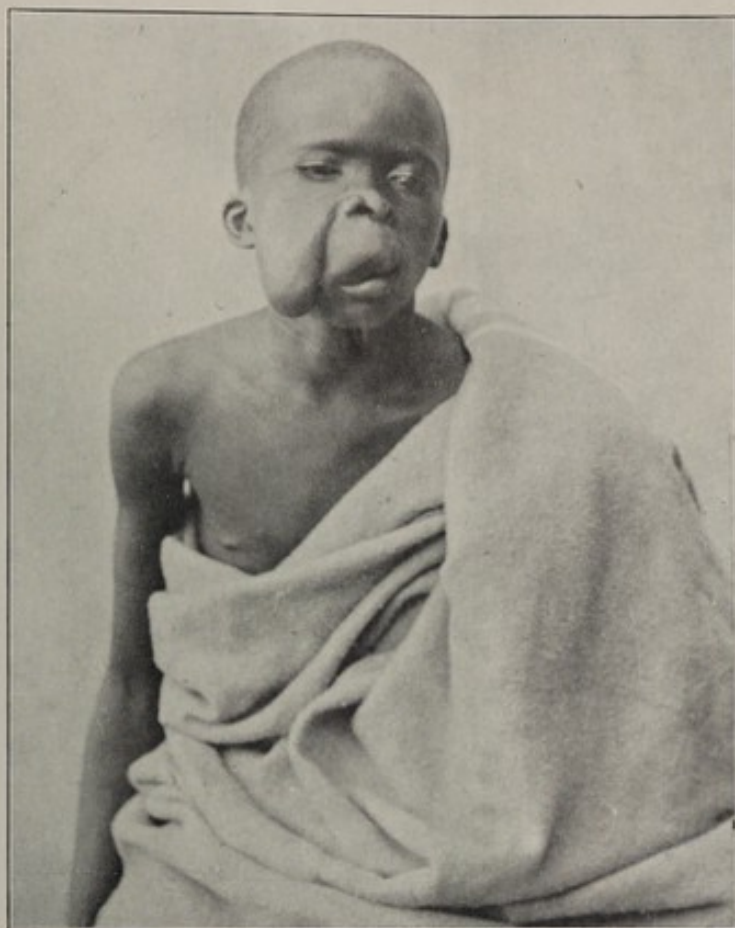


Fig. 6—LYMPHANGEIOMA OF FACE.

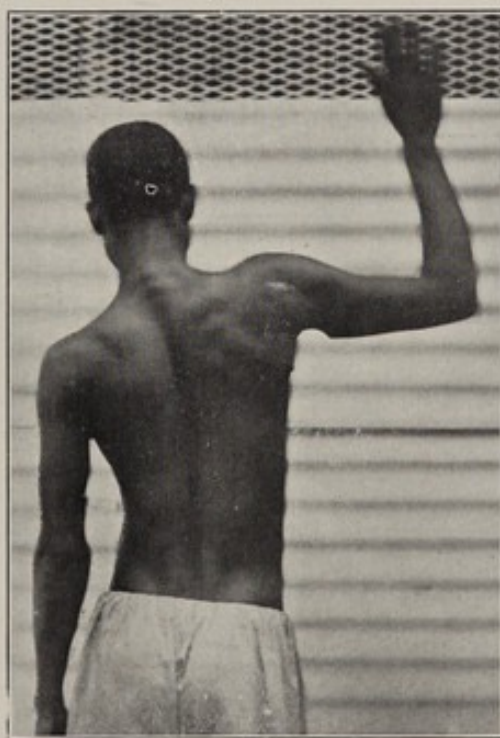
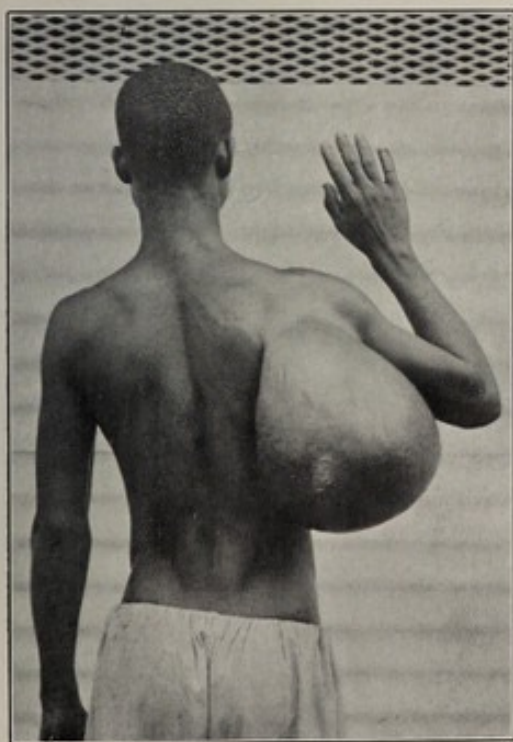


Fig. 7.—LIPOMA OF SHOULDER—Before and After Operation.





DR. QUINTIN STEWART, F.R.C.S., (Edin.)—MEDICAL OFFICER.

# SIX CASES OF MALIGNANT NEOPLASMS IN NATIVES OF NORTHERN AND SOUTHERN NIGERIA.

The question of the incidence of malignant disease amongst native races alluded to by Dr. Braithwaite in the Annual Report for 1923 on "Four cases of carcinomata in Africans" still occupies the medical press without any very definite conclusion being reached beyond the fact that malignant disease does occur in native races.

In Nigeria the proportion of the population affected is quite unknown and it is not yet possible to effect any classification of pathological types.

Until native races come in the mass under medical survey it appears to be only by individual record as mentioned above that any idea as to the prevalence of certain diseases (and in this connection malignant disease) will be arrived at. I therefore submit a resume of six cases with which I have had to deal and which are of some interest from the diversity in their pathology and from the fact that they occurred to me during short terms in the African hospitals of such widely separated centres as Lagos, Calabar, Kano and Kaduna.

Three of the cases were sarcomata, three were carcinomata; three occurred in males, three in females, three were natives of Southern, three of Northern Nigeria.

I am indebted to Dr. Dawson, Histologist to the Royal College of Physicians Laboratory, Edinburgh, for kindly reporting on the sections, several of which were prepared under his supervision.

*Case 1.*—A male from the bush in the vicinity of Lagos aged forty-two, admitted to the Lagos hospital with a complaint of "Epigastric pain for three years and a recent large haematemesis."

Examination disclosed marked signs of loss of blood and evidence of pyloric stenosis (gastric peristalsis being exceptionally well marked).

At the operation a hard mass was discovered in the pyloric region of the stomach attached to the pancreas and surrounded by adhesions—it was not removeable, and areas of new growth were observed in the spleen.

A posterior gastro-enterostomy was done.

Death took place two months later and the post-mortem examination disclosed some twenty ulcers of varying sizes and degrees of penetration in the stomach. One large ulcer in the pyloric portion showed malignant changes as did a mass of glands on the lesser curvature.

The areas in the spleen were secondary growths.

Section report—"A small-celled carcinoma of an infiltrating type difficult to distinguish from sarcoma; Secondary deposits in spleen and glands show a similar type"; Microscopically the pancreas and liver were invaded also.

*Case 2.*—A female aged thirty-nine from Efik admitted to the Calabar hospital with a complaint of "Dysmenorrhoea which commenced one year ago followed by amenorrhoea and abdominal pain with pain on micturition and defaecation". Examination disclosed a suspicious ulceration of the cervix and a large tumour in the pelvis apparently connected with the uterus and extending as high as the umbilicus. At the operation both ovaries were found to be the seat of large multilocular cysts; a diverticulum from the left cyst filled the recto-uterine pouch and pressed on the rectum. After removal of the ovaries and while separating the bladder off the uterus in front preparatory to



a hysterectomy it was found that the uterus was implicated by a growth which had invaded the bladder. The uterus was removed but complete extirpation of the disease was impossible.

Dr. Maples informed me that the woman died some months later. Section report—"The typical structure of a solid alveolar carcinoma, cervical in origin. The tumour cells form solid alveolar masses often necrotic in the centre and the stroma is infiltrated with chronic inflammatory cells".

*Case 3.*—A male aged twenty-four from Eket admitted to the Calabar hospital with a complaint of "Swelling and pain in the left leg—duration one year".

On examination a hard growth was found to be arising from the anterior surface of the tibia in its upper third.

The groin glands of that side were enlarged and hard. The patient refused amputation but begged for something to be done—an exploratory operation denied the possibility of removal.

Section report—"The structure of a periosteal osteogenic sarcoma—round cell in type with only slight evidence of osteogenesis".

*Case 4 (with photograph).*—A male aged fourteen from Kano Province admitted to Kano hospital with a complaint of "Swelling on the left side of the face associated with pain—duration five years".

On examination a tumour was seen to bulge the left cheek and to extend from the anterior margin of the left ear to half an inch from the angle of the mouth and from the outer canthus of the left eye to the angle of the lower jaw.

It showed several bosses on its surface and a depression in the centre, it was hard in some places, soft in others. At the operation it was found to be attached to the fascia over the masseter and buccinator muscles. On removal it was seen to be a compound cystic tumour, the cysts containing a dark turbid fluid.

Section report—"The structure of a basal celled epithelial growth which has arisen probably from the skin glands of the cheek. Such tumours form acini and cysts and have the same malignancy as the basal celled tumours of the epidermis—the rodent ulcers, but they are very infiltrative and may become malignant with metastases. They get various names such as "Syringo-cyst-adenoma", "Syringoma" or "Syringo-cyst-epithelioma". The Italians who have worked a good deal at times on these call them "Cylindroma of the superior maxilla".

*Case 5.*—A female aged twenty-five from Yola admitted to Kano hospital with a complaint of "Swelling of the right cheek and pain". The swelling had appeared five months ago and was steadily increasing.

On examination there appeared to be a growth arising in the right maxillary sinus which was bulging the cheek and the canine fossa region inside the mouth.

The growth was removed through an incision in the dentolabial sulcus, the lip being turned up; it was found to be encapsulated. Macroscopically the tumour was fibrous looking and reminded one of an enlarged prostate.

Section report—"The structure of an osteogenic fibrosarcoma. Such tumours are very infiltrative and are undoubtedly more malignant than the benign giant-celled tumours (myeloma)."

*Case 6.*—A female aged forty from Bida admitted to Kaduna hospital with a complaint of "A steadily increasing swelling of the right thigh of three months duration".

On examination a large swelling was seen to be present on the anterior surface of the middle third of the thigh.



It moved freely laterally but was fixed vertically. No glands were palpable in the groin.

At the operation the tumour was found to be infiltrating the sartorius and extensor muscles—it was necessary to remove the greater portion of these—a smaller mass was found underneath the main mass adherent to the periosteum, and was removed with the periosteum from the middle third of the anterior surface of the femur. The sections cut in the Kaduna laboratory showed a mixed celled sarcoma with giant cells scattered here and there through the tumour.

Few as these cases are they point to the fact that malignant disease is present throughout Nigeria and that these indigenous growths resemble in their pathology those of European origin.

Although we know that we see but a fraction of the tumours in natives yet the general consensus of opinion is that malignant disease especially carcinoma does not occur to anything like the same extent as in Europe. Again, from my own limited experience and from conversations with other Medical Officers I should put the incidence of malignant disease higher in Southern than in Northern Nigeria.

#### DR. W. R. PARKINSON—SPECIALIST SURGEON.

##### LARGE LIPOMA OF SHOULDER.

There is little of interest in this except the size of the lipoma. It weighed twenty pounds and had begun to ulcerate at its most dependant point before the patient sought relief.

The patient L.F.O., a native of Lagos was admitted for operation and went out the next day.

A tourniquet was used as the bleeding is very profuse in some large lipomata and a previous case had suffered very seriously from shock. The photographs show the condition before and after the operation. (Fig. 7).

#### DRS. AITKEN, CONNALL, GRAY AND SMITH.

##### YELLOW FEVER IN LAGOS, 1925.

##### CLINICAL AND PATHOLOGICAL NOTES.

In this analysis of the recent outbreak of yellow fever in Lagos we include those cases definitely diagnosed as such, together with certain cases which were under observation as "suspected" but were not definitely diagnosed as yellow fever.

We would express our indebtedness to Dr. Beeuwkes of the Rockefeller Yellow Fever Commission for his assistance in obtaining serological tests in certain of the cases.

In all seventeen cases are included in the two groups:—

A.—Cases diagnosed Y.F.—twelve. Of these five recovered and seven died.

B.—Cases not definitely diagnosed—five, all recovered.

Table I gives a list of the cases in chronological order. Cases 1 and 2 occurred in members of the crew of the same ship. Case 3 was the first in which a definite diagnosis of yellow fever was made and was shortly after followed by a group of acute cases. As regards the origin of the infection there is no evidence to suggest that infection might have been contracted outside Lagos with one exception (Case 5). This man had been absent from Lagos for a few weeks and returned to the same



quarters from which Case 3 had been removed to hospital two days previously. During his absence from Lagos and while he was in Ibadan a case of yellow fever occurred there. None of the other early cases had been away from Lagos for some weeks before the development of their illness. (See explanatory map at end of Report).

Detailed clinical notes, in some instances incomplete, are appended, and for reference the salient features are presented in tabular form (Tables II, III, IV).

Commenting on the clinical features of the cases, one would note the following as of interest:—

*Onset.*—Briefly the cases seen within the first twenty-four hours presented little which could be considered characteristic; suffusion of the face and injection of conjunctivæ were usually present but often not to a degree greater than as seen in a sharp attack of malaria. Prostration, usually considered a marked feature, was not always so at this early stage, even in cases which subsequently became severe and ended fatally. In the early stages the tongue frequently presented the appearances seen in malaria and otherwise was not characteristic.

*Vomiting* was frequent and severe from the beginning in all the fatal cases and in three of those which recovered. The earliest occurrence of "coffee-ground" vomit was on the third day (one recovery and one death).

*Backache*, which appears to have been a prominent feature in some outbreaks, was marked in one case only (8).

*Icterus* in two cases was limited to very slight icteric tinting (Cases 12, 13) and in the others—with one exception—did not develop further than a faint yellow colour. Epigastric tenderness was noted as severe in two fatal cases. In the other cases where its presence was noted it was not a prominent nor an early symptom and would be described more correctly as hepatic tenderness associated with the progressive hepatic enlargement which was observed to develop during the course of the illness in the majority of cases.

*Urine.*—This was diminished in amount in a varying degree up to almost complete suppression. Albuminuria was a marked feature in all except two cases; at first a mere haze, it rapidly increased in amount until in some it is noted as "equalling a quarter of the tube" (heat and acetic acid). The rapidity with which albuminuria developed from a faint haze into a heavy deposit on heating was remarkable—twelve hours sometimes. One would here note that the degree of albuminuria did not seem necessarily a measure of the severity of a particular case. Bile pigment was frequently present.

An interesting feature of Case 15 was the sudden appearance of a very large number of tube casts on the third day of illness (a specimen examined the previous day having shown only a few casts) followed by almost complete suppression.

*Convalescence* in all was relatively slow, the patient remaining weak and debilitated for a considerable time, in marked contrast to the rapid recovery usually seen in malaria.

#### RESUME OF INOCULATION AND TRANSMISSION EXPERIMENTS.

##### 1.—Attempts to isolate leptospira: thirteen cases.

(a) Dark field examination—negative.

(b) Culture examination—negative.

In the earlier cases the culture medium employed was prepared locally. In the later cases tubes of media prepared at the Rockefeller Institute (N.Y.) were employed.

##### 2.—Inoculation of guinea pigs: thirteen cases.

In no instance was a condition resembling yellow fever produced.



3.—Transmission experiments: five cases. *Stegomyia* were allowed to feed on patients, kept alive in test tubes and subsequently fed on guinea pigs. These experiments were carried out in one fatal case (Case 9) and in three recoveries (cases 10, 11, 12).

Results—negative.

Commenting on these results, one would note that in all cases except two the blood used for inoculation was withdrawn not later than the third day of illness. The guinea pigs employed were native bred, but young animals, such as Noguchi has found to be susceptible.

*Diagnosis.*—It will be noted that leptospira has not been found in any of the cases either in the blood during life, or in sections from the tissues in fatal cases.

A serological test has been obtained in cases 2, 11, 13, 14, 15: result—negative.

(Facilities for this test were not available during the early period of the outbreak and attempts to get in touch subsequently with a number of these patients have failed).

With regard to the fatal cases the clinical picture and post-mortem findings together leave little doubt as to the correctness of the diagnosis, and the appearance seen in stained sections of various organs are such as to confirm this.

The cases which recovered were of varying severity from one in which all the typical features including coffee-ground vomit were present (Case 10) to one in which the illness throughout was very mild (Case 12) and under ordinary circumstances would in all likelihood have been regarded as an attack of malaria. In all these cases the symptoms and physical signs present were essentially similar to those noted in the fatal cases, the difference being one of degree.

The cases classed as doubtful had many features in common with one another and with the foregoing group of cases—some disproportion between pulse and temperature, mild icterus with hepatic enlargement, gastric disturbance, nephritis.

The clinical resemblance between these cases suggests to us that they should be grouped together.

In the light of subsequent events the diagnosis of infectious jaundice suggested in the earlier cases (1 and 2) on account of the comparatively mild nature of the illness would appear to require revision.

Cases 13 and 14 occurring at a later stage of the epidemic and clinically very similar in character to the earlier cases were seen by one who has had a large experience of yellow fever in the Western Hemisphere and who found himself unable to agree with a diagnosis of yellow fever, the picture presented differing in some respects from that which he has been accustomed to associate with that disease.

Malaria presenting rather unusual features may be excluded in our opinion; in the early cases from the lack of response to quinine in adequate doses, in the later ones from the continued negative blood reports and the recovery without the exhibition of quinine.

Two points have appeared to us as important in distinguishing these cases in their early stages from cases of malaria in which parasites are not found on blood examination.

- (1) Prominence and persistence of nausea and vomiting.
- (2) The early development of albuminuria rapidly attaining a high degree.



The differentiation between infectious jaundice and yellow fever on clinical grounds alone is admittedly very difficult, in some cases impossible; further the occurrence of the former condition in West Africa still lacks proof.

In spite of the absence of laboratory proof on clinical and epidemiological grounds we suggest that these cases should all be regarded as yellow fever.

TABLE I.

Case.	Name.	Department and Residence.	Date of admission to Hospital.	Diagnosis.	Result.
1	Lydamore ...	Marine, s.s. <i>Hercules</i> .	2nd April, 1925	? Epidemic Jaundice ? Carbolie acid poisoning	Recovery.
2	Marshall ...	Marine s.s. <i>Hercules</i>	12th " "	? Epidemic Jaundice	"
3	WN. ...	P.W.D., 34 Broad Street	23rd " "	Yellow Fever ...	Died.
4	GB. ...	A. W. & Co., (Apapa)	23rd " "	Acute Nephritis P.M. Y.F.	"
5	MN. ...	P.W.D., 34 Broad Street	30th " "	Yellow Fever ...	"
6	Gresham ...	A. W. & Co., (Apapa)	30th " "	" " ...	Recovery.
7	RT. ...	P.W.D., (Marina)	3rd May, "	" ? " ...	Died.
8	Mills ...	P.W.D., 34 Broad Street	3rd " "	" ? " ...	Recovery.
9	RG. ...	A. J. Tangalakis	18th " "	Yellow Fever ...	Died.
10	Kettlewell	W. A. Soap Co., (Apapa)	26th " "	" " ...	Recovery.
11	Young ...	<i>Sandgrouse</i> ...	28th " "	" " ...	"
12	Crockart ...	" ...	2nd June, "	" ? " ...	"
13	Gibson ...	<i>Atlas and Child</i>	10th July, "	" ? " ...	"
14	Brown ...	<i>Child</i> ...	12th " "	" ? " ...	"
15	S. by ...	African Hospital	13th " "	Yellow Fever ...	"
16	HL. ...	<i>Akabo</i> ...	1st Aug., "	" " ...	Died.
17	TL. ...	Lagos Stores, (Marina)	8th Sept., "	" " ...	"

## CASE 1.

## LYDAMORE: CLINICAL NOTES ON.

*Age twenty-nine. First tour, nine months.*

- 2.4.25—Admitted with fever, headache. Illness began night before admission: Urine, no albumin.
- 4.4.25—Vomiting: continued pyrexia: abdominal discomfort.
- 5.4.25—Abdominal discomfort more: vomiting: nothing abnormal in lungs or heart: liver not enlarged: spleen not felt: tongue furred but moist: urine, cloud of albumin.
- 7.4.25—Urine dark coloured: bile: almost solid with albumin.
- 9.4.25—Urine still dark green tinted: jaundice marked. Derivatives of carbolie acid found in urine.
- 10.4.25—Improvement.
- 17.4.25—Steady improvement: still some jaundice: urine, no albumin.

Note that throughout illness daily quantity of urine considerably diminished. ? Spirochaetal jaundice.

TABLE II. DEATHS.

[illegible]





TABLE II DEVCAR2

TABLE III. RECOVERIES.

Case No.	...	...	6	10	11	12	15
Age	...	...	41	21	48	35	32
Length of residence. Present tour	...	...	1st 6 months	1st tour 3½ months	several tours	several tours	1 month
Previous tour	...	...	...	...	...	...	...
<i>General Appearance.</i> (Suffusion of face) (injection conjunctivæ Icterus.	...	...	+	+	+	...	+
sclerae	...	...	6th day	4th day	4th day	4th day	...
general	...	...	7th day	6th day	6th day	...	4th day
<i>Digestive system.</i> Tongue (early stage)	...	...	...	coated	coated	moist-coated	small dry
Epigastric tenderness	...	...	present	present	present	present	brownish
Nausea	...	...	present	present	present	slight	...
Vomiting.	...	...	...	...	...	...	...
(a) occurrence	...	...	slight	persistent bilious	slight	slight	present
(b) character	...	...	bilious	coffee ground 3rd day	bilious	bilious	slight
Hepatic enlargement. (development of)	...	...	+	+	+	+	...
<i>Pulse Temperature.</i> (disproportion) Pyrexia (duration of)	...	...	marked	2-5 days	3-5 days	2-3 days	2-3 & 6-8 days.
	...	...	8 days	18 days	7 days	5 days	13 days
<i>Urine.</i>	...	...	diminished	marked diminution	marked diminution	marked diminution	very marked
amount	...	...	4th day	1st day	2nd day	2nd day	1st day
albuminuria when noted	...	...	+	+	+	+	+
degree	...	...	13th day	18th day	17th day	11th day	+
when disappeared	...	...	...	...	...	...	+
blood	...	...	...	...	...	...	+
casts	...	...	...	...	...	...	+
bile	...	...	+	+	+	+	+
<i>Haemorrhages</i>	...	...	...	...	...	...	...
	...	...	...	...	...	...	vaginal
	...	...	...	...	...	...	(Inter Menstrual)
<i>Blood.</i>	...	...	...	...	...	...	...
Parasites	...	...	...	...	...	...	...
Leucocytes	...	...	...	...	...	...	16,000
Polymorphs	...	...	...	...	...	...	86%
Pfeiffer reaction...	...	...	...	negative	negative	...	negative





TABLE IV. DOUBTFUL CASES.

Case No.	1	2	8	13	14
Age	29	38	50	49	36
Length of residence. Present tour ... Previous tour ...	1st tour 9 months ...	2nd tour 11 months 18 months	some years ...	10 months 6 years	3 weeks 13 months
<i>General Appearance:</i> (Suffusion of face) (injection conjunctivæ) Icterus ... scleræ ... general ...	... ... ... ... ? 9th day	... ... ... 2nd day 4th day	+ ... ... ... 5th day	+ ... ... 3rd day 8th day	+ ... ... 4th day 20th day
<i>Digestive system.</i> Tongue (early stage) Epigastric tenderness Nausea ... Vomiting ... (a) occurrence ... (b) character ... Hepatic enlargement (development of) ...	... present present severe and persistent bilious ...	coated ... present severe and persistent bilious ...	large flabby present none none ... +	coated ... present ... slight ... +	dry coated ... present present slight ... +
<i>Pulse Temperature.</i> (Disproportion) Pyrexia (duration of) ...	3-5 days 12 days	present 12 days	? 4 day 8 days	2-3 days 6 days	2-4 days 6 days
<i>Urine.</i> Amount ... Albuminuria when noted Degree ... When disappeared ... Blood ... Casts ... Bile ...	diminished 5th day + 16th day ... + +	diminished 1st day + ? 34th day ... + (granular) + +	diminished 2nd day + slight persisted + (granular) +	considerable diminution 1st day + 14th day ... + (granular) +	marked diminution 2nd day + 13th day ... + hyaline granular +
<i>Hæmorrhages</i> ...	...	gums	...	...	...
<i>Blood.</i> Parasites ... Leucocytes ... Polymorphs ... Pfeiffer ...	... ... ... ...	... ... ... negative	... ... ... ..	... 4,400 65% negative	... 4,800 79% negative





## CASE 2.

## MARSHALL—CLINICAL NOTES ON.

*Age thirty-eight. Second tour. Eleven months.*

- 12.4.25—Admitted with pyrexial attack, onset with rigor previous evening: vomiting. Temperature 102. Tongue coated: chest nil: no notable splenic enlargement.
- 13.4.25—Repeated sickness: conjunctivæ icteric: urine dark in colour, bile.
- 14.4.25—Albumin abundant. Bowels loose, stool lightish, offensive, urine, a few granular casts.
- 15.4.25—Sickness less troublesome: continued pyrexia, pulse slow: general icteric tint: urine, bile, abundant albumin.
- 17.4.25—Steady improvement: still some jaundice: urine, no albumin. derivatives from urine (*note* Lydamore from same ship): Lethargic: cessation of vomiting.
- 19.4.25—Urine: granular casts: blood cells.
- 20.4.25—Condition much the same with more marked icterus: general lethargy. Chest few rhonchi right base.
- 24.4.25—Gradual subsidence of temperature with general improvement: urine still a cloud of albumin but diminished: daily output of urine, at first much diminished, now increasing.
- 1.5.25—Improvement continues: gradual disappearance of icterus.
- 15.5.25—Urine, no albumin.

Agglutination test positive to paratyphoid C.

- 22.5.25—Invalided: condition satisfactory although he remains slightly anæmic.

Attempts to culture the organism and transmit the disease to guinea pigs.

- 20.4.25—15 c.c. of blood were drawn. 5 c.c. inoculated into each of two guinea pigs and remaining 5 c.c. were cultured.  
Results: Culture contaminated and guinea pigs remained normal.

## CASE 3.

## WN.—CLINICAL NOTES ON.

*Age twenty-five. First tour. Five months.*

- 23.4.25—Admitted with pyrexial attack, onset late previous evening with headache, vomiting.  
On admission: Tongue flabby, coated: no notable suffusion or injection of conjunctivæ: chest nil: abdomen, slight splenic enlargement (palpable). Urine, no albumin.
- 27.4.25—Continued pyrexia: persistent sickness, vomitus bilious: complaint epigastric discomfort.
- 29.4.25—Continued pyrexia. Icteric tint of conjunctivæ marked, and slight general icterus noted: no increased enlargement of spleen: slight hepatic enlargement noted: urine contains bile, heavy cloud of albumin: general lethargy. Vomiting less frequent, but dark in colour.
- 1.5.25—Epistaxis several times yesterday: several prolonged attacks of hiccough: some petechial spots on neck and chest with blotchy condition (as if bruising) about neck.
- 3.5.25—Died.



## Post-mortem Record :

Died 3.5.25, 5.40 a.m.

P.M., 3.5.25, 10 a.m.

Some hypostatic congestion. A few gross petechiæ on the forehead and chest. General lemon yellow tint of entire body. Nutrition and development poor. Rigor mortis present. General nervous system: not examined.

Chest: No abnormality except old adhesions right pleura. No petechiæ, no congestion, no excess of fluid.

Peritoneum: No excess of fluid, no petechiæ.

Stomach: Submucous hæmorrhage scattered over whole extent but most marked at cardiac end and greater curvature. Contents coffee-ground material.

Liver: Enlarged, greyish-yellow appearance, firm.

Gall-bladder: Considerable amount of bile.

Pancreas: Nothing noteworthy.

Spleen: Not enlarged but greatly congested.

Kidneys: Acute congestion both.

Bladder: No hæmorrhage.

Smears of spleen, liver and kidneys show no parasites.

Post-mortem findings in accord with a diagnosis of yellow fever during life.

## Histological Examination :

Liver: Outline of lobules indistinct and trabecular arrangement distorted or lost. Cells granular, vacuolated and necrotic. Where outlines of the lobules can be made out cells at the periphery show relatively less degeneration than those of the inner zones. Nuclei of peripheral cells are large with some mitotic figures. Many nuclei especially those of the middle and inner zones have disappeared. Some lymphocytic infiltration about the bile ducts. There is a fairly profuse deposit of yellowish pigment especially towards the centres of the lobules.

Kidney: There is a marked congestion of the entire organ all vessels being distended and with minute hæmorrhages between the tubules. Vessels of the Malpighian tufts distended with blood. The most striking feature is the swelling and cloudy appearance of the cells of the convoluted tubules—high type epithelium. The nuclei of these cells appear fairly normal. The process here appears more diffuse but less advanced than in the case of GB.

The tubules are not especially distended, but contain a granular material.

Although no fat stains were made the liver cells and the kidney parenchyma appear distinctly fatty.

Tissues stained by Levaditi's method negative for organisms.

Attempt to transmit the disease to guinea pigs and to identify the causative organism.

29.4.25:—

A.—20 c.c. of blood were withdrawn.

5 c.c. were injected into each of two guinea pigs.

Result: no reaction and both pigs remain healthy.



B.—10 c.c. were triple centrifuged and the final sediment was examined under dark field and also stained.  
Result: no leptospira seen.

#### CASE 4.

##### GB.—CLINICAL NOTES ON.

*Age fifty. Second tour five weeks. First tour thirteen months.*

23.4.25—Illness began? Previous day, headache, vomiting, slight temperature.

On admission drowsy: tongue dry, red, small: T.103. P.60. Suffusion face, injection of conjunctivæ with very slight icteric tint. Chest, nil: Abdomen—slight splenic enlargement. Blood smear, no parasites.

24.4.25—General condition remains much the same: does not seem quite so drowsy and lethargic: no general icterus. Had several severe and prolonged attacks of hiccough yesterday. Slight bleeding from gums. No urine passed since admission.

Later: sudden severe convulsive seizure with coma: death.

##### Post-mortem Findings:

No petechiæ. Subcutaneous and other tissues were not definitely yellow. Gums filthy but pale and there was no evidence of bleeding.

Lungs and heart showed no special change and there were no hæmorrhagic foci.

Liver: considerably enlarged and yellow in colour but not uniformly so, the appearance being rather patchy-yellow and brownish-red. It was very definitely fatty.

Stomach: contained no bloody fluid and the mucosa was not injected or congested.

Kidneys: approximately normal in size but very markedly congested.

##### Histological Examination:

Liver: Disorganisation of the liver structure, the lobules being difficult to outline and the trabecular arrangement can still be made out, some nuclei are intact and fairly normal. The great majority of the cells, however, show various stages of degeneration up to complete necrosis. Some cells are distended with vacuoles. Nuclei are pale and a large proportion of them have disappeared. Cells in the middle and the central zones show what appears to be large fat droplets.

There is moderate round celled infiltration in Glisson's capsule. There is a large deposit of brown pigment especially in the middle and central zones.

Kidneys: Malpighian tufts show little change. There is a marked swelling of the cells of the convoluted tubules the protoplasm being granular and many of the nuclei staining very poorly. Considerable amount of œdema and some hæmorrhage between the tubules. Lumina contain a large amount of granular and some colloid material. The tubules near the tufts show somewhat less change than those at a distance from the same.



## CASE 5.

## MN.—CLINICAL NOTES ON.

*Age twenty-nine. First four five and a half months.*

- 30.4.25—Complaint, headache and shivering, yesterday evening general malaise but not feeling particularly ill. T. 100.6. P. 90. Tongue coated. Chest nil: abdomen, lower pole of spleen palpable: urine, no albumin. Blood smear, no parasites.
- 2.5.25—Continued pyrexia and persistent sickness. No marked conjunctival injection.
- 3.5.25—Urine, abundant albumin: slight bile tinge. ? slight icterus.
- 4.5.25—Has vomited altered blood: icterus definite, a few scattered petechiæ over the trunk. Complaint of epigastric discomfort: hepatic enlargement appreciable.
- 5.5.25—As last note but pulse becoming rapid and weak: coma: death. Died at 6 p.m. 5.5.25.

Post-mortem at 8 a.m. 6.5.25.

Some hypostatic congestion. Petechiæ on chest and abdomen. General yellow tint of entire body. Rigor mortis present. Nutrition and development good. Central nervous system, not examined.

Chest: only abnormality a few petechiæ on parietal pleura.

Peritoneum: No petechiæ and no excess of fluid.

Stomach: Extensive hæmorrhagic erosion occupying the main portion of the stomach except for a small area at the cardiac end: contents: coffee-ground material.

Liver: slightly enlarged, distinct yellowish colour in spite of some congestion. Firm consistence.

Gall-bladder: a fair quantity of dark fluid bile.

Spleen: not enlarged, but deeply congested and firm.

Kidneys: both deeply congested and with a yellowish tinge.

Bladder: dark bile-stained urine and some petechiæ.

Smears: No parasites in smears from spleen, liver or kidneys.

Post-mortem findings in accord with diagnosis of yellow fever made during life.

#### Histological Examination:

Liver: marked destruction of the liver structure, the outline of the lobules and trabeculæ being almost completely lost. Some few cells about persisting bile ducts in relatively good condition, but granular and with many vacuoles, and with giant nuclei. Marked lymphocytic infiltration about Glisson's capsule, and some proliferation of the bile ducts. A considerable amount of fine black pigment more or less generally deposited.

Kidneys: Malpighian tufts swollen, and with marked increase in nucleation due to proliferation of the endothelial cells. Convoluted tubules show great swelling of the cells about occluding the lumen in places. Nuclei are generally in good condition, but some of them have disappeared. Moderate general œdema.

Special fat stains were not prepared, but the picture indicates a marked fatty change.

Sections stained by Levaditi's method failed to show leptospira.



Attempt to transmit the disease to guinea pigs and to identify the causative organism.

1.5.25—20 c.c. of blood were withdrawn.

A.—5 c.c. injected into each of two guinea pigs.

Result: no reaction and both pigs remain healthy.

B.—10 c.c. were triple centrifuged and the final sediment was examined under dark field and also stained.

Result: no leptospira seen.

#### CASE 6.

##### GRESHAM—CLINICAL NOTES ON.

*Age forty-one. First tour six months.*

1.5.25—Admitted last night with pyrexial attack which commenced same evening: severe headache. T. 102.4.

Pulse 80: chest nil: abdomen? slight splenic enlargement: urine nil.

2.5.25—Vomiting slight, bilious: continuance of pyrexia.

3.5.25—Urine now contains slight haze of albumin.

4.5.25—Still pyrexia: pulse marked slow, 50: no icterus but conjunctivæ congested: hepatic enlargement distinct, and discomfort in this region: urine, abundant albumin.

5.5.25—Now very slight conjunctival icterus.

6.5.25—Slight general icterus: urine dark in colour, bile, albumin heavy cloud. Pulse and temperature as before.

7.5.25—Still much albumin: right kidney large and moveable: comes well down, slips up between hands. Hepatic enlargement marked.

8.5.25—Much better.

11.5.25—No albumin.

22.5.25—Invalided.

The development during the illness of a palpable degree of enlargement of the right kidney is of interest.

Attempt to transmit the disease to guinea pigs and to identify the causative organism.

2.5.25—20 c.c. of blood were drawn.

A.—5 c.c. injected into each of two guinea pigs.

Result: no reaction and both pigs remain healthy.

B.—10 c.c. were triple centrifuged and the final sediment was examined under dark field and also stained.

Result: no leptospira seen.

#### CASE 7.

##### RT.—CLINICAL NOTES ON.

*Age thirty. First tour one month.*

3.5.25—Onset of pyrexial attack on evening of 1.5.25, with headache, backache: profuse perspiration subsequently. On admission, suffusion of face, conjunctival injection. T. 103.4. Pulse 92: Chest, scattered rhonchi: abdomen, spleen slightly enlarged, no hepatic enlargement: urine—albumin, thick haze. Blood smear: no parasites.



- 5.5.25—Seems much worse: conjunctivæ injected, slight icterus: continued pyrexia with slow pulse: attacks of severe hiccough: vomited altered blood.
- 6.5.25—Much hiccough, coffee-ground vomit since last note: urine plentiful and not much albumin: jaundice marked. Petechial hæmorrhages neck and body: very restless.
- 7.5.25—Unconscious: died.

Post-mortem (two hours later).

Petechiæ on skin of chest: marked post-mortem staining: little if any icterus: rigor mortis present.

Central nervous system: not examined.

Heart: few petechiæ on visceral pericardium.

Lungs: dense adhesions right pleura: some petechiæ on left pleura.

Peritoneum: no petechiæ and no free fluid.

Stomach: nearly full of coffee-ground material: hæmorrhagic erosions general, mainly linear, but more where lines cross and meet.

Duodenum: first part eroded but not so markedly as in the stomach.

Liver: somewhat enlarged, yellow and firm.

Gall-bladder: contains fluid bile.

Spleen: not enlarged but deeply congested.

Kidneys: congested and yellow.

Bladder: dark bilious urine: some petechiæ on mucosa.

Smears of liver spleen and kidneys negative.

Signs noted post-mortem in accord with diagnosis of yellow fever during life.

#### Histological Examination:

Liver: more or less complete destruction of the liver cells many of the lobules cannot be made out and all trabeculæ are markedly distorted. Cells about the periphery of the lobules are in some cases in relatively better condition than those in the middle and inner zones, but even these are markedly granular and vacuolated and with poorly staining nuclei. Marked lymphocytic infiltration about the bile ducts, and considerable hæmorrhage throughout the lobules. Pigmentation diffuse.

Kidney: the capillary tufts are swollen and there is some hæmorrhage between the tubules. The cells of the convoluted tubules are swollen and more or less granular. The nuclei are as a rule quite well preserved, but some cells are broken down, and the nuclei have disappeared. Most of the tubules contain a granular debris.

No fat stains were made but there is evidently a marked fatty change.

Sections stained by the Levaditi's method negative for the leptospira.

Attempt to transmit the disease to guinea pigs and to identify the causative organism.

- 4.5.25—20 c.c. blood withdrawn.

A.—5 c.c. injected into each of two guinea pigs.

Result: no reaction and both pigs remain healthy.

B.—10 c.c. triple centrifuged and the final sediment examined under dark field and also stained.

Result: no leptospira seen.

## CASE 8.

A. G. MILLS—CLINICAL NOTES ON.

*Age fifty. Several tours.*

3.5.25—Onset of fever with rigor previous evening, feeling of nausea, no vomiting: severe backache. T. 99.8. P. 92. Tongue, large flabby.

Spleen: palpable; no hepatic enlargement.

Urine: faint haze of albumin.

Blood smear: no parasites.

4.5.25—Slight pyrexia continues: no notable suffusion of face or injection of conjunctivæ: complaint of severe backache: no vomiting

6.5.25—Very little jaundice if any: tongue remains furred and swollen: urine, heavy cloud of albumin.

Secretion diminished.

8.5.25—Appears very much better: urine granular casts, red blood cells.

9.5.25—Marked jaundice. Complains of abdominal discomfort: definite hepatic enlargement.

11.5.25—Subsidence pyrexia.

16.5.25—Progress satisfactory: jaundice less: albumin less.

22.5.25—Invalided.

## CASE 9.

R. G.—CLINICAL NOTES ON.

*Age twenty-one. First tour six months.*

18.5.25—Admitted with pyrexia, headache, vomiting. Illness commenced on morning of 16.5.25.

On admission (about twenty-eight hours after onset):—T. 103. Pulse 100.

Patient drowsy and lethargic. Tongue dry, red: lips dry, sordes. Skin generally, dry: slight suffusion of face, injection of conjunctivæ. Chest, nil: abdomen, nil, except splenic enlargement (palpable).

Urine: high coloured, heavy cloud of albumin.

Blood: no parasites.

19.5.25—Slight repeated bleeding from gums yesterday and in evening typical dark vomit—once.

To-day definite conjunctival icterus: also over body generally—faint but definite. Marked restlessness.

20.5.25—Melaena noted yesterday evening. Icterus definite.

Pulse weak and rapid: fall of temperature. Died.

Post-mortem (three hours later).

General orange-yellow tint of skin: some lividity: no petechiæ seen: general nutrition and development good: rigor mortis present.

Central nervous system: not examined.

Heart: slightly pale, no petechiæ.

Lungs: normal, no petechiæ.



Stomach: contents coffee-ground material: general dull red tint of mucosa with scattered areas of hæmorrhagic erosion.

Small intestine: duodenum and part of jejunum—pink tint but no erosion.

Liver: somewhat enlarged, yellow in colour and oozing blood profusely when cut.

Gall-bladder: distended with bile.

Spleen: distinctly enlarged and deeply congested.

Kidneys: both acutely congested with yellowish tinge.

Bladder: dark urine, no hæmorrhage.

Smear: no parasites seen in smears of kidney, liver or spleen.

The post-mortem appearances were in accord with a diagnosis of yellow fever made during life.

#### Histological Examination:

Liver: there is relatively less change in this than in any other case in the series.

The outlines of the lobules and the trabecular arrangement can be made out fairly well. The hepatic cells show swelling and appear granular and there is some vacuolation; the nuclei are fairly well preserved. There is moderate lymphocytic infiltration, and also some evidence of increased connective tissue about the hepatic ducts and vessels.

Kidneys: considerable congestion. Malpighian tufts are swollen and with hæmorrhage into the glomerular spaces, and the tufts, so that these practically fill the capsule. There is also marked proliferation of the endothelial cells. The tubules are distended by a great amount of albuminous material and some blood, and the epithelium which is of a low type appears to be compressed. The nuclei of the epithelial cells appear fairly normal.

Fat stains were not prepared but there appears to be a considerable amount in fine droplets especially in the liver.

Tissues stained by the Levaditi method fail to show the leptospira.

Attempts to isolate the *Leptospira Icteroides*.

19.5.25—20 c.c. blood drawn.

10 c.c. in citrate brought back to laboratory by Dr. Connal and used to inoculate twenty-two tubes of Noguchi culture medium prepared by him.

Result: tubes examined May 23 and 28 were all negative, some showing contamination and others remaining sterile.

5 c.c. blood inoculated into each of two guinea pigs. May 23, one pig died without any symptoms of yellow fever. Liver and kidney ground up and examined. No leptospira seen.

May 25, second pig died without symptoms of yellow fever.

Heat blood inoculated into a third pig which died on June 9.

Sections made of all showed nothing suggestive of yellow fever. One sub-inoculated guinea pig is still alive.

Mosquito Transmission Experiment:

- May 20—Three *S. fasciata* (female) were fed upon RG. by Dr. Connal and kept alive in an ordinary test tube.
- „ 21—All mosquitoes fed on single clean guinea pig.
- „ 22—All mosquitoes fed on single clean guinea pig.
- „ 23—One fed, others refused.
- „ 24—All three fed.
- „ 25—All three fed.
- „ 26—Two fed.
- „ 27—All refused.
- „ 28—One fed, one dying, one refused.
- „ 29—Both refused.
- „ 30—One fed, one refused.
- „ 31—One fed, one refused.
- June 1—One refused, one died.
- „ 2—Fed greedily.
- „ 3—Refused.
- „ 4—Fed.
- „ 5—Refused, etc.
- „ 11—Third mosquito died.
- All mosquitoes prepared for section.
- No apparent effect on guinea pig.

#### CASE 10.

##### KETTLEWELL—CLINICAL NOTES ON.

*Age twenty. First four three and a half months.*

26.5.25—Onset of illness yesterday evening. Headache, backache, nausea, no vomiting.

Condition on admission: T. 103. Pulse 104. Tongue coated, skin moist.

Chest: nil.

Abdomen: spleen slightly enlarged, not palpable.

Urine: distinct haze albumin.

Blood smear: no parasites.

27.5.25—Repeated vomiting: pyrexia continues.

28.5.25—Continued pyrexia. Pulse slower. T. 102.4. Pulse 72.

Marked injection conjunctivæ.

Repeated vomiting, at first bilious, now definitely dark brown.

During the night repeated stools very dark green in colour.

Spleen now palpable.

Complains epigastric discomfort and there has developed some hepatic enlargement: lower edge now palpable distinctly below costal margin.

Urine: clear, light colour, albumin.

Blood for inoculation and culture.



- 29.5.25—Pyrexia continued: general condition somewhat improved: sickness less. Faint icteric tinge conjunctivæ.
- 30.5.25—More definite icterus conjunctivæ.  
Hepatic enlargement. Lower edge three fingers below costal margin, general condition maintained, no further sickness.
- 31.5.25—Icterus over body generally, very slight. Urine, albumin—bile: sickness stopped.
- 1.6.25—Improvement maintained.
- 2.6.25—Recurrence pyrexia.  
Icterus conjunctivæ remains marked: nothing more than very slight over body generally.  
Development of number of dusky red papules over neck and shoulder. ? Septic.  
Complaint pain right side, small area of tenderness over seventh rib anterior axillary line ? periosteal or intramuscular.  
Urine: albumin, bile.
- 4.6.25—Continued pyrexia.  
Right sided parotitis noted.  
General condition maintained.  
Icterus definite over body generally.
- 5.6.25—Some improvement general condition.  
Parotid swelling.  
Swelling noted above over rib more definite, slightly tender: now seems connected with muscle.
- 6.6.25—Urine, still bile tinged.  
Albumin present but much diminished.
- 8.6.25—Slight diminution parotid swelling.  
Swelling over rib increased considerably.  
Urine faint bile albumin haze only.
- 10.6.25—Icterus disappeared but for some staining of conjunctivæ.  
General condition improved: parotid swelling less; increase of swelling over rib: fluctuant.
- 11.6.25—Complaint pain inner side left elbow: fullness here in triceps, joint free: also pain back of left shoulder—posterior fold axilla.  
Local stovaine: incision over swelling—chest.  
Pus evacuated: no bare bone discovered.  
Inflammation would appear to have been intramuscular.  
Further progress uneventful.  
Blood for Pfeiffer reaction.
- May 28—Attempts to culture leptospira icteroides.  
10 c.c. blood withdrawn on this date and twelve tubes of Noguchi culture medium prepared by Dr. Connal were inoculated with amounts varying between .2 and 2 c.c.  
Some of the tubes became contaminated but the majority showed no growth and were negative for leptospira.  
5 c.c. of blood were inoculated into each of two guinea pigs.  
No reaction and pigs remained healthy.

## Mosquito Transmission Experiments.

## A.

May 28—Three *stegomyia fasciata* caught in the bedroom of this patient, placed in a dry test tube were fed on a single clean guinea pig.

„ 29—Two mosquitoes fed : one died (prepared for section).

„ 30—Both remaining mosquitoes fed greedily.

„ 31—Both remaining mosquitoes fed greedily.

June 1—Both refused to feed.

„ 2—Both fed.

„ 3—One fed, one refused.

„ 4—Both refused.

„ 5—Both fed greedily.

„ 6—One fed. Both laid eggs in a dry tube.

„ 7—One fed, one refused.

„ 8—Both fed.

Same was continued till June 12 when second mosquito died.

July 30—Third mosquito is still living.

Guinea pig perfectly well.

## B.

May 28—Four *stegomyia fasciata* were fed upon the patient. They were kept alive in a dry test tube and fed daily on a single clean guinea pig.

June 8—First mosquito died.

„ 10—Second mosquito died.

„ 12—Third mosquito died.

„ 22—Fourth mosquito died.

Guinea pig remains healthy having shown no reaction at any time.

## CASE 11.

## YOUNG—CLINICAL NOTES ON.

*Age forty-eight. Several tours.*

28.5.25—Had attack of illness a week ago, headache, sickness. ? Fever. Further similar attack commenced yesterday afternoon, headache, backache, etc., nausea but no vomiting.

Condition on admission: T. 103. Pulse 100, extensive prickly heat. Some injection conjunctivæ. Tongue moist coated.

Chest nil.

Abdomen spleen, palpable. Liver ? slight enlargement.

Urine: bile, considerable albumin.

Blood: no parasites.

30.5.25—Pyrexia continues, feeling of nausea, vomited, nil characteristic.

Icterus conjunctivæ.

Urine: albumin bile.

Hepatic enlargement definite, slight tenderness.



- 31.5.25—Increased icterus conjunctivæ: very faint general icterus.  
Tongue coated.  
Nausea but very little vomiting and that not characteristic.  
Definite hepatic enlargement and tenderness.  
Continued pyrexia: Pulse slow.
- 1.6.25—Subsidence pyrexia: general condition remains fairly satisfactory: no sickness: icterus definite.
- 2.6.25—Subsidence pyrexia: general condition remains good.  
Urine: albumin, bile.
- 3.6.25—Increase in icterus conjunctivæ on body generally.
- 4.6.25—Marked increase icterus. Urine deeply bile tinged.  
Temperature subnormal: marked slowing of pulse.  
General condition remains satisfactory.
- 6.6.25—Inflammatory swelling left deltoid (site of injections) noted for two days. Urine: still dark, bile pigment.  
Albumin present but considerably diminished.
- 8.6.25—Condition satisfactory.  
Urine: bile, albumin less now, only haze.  
Diminution of hepatic enlargement.
- 10.6.25—Icterus disappeared except for slight staining conjunctivæ.
- 11.6.25—Albumin: very faint haze only, no bile tint.  
Large boil developed over buttock.  
Further progress uneventful.  
Blood taken for Pfeiffer reaction.  
Attempts to culture *Leptospira Icteroides*:
- 30.5.25—10 c.c. blood were drawn and twelve tubes of Noguchi culture medium prepared by Dr. Connal were inoculated with amounts varying from .2 to 2. c.c. Some tubes were contaminated but the remainder remained sterile, showed no growth and were negative for leptospira.  
5 c.c. blood inoculated into each of two guinea pigs.  
Result: no reaction and pigs remained healthy.  
Mosquito Transmission Experiment:
- 30.5.25—Three *Stegomyia* were fed upon Young by Dr. Connal. They were kept alive in a dry test tube and fed upon a single clean guinea pig.
- 2.6.25—Two died. Remaining mosquito fed until 27.6.25 when it died.  
Result: Guinea pig remained alive and is still living.

#### CASE 12.

##### CROCKART—CLINICAL NOTES ON.

*Age thirty-five. Several tours.*

- 2.6.25—Admitted with pyrexial attack.  
Abrupt onset early morning, shivering, headache, vomited once.  
Condition on admission: T. 102.4: Pulse 106.  
Tongue, moist furred: no noteworthy conjunctival condition.

Chest : nil.

Abdomen : no splenic enlargement, hepatic dullness normal.

Blood : no parasites.

Urine : no albumin.

3.6.25—Condition remains much the same : slight sickness, not characteristic.

Slight conjunctival injection.

Urine : faint haze albumin.

4.6.25—Continued pyrexia. Pulse slow.

Urine last night contained increased albumin : this morning again only very faint haze, bile tinged.

Slight discomfort noted on deep palpation under right costal margin.

5.6.25—Slight icterus conjunctivæ.

Slight hepatic enlargement.

Urine : definite haze albumin, bile.

Pyrexia continued. Tongue clean, dry, raw.

General condition : good. No sickness.

8.6.25—Subsidence pyrexia : urine, very faint albumin—no bile, heavy urate deposit, no further icterus.

Further progress uneventful.

Blood for Pfeiffer reaction taken.

Attempt to culture leptospira icteroides.

4.6.25—10 c.c. blood were drawn in afternoon and twelve tubes of Noguchi culture medium prepared by Dr. Connal were inoculated by him with amounts varying from .2 to 2 c.c.

Result : some of the tubes became contaminated, remainder showed no growth and were negative for leptospira.

5 c.c. blood inoculated into each of two guinea pigs.

Result : no reaction and pigs remained healthy.

Mosquito Transmission Experiment :

4.6.25—Seven *S. fasciata* fed on patient by Dr. Connal. They were kept alive in a dry test tube and fed daily on a single clean guinea pig.

10.6.25—Two died.

25.6.25—One died.

28.6.25—One died.

4.7.25—Two died.

6.7.25—One died.

All of the mosquitoes were prepared for section.

Result : the guinea pig has shown no symptoms of the disease and remains healthy, July 30th.



## CASE 13.

GIBSON, JAMES—CLINICAL NOTES ON.

10.7.25—Sudden onset of headache, backache, with shivering last evening, no vomiting.

(*Note*: came to Nigeria 1919. Fourth tour ten months).

*Condition on admission*: T. 100.4. Pulse 70: skin moist, had been perspiring freely.

Tongue: coated. Some injection conjunctivæ.

Chest: scattered rhonchi.

Abdomen: nil.

Urine: slight haze albumin.

Blood: no parasites; leucocytes 4400 { Polymorphs, 65%  
Lymphocytes, 32%  
Large monos, 3%.

12.7.25—Patient very drowsy, lethargic, but rational.

Slight conjunctival icterus.

Tongue: dry coated. (*Note*: presence of nasal obstruction).

Edentulous except for one or two stumps.

Urine: increased albumin, few granular casts, no blood.

Blood smear again negative for malaria.

Culture tubes of Noguchi media inoculated on this date.

13.7.25—Subsidence pyrexia but otherwise general condition much as before. Vomited.

14.7.25—Slight pyrexia again: no further sickness.

Liver edge palpable below costal margin, but no tenderness.

No general icterus, but slight increase in scleral icterus.

Urine: high coloured, slight bile tint, albumin considerably increased: microscopically numerous granular casts, no blood.

16.7.25—Gradual subsidence pyrexia and slowing of pulse.

Marked icterus conjunctivæ, no general icterus.

Hepatic enlargement: no tenderness.

Urine: secretion free, gradual deepening of colour (bile): albumin, marked increase (forms a sediment equal of one-fourth of tube).

17.7.25—Patient remains drowsy and lethargic.

Iceterus: very slight tint over body generally.

Urine: dark coloured—(bile).

Considerable diminution in amount of secretion, albumin remains abundant (about one-fourth of tube).

*Note*: several small blood crusts for last two or three days about hair follicles of upper lip.

18.7.25—Very definite general icterus this morning.

Conjunctival tinting deeper.

Urine remains deeply bile tinged albumin.

Hepatic enlargement: (definite) still present but no tenderness.

19.7.25—Icterus more pronounced.

Urine slightly lighter: albumin less.

20.7.25—Icterus marked: urine still dark: albumin much less—cloud only (only a few granular casts in centrifugalised specimen).

22.7.25—Improving: icterus less: urine clearing, albumin haze only.

24.7.25—Icterus disappeared. Urine: no bile tint, no albumin.

29.7.25—Condition satisfactory.

No icterus. Hepatic enlargement subsided.

Blood withdrawn for Immunity test.

#### CASE 14.

BROWN, MR. J. A.—CLINICAL NOTES ON.

12.7.25—Ill thirty-six hours, headache, backache, no sickness.

One previous tour thirteen months with frequent attacks of malaria. Present tour three weeks.

*Condition on admission:* T. 102. Pulse 80.

Tongue coated (brownish white) dry: Edentulous.

Some conjunctival injection and suffusion of face.

Chest: nil.

Abdomen: spleen enlarged, palpable.

Liver not enlarged but slight tenderness on palpation under costal margin.

Urine: haze of albumin.

Blood: no malarial parasites (several examinations) Leucocytes 4800.

{	Polymorphs 79%.
	Lymphocytes 17%.
	Mononuclears 2%.
	Transitionals 1%.
	Eosinophiles 1%.

13.7.25—Nausea: vomited twice.

Urine: hyaline and finely granular casts numerous: no blood, albumin approximately  $\frac{1}{4}$ %.

14.7.25—Condition much as before.

Vomited once during night—curdled milk slightly green in colour.

Suggestion of icterus in conjunctivæ.

Liver: definite tenderness under costal margin especially in region of gall bladder.

Urine high coloured: increased albumin.

16.7.25—Gradual subsidence pyrexia and slowing of pulse.

Conjunctivæ: slight icterus.

Hepatic enlargement definite and uniformly tender.

Urine: secretion diminished in quantity, colour has deepened considerably (bile).

Albumin considerable but rather less than yesterday, a few casts.

17.7.25—Drowsy and lethargic.

Urine: marked diminution in quantity.



- 18.7.25—Seems better: no increased conjunctival tinting, no general icterus.  
 Liver still enlarged and tender.  
 Urine: colour lighter, albumin much less.  
 Increase in amount of secretion.
- 20.7.25—Condition much as at last note.
- 23.7.25—Urine: no albumin.
- 29.7.25—Pyrexial attack last two days.  
 Blood smear: malaria parasites (subtertian) (smear taken before quinine given).  
 To-day very marked conjunctival icterus.
- 30.7.25—General icterus: urine very deep bile tint, slight albumin. (Deposit examined microscopically—no blood).
- 1.8.25—Subsidence pyrexia, icterus fading, urine still deeply bile tinted: albumin very faint haze only.
- 3.8.25—Icterus almost gone.  
 Urine: light in colour, no albumin.  
 Hepatic enlargement less.  
 Blood taken for Pfeiffer reaction.

#### CASE 15.

S. . . .by—CLINICAL NOTES ON.

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- 14.7.25—Onset of illness evening of 12.7.25.  
 Felt shivery, general malaise, headache, and some abdominal discomfort: no vomiting.  
 (Note: first tour one month. Took quinine grs. V daily for some time then reduced to grs.  $2\frac{1}{2}$  and for several days before onset of illness none).  
 Admitted to hospital 13.7.25 having previously had quinine grs. V.; T. 104. Pulse 112. Tongue small dry slightly brownish.  
 Conjunctivæ: injected.  
 Chest: nil. Abdomen, nil.  
 Urine: definite haze albumin—no casts, no red cells (centrifugalised specimen).  
 Blood: no parasites: Leucocytes 16200 (Polymorphs 86%).
- 15.7.25—Continued high pyrexia, delirium.  
 Sickness during night.  
 Urine: striking diminution in amount of secretion: *large number* of casts (epithelial and large granular). Anti-icteroides serum 50 c.c. in two doses given intravenously.
- 16.7.25—Marked improvement in general condition: subsidence of temperature.  
 Mentally clearer: tongue moist, still coated.  
 Conjunctivæ: faint icterus.  
 Abdomen: nil.

Urine deeper in colour, albumin about the same: casts only very faint.

Secretion diminished markedly (impossible accurately estimate amount as some passed in bed).

17.7.25—Complaint of pain in chest yesterday evening, slight cough.

Examination showed coarse bubbling rales left sides.

Continued subsidence pyrexia and slowing of pulse.

Delirium: very slight conjunctival icterus.

Urine marked diminution in quantity: passed none since yesterday morning: subcutaneous saline glucose (5%) one pint, evening.

This morning four ounces urine by catheter: *small quantity albumin* ? casts.

Saline glucose (5%) 1 pint 9.30 a.m.

Saline glucose (5%) 1 pint 3.30 p.m.

18.7.25—Recrudescence pyrexia. Pulse remains good and not increased.

Urinary secretion re-established (large quantity in bed during night). Diminution in amount of albumin.

Specimen was examined, high coloured, no bile, albumin rather less.

Mental condition last three days one of intense excitement, constant muttering, restlessness.

This morning clearer and more inclined to rest.

Examined chest (front) few rhonchi left side.

Slight cough at times.

Stimulant expectorant mixture.

19.7.25—Continued pyrexia: pulse remains slow.

Still slight delirium but quieter and has slept.

Urinary secretion continues, slight albumin.

Note presence of slight vaginal hæmorrhage.

20.7.25—Has complained more of pain in chest and cough has been troublesome: no expectoration.

Examined: areas of deficient air entry posteriorly (patchy dullness with deficient R.M. and coarse scattered rales) particularly left side.

21.7.25—Last night some distress of respiration: examination of chest posteriorly shows condition as on last note but more marked.

This morning appears more comfortable.

22.7.25—Improved. Chest: no extension of physical signs, cough only slight.

29.7.25—Gradual and marked improvement since last note.

Gradual disappearance of physical signs in chest.

Slight expectoration on one or two occasions.

Examination: diplococci and streptococci.

Blood withdrawn for Immunity test.



5.8.25—Continued general improvement.

Physical signs on chest have entirely disappeared.

The physical signs on chest were regarded as of hypostatic origin and the subsequent progress of case appears to bear this out.

Blood has been taken for Pfeiffer reaction.

# CASE 16.

## HL.—CLINICAL NOTES ON.

Age fifty-three: not resident in Lagos but as Marine Engineer has been travelling to and from the Coast for thirty years.

Recent movements:—

Arrived with R.M.S. *Akabo* from Fernando Po, 20.7.25.

Ship alongside Customs wharf until 21.7.25.

Ship alongside Apapa wharf until 24.7.25.

Ship docked Apapa on 25.7.25.

Ship at buoys on 31.7.25.

Note on this date patient inspected the ship from the interior of Dry Dock.

*History of illness:* (obtained from Ship's Surgeon).

Commenced on 28.7.25 with headache, general malaise and aching, no particular backache; vomiting shortly after the onset of illness and this has been persistent (no reliable information as to characters of vomit); there has also been considerable epigastric pain. On 30.7.25 has extraction of a tooth which had been troubling him; this was accompanied by little bleeding but some eight hours later profuse hæmorrhage started and continued for six hours or thereby in spite of application of various styptics.

No blood smears were taken but quinine exhibited in the under-noted doses:—

28.7.25—grains 30 (by mouth and intramuscular).

29.7.25—grains 30 (intramuscular).

30.7.25—grains 30 (intramuscular).

31.7.25—none.

No urine examination made.

This patient was first seen on board *Akabo* in consultation with the ship's Surgeon late in the evening of 31.7.25 and was removed to hospital early the following morning.

Admission to hospital, 1.8.25.

There is very definite icterus generally over the body but most marked over the face and neck; marked scleral icterus with some œdema.

Tongue and gums are not informative as result of previous treatment; little or no bleeding from tooth socket at present.

Patient looks toxic; feeling of nausea and occasional hiccough.

Chest: few scattered rales.

Abdomen: no splenic enlargement; lower edge of liver palpable below costal margin in nipple line.

Urine: dark in colour (bile), heavy deposit of albumin.



Centrifuged specimen shows red blood cells, no casts.

Albumin  $\frac{1}{4}$  of urine (heat and acetic acid).

Urine positive for occult blood.

Blood : 1.8.25—Polymorphs 83.4%.

Lymphocytes 7%.

Large mononuclears 4%.

Eosinophiles 6%.

No parasites.

Later :—

Condition during the day remained much as on admission, no vomiting, slight recurrent hiccough, slight bleeding from gums at intervals, mental condition quite clear.

In evening (6.30) sudden coma with at onset general rigidity and conjugate deviation of eyes, stertor; coma gradually deepened and death at 8.15.

During this period bowels moved—large quantity of only slightly altered blood.

Result of Post-mortem examination. Aug. 2nd, 1925, 8.30 a.m. :

A large man, well developed and well preserved.

Exceedingly deep post-mortem lividity of all dependent parts, while above the livid area, the skin exhibits a lemon-yellow colour, most pronounced over the face, front of chest, and about the knees and feet but lighter over the abdomen and other parts.

This colour has become very much deeper since the death of the patient.

There are a few fine petechiæ over the front of the chest, and numerous very deep petechial spots over the shoulders and the interscapular area. The scleræ are yellow and oedematous.

There are no sordes about the lips.

Rigor mortis exceedingly marked.

The subcutaneous fat is deeply yellow, and the muscles appear darker than normal.

Heart : the pericardial fluid increased and of a greenish-yellow colour. The heart muscle and valves show no organic disease.

The lining of the valves and of the large vessels present a jaundiced appearance, and the colour of the heart muscle is distinctly darker than normal, and with a greenish tint. The heart blood is fluid and with little tendency to clotting.

Specimen taken for Pfeiffer reaction. The aorta shows a few atheromatous areas, and slight corrugations.

Lungs : large and not completely collapsed; crepitant throughout. No consolidated areas, but marked general congestion; the section of the organ being very hæmorrhagic and oedematous.

No increase in the pleural fluid and no adhesions.

Gastro-intestinal : the œsophagus is normal except for small granular masses which project slightly from the mucosa.

Stomach contains a pint of very dark, bloody material; and the mucosa is completely covered with a tenacious layer of bloody mucus.

Beginning at the cardia, and involving the mucosa of the entire stomach there is an extremely marked ecchymotic condition, with several small ulcerations at the lesser curvature, but without ulceration of the mucosa in general.



Duodenum: the process extends into the duodenum where the vessels are greatly congested, and the mucosa ecchymotic, and with small linear erosions capping the transverse folds of the second portion. The process stops short at the junction of the duodenum and jejunum.

The mucosa of the colon is dark in colour, and with diffusely scattered petechiæ.

Liver: the organ is considerably enlarged, friable, and of a mottled yellow colour (boxwood). There are definite and diffuse small hæmorrhages beneath the capsule.

The section bleeds freely and appears fatty.

Spleen: moderately enlarged and congested. The malpighian bodies stand out prominently.

Kidneys: large congested, lobular, and covered by a mass of fat which is difficult to separate from the capsule.

The capsule strips fairly readily.

The cut section bleeds freely. The cortex is rather swollen and the glomeruli are distinct.

Some uric acid deposit in the apex of the pyramids.

Pancreas and suprarenals are normal.

#### Histological Examination:

Liver: the lobules and trabecular arrangement are quite well preserved throughout most of the sections. The hepatic cells are granular and finely vacuolated, but destroyed only in limited areas, which are definitely hæmorrhagic. The cells beneath the capsule and about the periphery of lobules are relatively least affected. There is more or less diffuse hæmorrhage throughout the liver and marked infiltration about the portal tracts. Some of the hepatic cells are almost replaced by large vacuoles, probably fat. The bile capillaries between the liver cells are distended. There is diffuse pigmentation of the hepatic and Kupfer cells.

Kidneys: the malpighian tufts are contracted and there is little desquamation into the capsule. The convoluted tubules show low type epithelium and are separated by a delicate granular tissue. The contents of the tubules consist of a granular and a little colloid material. There are minute hæmorrhages between the tubules and all the capillaries are markedly distended.

Spleen: there is a marked congestion and extensive blood extravasation. Distension of sinuses is marked, plasma cells are numerous.

Heart: the heart muscle shows a distinct cloudy appearance.

Stomach: very marked distension of the blood vessels in the mucosa, and some superficial hæmorrhage.

Oesophagus: negative.

Duodenum: the lower third shows enormous congestion with hæmorrhage and exudate, which form on the surface almost a membrane. There is marked œdema and separation of the layers of the sub-mucous coat. Upper third shows similar but much less extensive change.

Small intestine: shows infiltration and œdema of the villi, which in places have become completely destroyed and replaced by exudate. The deeper parts of the glands are preserved.



## CASE 17.

## TL.—CLINICAL NOTES ON.

8.9.25—Admitted to hospital; took ill during the night, shivering, etc.

Seen at 11 a.m. to-day; temperature 103.4; pulse 98. Spleen and liver not palpable, no icterus; cough. Had played football previous day, sat down afterwards and was exposed to chill.

Seen again 5 p.m.; temperature 104.8; pulse 112; sent to hospital.

Has had several attacks of malaria.

Had quinine gr. 15 during the day, no vomiting.

On admission: tongue coated, no injection of conjunctivæ. No icterus. Chest negative: Spleen? Liver: negative.

Blood: negative for malarial parasites.

Urine: faint trace of albumin.

9.9.25—Temperature and pulse still up. Question of catarrhal injection of chest appears to be negated.

Spleen and liver not enlarged, no icterus.

10.9.25—Began vomiting in afternoon—bilious vomit. Whole clinical picture changed this morning, vomit became black, patient toxic, suffused and injected conjunctivæ: no icterus: chest negative: sighing respiration.

Blood negative for malarial parasites: leucocytes 7200 (polymorphs 85 *per cent.*; small lymphocytes 5 *per cent.*; large 5 *per cent.*; large mononuclears 5 *per cent.*).

Urine: deposit centrifuged shows large number of coarsely granular casts, no blood cells.

Albumin now very abundant. Vomit strongly positive for blood.

Was given Anti-Icteroides serum to-day 35 c.c. at noon and 15 c.c. at 7 p.m.

11.9.25—Very restless, violent delirium; distinct icterus of face and body: chest negative, liver enlarged. Serum 25 c.c. given to-day.

12.9.25—Continuance of delirium, black vomit and melæna.  
Died.

## AUTOPSY RECORD IN THE CASE OF TL.

Autopsy performed by Doctors Connal and Smith at the European Hospital, Lagos:—

Large and well developed man.

Rigor mortis marked.

Jaundice, a light lemon yellow tint, most marked on the face, the front of the chest and abdomen, and the arms, gradually shading away and finally disappearing over the forearms and legs. Dependent portions of the body livid, especially the head and trunk.

A few indefinite punctate petechiæ on the face.

Gums not bleeding, but show a line of congestion just above the tooth margin. Tongue stained black, and deeply congested over the dorsum.

The cartilages of the ribs are yellow, the abdominal fasciæ have a light tint of lemon, and the subcutaneous fat is quite yellow.



This is not noticeable in the general musculature.

Heart: normal in size and the valves and muscle show no abnormality. The external surface of the organ has a yellowish appearance, but this is more marked on the internal surface, especially about the valves and linings of the great vessels.

The pericardial fluid is not increased in amount.

Lungs: no pleural adhesions and no exudate.

The organs are congested and red, especially posteriorly. They are crepitant throughout, and there are no consolidated areas.

The cut section in the congested areas is markedly hæmorrhagic.

The mucous membrane of the trachea is also congested to a marked degree.

Gastro-intestinal: the stomach contains a considerable amount of typical coffee-grounds material.

The œsophagus is stained dark, and the mucous membrane is ecchymotic.

Fine profuse ecchymosis involves the entire gastric mucosa.

This is most marked at the cardiac end of the organ and the lesser curvature.

It shows a definite tendency to cap the rugæ, giving the appearance of red lines passing across the organ. There are no ulcerations.

This condition extends into the duodenum especially the second and third portions where it is more marked than in any part of the stomach. About the opening of the bile duct, the mucosa is intensely reddened for a considerable area, and gradually diminishing above and below, the process disappears at the end of the duodenum.

The intestines contain a black material.

Liver: slightly enlarged, of a mottled yellow colour anteriorly, and a reddish brown mottled yellow posteriorly. No fat droplets seen upon section and the tissue is not particularly friable. Cut section bleeds freely.

Spleen: of approximately twice normal size, deeply red, soft and very bloody on section. Malpighian bodies stand out distinctly.

Kidneys: one or two small petechiæ beneath the capsule.

Organs considerably enlarged and markedly congested. The capsule strips with some difficulty and carries away with it portions of the kidney parenchyma.

The cut section is very bloody and the parenchyma appears cloudy and swollen.

There are numerous hæmorrhagic areas in the pelvis of each kidney, and extending down into the ureters.

Trachea: the lymphoid nodules in the mucosa appear enlarged and the mucous membrane is ecchymotic in the lower third continuing into the bronchi. The brain was removed but except for moderate congestion of the vessels revealed no abnormality.

Present at Autopsy: Drs. Connal, Smith, Gray, Walcott, Beeuwkes and Mr. Bryant.

Fluids from the various organs were examined under the dark field for the leptospira, with negative results.

## APPENDIX E.

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REPORT OF THE TSETSE INVESTIGATION, 1925.

BY

DR. LLEWELLYN LYOID, D.SC.—Tsetse Investigator.





## REPORT OF THE TSETSE INVESTIGATION, 1925.

After Dr. J. W. B. Hanington left the Investigation at the end of February only one Investigator was at work till October when Dr. F. H. King arrived to take charge of sleeping sickness treatment. Dr. W. B. Johnson, who was attached to the Investigation during the first two and a half years of its existence, returned to it in November and is now definitely seconded for this work. Dr. P. H. Rawson who has had useful experience of tsetse work and sleeping sickness in Uganda, joined the working party in the following month. The Investigation is therefore now more strongly staffed than it has previously been.

The experimental work of the present year in the laboratory has consisted in the routine dissections of *G. morsitans* and *tachinoides* from various fly foci around Sherifuri. This is the third year of these dissections, more than 50,000 flies having been examined, and from the accumulated statistics it is possible to estimate the effect of conditions changed artificially or the influence of varying seasons on the tsetse.

The experimental field work has included :—

- I.—The fencing of a tsetse focus with the exclusion therefrom of game.
- II.—Attempts at controlled grass burning.
- III.—Clearing.

Treatment of sleeping sickness has been continued so far as possible.

## I.—THE FENCING EXPERIMENT.

The question of the advisability of game destruction in connection with the control of *G. morsitans* has long been a subject of controversy. The Committee appointed by the Colonial Office in 1913 to consider tsetse problems discussed a proposal for enclosing a tract of country some hundred miles in extent by a ring-fence of about forty miles in length and excluding from it the wild Ungulata in order to obtain indications of what would be the effect on *G. morsitans* of game destruction. It was obvious that the cost of such an experiment would be great and its organisation difficult while it was uncertain that it would yield a definite finding. The war intervening nothing was then done. Such an experiment has now been carried out at Sherifuri though not on the scale originally suggested as this would have been beyond the scope of the funds and organisation of the Investigation.

It was found impracticable to enclose an area which included any considerable tract of permanent water owing to the great inundations which would have submerged portions of the fence for several months of the year, and in any such scheme this would be a difficulty which would alone in most areas preclude the efficient fencing in of any considerable tract. A forest pool of about a mile in length, which contained almost permanent water, and the surrounding half square mile of country was enclosed by a wire fence three miles in length. For most of the year normally the area was heavily infested with *G. morsitans* and *tachinoides* both of which become scarce, though never wholly absent, at the end of the dry season. It was frequented by roan, smaller antelope and warthog, while lion, buffalo and Senegal hartebeeste visited it. There were numerous small animals in the area including porcupine, serval, civet and smaller cats. Water birds, geese of three species, pelicans, the marabou and other storks were often there in numbers. Monitor lizards and pythons were numerous there. Apart from the game there was thus present a large fauna which fencing should not disturb. The banks of the pool are clothed with heavy thicket and about half the enclosed area is heavy forest, the rest being mud plain or swamp. The area is skirted along one side for



several hundred yards by a much used main road and along the whole of another side by a native path. The local name for the pool means "Thieves' Water" as in the old days it was the resort of brigands who attacked the traffic passing between Hadeija and the south.

From our earlier study we thought that, except at one point, a burnt plain which surrounds the area and is comparatively free of tsetse in the dry season isolated the enclosed tract from other fly foci during these months. This supposed isolation proved less real than we had thought.

The wire selected for the fence was ordinary netting, five feet six inches high, of four inches mesh and fourteen gauge, provided with three selvages. It was attached to posts sunk two feet in the ground at five-foot intervals and the bottom of the wire was buried to a depth of three inches. As soon as the fence was of sufficient length to incommode animals it became evident that it was not strong enough, warthog and even duiker breaking through it, while roan stampeding one morning did damage that took a whole day to repair. It was therefore strengthened by a second run of the wire to half its height all round and this made it strong enough to deter the smaller Ungulates for the most part. It stood the rains well, a quarter of a mile length being inundated for several weeks to a depth of two or three feet.

In view of the vagueness as to what the original scheme would have cost the following may be of interest. The cost of the wire, rail transport for 700 miles, road transport 120 miles, labour of construction (an average of eighty labourers for two and a half months) totalled a little over £700 so that forty miles of fencing done in the same way would have cost between £9,000 and £10,000 and would have occupied 250 labourers ten months to complete. It is possible that a fence could be constructed more cheaply with local timber but the labour involved would be much greater and upkeep more difficult in country where termites abound while it is doubtful whether a timber fence would deter animals so effectively as one of wire.

At first the larger animals and pigs skirted the fence a good deal, a roan breaking in once and a hartebeeste once, the latter leaping the wire without marking it. In the second dry season these have kept away except that once a herd of warthog broke in and out again the same day. Unfortunately the smaller antelope are more difficult to deter and duiker have often attempted to burrow in. Porcupines which were satisfied to be neither in nor out have proved themselves the greatest nuisance since a burrow made under the fence by one of them gives a duiker a chance to slip inside. When duiker are thoroughly frightened they become extraordinarily secretive in their habits, lying up in thickets while beaters and dogs pass almost over them. The area has hardly ever been free from at least one of these animals. What such vitiating factors would have been if the area had been two hundred times as great may be imagined.

The effect of the removal of the game animals might show itself in the following ways:—reduction in the amount of fly; alteration in the blood taken, whether in quantity or type, *i.e.*, increase in the proportion of non-mammalian blood in diet or of human blood; mal-nutrition as evidenced by the lean condition of the flies; change in the female percentages in the catches of *morsitans*, increase being indicative of hunger; change in the infectivity of the flies. A full report on the experiment is in preparation and will be published in the Bulletin of Entomological Research, the following notes being a summary of the changes recorded.

(1) *G. tachinoides*.—The numbers were reduced, the density (number of flies caught per net per hour) becoming 21 to 24 as against an old density of about 50. The proportion of non-mammalian blood



in the diet (chiefly reptilian) remained the same, 53% of the blood taken. Blood that was almost certainly human increased in the flies from 1.3% to 2.8%, the actual increase in the proportion of this type of blood among all the mammal bloods of which the size could be recognised was from 24% to 34%. There was no real evidence of mal-nutrition, the proportion of well-nourished flies being 73% as against 75% in the neighbouring fly area, and in view of this a rise of from 4% to 10% in flies apparently starving cannot be considered of great importance. There was a slight increase in the female percentage. There was no notable change in the infectivity to domestic stock.

(2) *G. morsitans*.—The numbers were reduced, the density in the latter part of the first dry season after closing the fence being 11 as against 30 in a closely similar area studied as a control and in the whole of the second dry season 23 as against 41 in the control. The proportion of non-mammalian blood (all avian so far as could be determined) increased from 3.4 to 9.4% of the blood taken. Blood that was almost certainly human increased from 1.4 to 2.3%, the actual proportion of blood of this type among all the mammal bloods was from 12.4 to 17.1%. Evidence of mal-nutrition in the flies was very marked in the second dry season when game was keeping more at a distance. In the four months after the closing of the fence the proportion of starving flies among 1,196 examined was 14.2% as against 6% among 1,344 in the control area. In the second dry season this rose to 33.9% in 864 flies as against 8.8% in 806 flies from the control. In addition to this 27.5% of the flies in the fence were young and had not obtained a meal at all, as contrasted with 12.9% in the control. In other words the control area held twice as dense a population of flies as the fenced area and they were twice as well nourished. The female percentage in the catches in the dry season was uniformly higher than in the control area, being generally about double and in two months reached the high proportion of 30%. The infectivity of the flies to stock in the fence was rather higher than previously and distinctly higher in the dry season than in the control area.

It proved a comparatively easy thing almost to catch out the *morsitans* in the fence in mid dry season. For instance, in March on five successive days the density figures were:—21, 16, 15, 9, 9, total caught 426; as contrasted with the control area density figures similarly obtained:—51, 41, 59, 43, 29, total caught 833. The fly population recovered in the fence too quickly to be the result of breeding there. From this and other things that were noted one can only conclude that the *morsitans* in those more outlying parts of a fly area which have been called secondary foci are being constantly recruited in numbers even in the dry season by invaders from the primary foci. The invaders are composed of hungry flies venturing out in search of food as well as those brought by animals or man. Finding adequate shade and the probability of food about some smaller forest pool they naturally linger there. It is for this reason that the apparent anomaly has occurred in this experiment that the amount of blood found in the flies has not fallen in proportion to the extraordinary state of starvation that has been produced. It obviously came from outside the fence for, if it had been got from the small creatures still inside, it would have been a regular supply and there would have been normal nourishment.

It is evident that if there is no game a state of starvation in *morsitans* is very quickly produced and, judging by this experiment, man's blood, though it may appear more frequently in the fly, does not make up for the deficiency. Not only was the fence in contact with much used paths but also a gang of ten men was kept in and about the fence each day for about five hours so that the fly had every opportunity of feeding on them. It cannot however do so economically and it is one's common experience that when among starving *morsitans*, as in this fence in the early dry season when the flies are numerous, that considerable numbers are caught with the



hand in their attempts to feed. The experiment seems to indicate that if the wild Ungulates could be destroyed in *morsitans* areas the fly would rapidly disappear since such a slowly breeding race of insects could not continue to exist in so poor a state as that obtaining in the fence during most of the dry season. It does not show however that organised game destruction would therefore be a good thing, at any rate as in this case and throughout the *morsitans* areas of Nigeria where there is, in addition to *morsitans*, a second species always present, whether *tachinoides* or *palpalis*, which though it may be reduced in numbers by game destruction shows no signs of being exterminated thereby and can feed more economically on man than the bush tsetse can do. The experiment also emphasises the great difficulty of exterminating game in thicket areas such as the flies frequent. At the same time we think that any laws which might tend to the increase of game in Northern Nigeria, unless in limited reserves, are a mistaken policy; for domestic stock, game and *morsitans* cannot range the same areas. If the game increases *morsitans* would spread as it has done in East Africa.

The fencing experiment is to be continued through another season when it will be more isolated by clearings.

## II.—CONTROLLED GRASS BURNING.

Attempts were made to study the effects of the postponement of grass burning upon tsetse but were unsatisfactory owing to natives firing the grass in spite of the Emir's orders to the contrary. One area of about twenty square miles was preserved unburnt till February, some two months after the normal time of burning. The area acted as a sanctuary for game and *morsitans* was very well fed up to the time of the burning while for the month after the fire, owing to the departure of the game, it obtained little food but this deprivation was not of sufficient duration to produce mal-nutrition.

Another attempt at this experiment is being made, a well defined area of twenty square miles of country heavily infested with *morsitans* and *tachinoides* having been closed by the Emir's orders to hunters and others who might fire the grass and a guard of four men has been set to patrol it. It is intended to preserve the area from burning till April.

## III.—CLEARINGS.

It is our intention to attempt large scale clearings with settlement such as is being carried out in East Africa. The first clearing is to be a broad belt right across the fly area in which the investigation camp is situated in order to divide the area into two parts which can be dealt with subsequently. If the initial clearing is successful it will link up two important cattle areas by a safe road that is at present lacking and free an important trade route from tsetse.

The months in which large scale clearings can be carried out are those in which there is no farm work to be done, November or December to the end of March. The Emirs of Katagum and Hadeija have been interested in the work and have promised a labour supply for these months. During the rest of the year labour is hard to obtain and work can be carried on by a small gang only.

The general plan is to make very radical clearings on the banks of the rivers and more permanent pools, cutting out all thicket and thicket-supporting trees. This is often heavy work as the thorn thicket may be from fifty to a hundred yards in width and almost impenetrable. The cut material is stacked for burning and is often utilised to destroy the larger thicket-supporting trees. Such clearings if kept up are certainly sufficient to keep away *G. Tachinoides* and it is hoped they will prove sufficient to destroy *morsitans* also since



this more widely ranging fly is almost confined to the thicket edges for two or three months and breeds mainly in the type of bush that is being cleared. If this hope is realised it will be unnecessary to cut down the deciduous savannah forest except as an immediate precaution along the main road.

A dangerously infested pool close to the main road and about two hundred acres of forest, which connected the pool tsetse with the road, were cleared in May to July by a small gang of men. This has freed a long stretch of road from tsetse. This dry season's clearing began in November and a second bad pool about a mile in length was cleared. The harvest was very late and labour not freely available till the second week in December when clearing on the bank of the Katagum River at the ford was commenced with about 200 labourers. This was the heaviest type of bush with which we shall have to deal and we found that with this supply of labour progress was at the rate of about half a mile a week. (At the time of writing, in May, this piece of clearing is now quite free of tsetse whereas at the same time last year *morsitans* were caught at the rate of 130 to the net-hour and *tachinoides* were also exceedingly abundant.)

It is very surprising that when working with a large gang of men in this very heavily infested bush we see very little tsetse either on the men or on ourselves. From former experience in these forests we had expected to be much hampered by the constant biting which at times has been intolerable. There seems no doubt but that the activity of a large gang of men deters the fly in some way.

The prospects of settlement in the cleared areas are good as the land, especially just north of Sherifuri, is excellent for farming. In order to organise the settlement Captain R. O. Ramage, who as Assistant District Officer in charge of the Katagum Division in which Sherifuri is situated has been very helpful to the investigation in the past, has been reappointed to the Division and resides at the Investigation Camp during the dry season.

#### IV.—TREATMENT OF SLEEPING SICKNESS.

As the Entomologist was alone at Sherifuri for seven months of the year the treatment of sleeping sickness has not been actively carried on. Those cases which came to the camp for treatment were properly dealt with but these were few as it is our experience that cases come in freely only while an active general Clinic is being carried on. The treatment of other ailments, especially venereal diseases, acts as an advertisement and the sleeping sickness cases come in with the general stream of sick. Thus in the first ten months of the year only fifteen cases were seen and in the last two months after Dr. King's arrival there were fifty. A proportion of these were found by travelling and certainly touring an affected area is the best way to find the cases. Travelling necessitates a base where treatment can be completed.

Tryparsamide, which seems to give better results with advanced cases, is now being employed as well as Bayer 205. As a vindication of the efficacy of the latter drug for early cases the history of the five members of the Native Staff of the Investigation who have contracted the disease is worth keeping up to date. Four of these received the standard course of Bayer 205 soon after the onset of the disease. One has remained perfectly fit for the following thirty-seven months and three for the following twenty-seven months. One of the latter drives a ton motor lorry regularly for the Native Administration. The fifth case is interesting. His first attack was in January, 1923 when, no Bayer 205 being available, he received a mixed treatment of Tartar Emetic, Tryparsamide and finally Bayer 205. He remained well till May, 1924 when he developed the disease again and received the normal course of Bayer 205. He was again perfectly fit for a year



and went down under a third attack in June, 1925 and again responded to Bayer 205 like an early case. The appearance of each attack was that of a fresh infection and he has never developed any mental symptoms nor lost his energy.

Dr. Rawson writes :—

"The total number of cases treated during the year is sixty-five of whom eight are known to be dead. Thirty were treated with Bayer 205 alone, seventeen with Tryparsamide alone and eighteen with both drugs. The usual course of Bayer was five grammes, and of Tryparsamide thirteen grammes. Lately, cases have been receiving five grammes of Bayer followed by three or five grammes of Tryparsamide. Cases that showed little improvement under Bayer have been given a full course of Tryparsamide, similarly relapsed cases have been fully treated with the latter drug. Of the cases known to have ended fatally five were given Tryparsamide only and three Bayer 205 only. One of these three would have appeared to have died of relapsing fever.

"Many cases remained for the full course of treatment but some returned to their homes in the middle of the course and several received only one or two injections. These were given to them while the Medical Officer was on tour and they failed to report at Sherifuri for further treatment. Effort is made to persuade all to have the full course, but if they insist on leaving they are allowed to go. Several have returned again for further treatment.

"Minor ailments and other diseases, *e.g.* venereal, are given treatment as this is the best method of getting the people to bring in their friends who may be suffering from Trypanosomiasis."

#### TSETSE CONFERENCE AT KADUNA.

In September a Conference on the Tsetse Problem in Northern Nigeria was held at Kaduna. It was attended by the Heads of most of the Departments which are concerned directly or indirectly with the tsetse-fly and all the Residents who were able to attend. The problem in all its aspects was discussed and hearty promises of co-operation were made.

ANNUAL REPORT OF THE PORT HEALTH OFFICER,  
LAGOS, FOR THE YEAR 1925.

BY

DR. G. B. WALKER, PORT HEALTH OFFICER.





## PORT HEALTH OFFICE.

## DEVELOPMENT.

As this is the first Annual Report on Port Health work in Lagos, it may be of interest to give in brief an outline of the development of this branch of the Sanitary Service.

Up to the time of the outbreak of plague on the Gold Coast in 1924, there was no separate Port Health Organisation, all sanitary measures in connection with the port being carried out by the Medical Officer of Health for the town. With the advent of plague however and the consequent urgent call for the enforcement of measures to prevent sea-borne infection from and to neighbouring ports and countries, it was found necessary to appoint a whole-time officer and staff for port sanitation. A combined medical inspection and disinfecting station was erected at Customs Wharf, and there examination of passengers and disinfection of baggage has since being carried out. As a further anti-plague measure periodical fumigation of lighters and other harbour craft was commenced. A further development of this latter scheme followed the outbreak of yellow fever in May 1925, which made obvious the necessity for more frequent inspection of harbour craft, and thus rendered imperative the acquisition of a launch and increase of the staff to its present strength.

## STAFF.

The present staff comprises :—

The Port Health Officer.

Two European Sanitary Inspectors.

Three African Sanitary Inspectors.

One Vaccinator.

One Female Attendant.

One P.W.D. Mechanic and labourer (Clayton Machines).

One Caretaker (Quarantine Station).

Two gangs of labourers (Average strength twenty).

Whenever passengers are placed under observation at the Quarantine Station the staff there is necessarily increased, cooks, nurses, and labourers being given temporary employment.

## INFECTIOUS DISEASES IN OUTSIDE PORTS.

Throughout the year under review no plague or smallpox epidemic of any magnitude was reported from neighbouring countries. Small outbreaks of yellow fever occurred on the Gold Coast in April, September, October, and December, and in Monrovia, Liberia, in July, August and September. Warri was declared an infected port for the period from 22nd July to 10th August.

MEASURES TAKEN TO PREVENT IMPORTATION OF  
INFECTIOUS DISEASES.

Whenever infectious disease is reported as being present in any port or country near enough to endanger the health of Lagos the Pilot is notified and all vessels which have called at such places are detained at the Quarantine Anchorage. There they are immediately boarded by the



Port Health Officer. Bills of Health and other ships' papers are scrutinized, and all passengers and members of the crew are examined for signs of infectious disease. When a case of infectious disease is discovered on board a vessel, or where a healthy ship has arrived from an infected place within the quarantine period, all Deck and Third Class passengers are landed at the Quarantine Station for observation. Saloon passengers may in such cases be required to give an undertaking to report themselves for a given period to the Medical Officer at their destination.

Where vessels arrive from a country in which the existence of infectious disease is suspected, all Deck and Third Class passengers disembarking at Lagos are required to pass through the Customs Disinfecting Station where they are examined, vaccinated, and inoculated against plague before being permitted to enter the town. Should any of those passengers appear to be exceptionally filthy thorough disinfestation of clothing and other belongings is carried out.

#### INFECTIOUS DISEASE IN LAGOS.

*Plague.*—104 cases of plague were notified in Lagos during 1925. These were spread out over the whole year with the result that, until the definition of "infected place" in the Quarantine Ordinance was altered, the port was seldom out of quarantine. During the periods in which the port was declared infected the following restrictions were imposed:—

- 1.—Police guards were employed to prevent persons from boarding any vessel unless they were in possession of a boarding pass issued at the Port Health Office. These passes were only issued to persons showing proof of legitimate business on board.
- 2.—All passengers were inspected by the Port Health Officer immediately prior to embarkation.
- 3.—All Deck and Third Class passengers were kept under observation in an isolation camp for a period of five days prior to embarkation, were inoculated against plague, and all their clothing and baggage were fumigated.
- 4.—All ships in the harbour were required to carry out the measures laid down in the Quarantine (Plague) Regulations of 1920.
- 5.—All loading of cargo was restricted to the hours of daylight.

While the port was out of quarantine only No. 4 of the above measures was enforced. The procedure with regard to out-going passengers was modified, no term of isolation being insisted upon. All Deck and Third Class passengers had however to report at the Customs Disinfecting Station where vaccination, inoculation against plague and disinfection of their effects were carried out.

Other preventive measures were carried out throughout the year. A register of all harbour craft was compiled and periodical fumigation of lighters and other craft was commenced. Other anti-rat measures were also instituted, rat-catching in the various warehouses on the foreshore and wharves and also on various Marine vessels forming part of the campaign. Great improvement was effected when the wooden flooring in the Customs warehouses was replaced by concrete, those being thus rendered rat-proof. Further, at the Marine Dockyard re-arrangement of stores and tackle on raised benches in the various buildings was carried out in such a manner as to reduce the number of possible nesting places for rats.



## YELLOW FEVER.

The port was infected with yellow fever during the period from 3rd May to 20th June. Eleven cases of this disease were reported, one of which occurred on board the R.M.S. *Akabo* while she lay on the Dry Dock at Apapa. Another case in which without doubt infection was received in Lagos harbour affected an engineer on the s.s. *New Columbia* while at Forcados, that vessel having spent a night at Lagos shortly before. In the case of the R.M.S. *Akabo* the entire crew were inoculated with Noguchi's Vaccine and the ship was fumigated throughout with Clayton Gas.

The outbreak naturally stimulated activities against stegomyia. One of the chief breeding grounds of that variety of mosquito was found to be the Marine Dockyard at Apapa, where machinery, scrap iron, and vessels undergoing repair or construction provided a wealth of suitable breeding places. As much as possible of the scrap and machinery was put under cover. Where this could not be effected depressions capable of retaining water were as far as possible obliterated with sand and systematic oiling was commenced.

A motor launch, the lack of which had severely handicapped the Port Health Staff up to that date, was provided and a European Sanitary Inspector with marine experience was allotted the duty of carrying out weekly inspections of all harbour craft. Special attention has since been paid to the bilges of lighters and other craft, as fresh water is frequently allowed to collect there forming a breeding ground for all types of mosquitoes. As a result of those operations the larval index on such craft has been lowered considerably.

## SMALLPOX.

Fourteen cases of smallpox were notified in Lagos during the year under review, the port being placed in quarantine from 29th April to 13th May, and from 28th May to 11th August. The precautions taken have already been outlined.

## STATISTICS.

No. of vessels entering the port ...	...	...	571
„ „ „ leaving the port ..	...	...	581
„ „ Deck Passengers examined	...	...	20,551
„ „ „ „ inoculated	...	...	18,777
„ „ „ „ vaccinated	...	...	10,793
„ „ craft fumigated	...	...	46
„ „ cases of plague occurring on ships	...	...	2
„ „ „ „ Yellow Fever occurring on ships	...	...	1
„ „ Abatement Notices served	...	...	40
„ „ „ „ „ complied with	...	...	39
„ „ summonses served	...	...	2
Total Fines	...	...	15s.



Yellow Fever

The port was infected with yellow fever during the period from the 1st to 30th June. Yellow fever cases were reported on the 1st of July, and the disease spread rapidly. The first case was a man from the ship "The ...", who had been on board for several days. He was taken to the hospital and died on the 3rd of July. The disease spread to other ships in the port, and many more cases were reported. The health authorities took measures to prevent the spread of the disease, but it was not until the 1st of August that the port was declared free of yellow fever.

A further outbreak of yellow fever occurred in the port in the month of September. This outbreak was more severe than the first, and many more cases were reported. The health authorities took measures to prevent the spread of the disease, but it was not until the 1st of October that the port was declared free of yellow fever.



Under review, the first outbreak of yellow fever in the port was reported on the 1st of July, and the disease spread rapidly. The health authorities took measures to prevent the spread of the disease, but it was not until the 1st of August that the port was declared free of yellow fever.

1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503	1504	1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	1567	1568	1569	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580	1581	1582	1583	1584	1585	1586	1587	1588	1589	1590	1591	1592	1593	1594	1595	1596	1597	1598	1599	1600	1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645	1646	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1661	1662	1663	1664	1665	1666	1667	1668	1669	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	1694	1695	1696	1697	1698	1699	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709	1710	1711	1712	1713	1714	1715	1716	1717	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727	1728	1729	1730	1731	1732	1733	1734	1735	1736	1737	1738	1739	1740	1741	1742	1743	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771	1772	1773	1774	1775	1776	1777	1778	1779	1780	1781	1782	1783	1784	1785	1786	1787	1788	1789	1790	1791	1792	1793	1794	1795	1796	1797	1798	1799	1800	1801	1802	1803	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813	1814	1815	1816	1817	1818	1819	1820	1821	1822	1823	1824	1825	1826	1827	1828	1829	1830	1831	1832	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	
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LAGOS & ENVIRONS

SHEET 4. PROVISIONAL

LAGOS

APAPA

Badagry Creek

Scale: 1 inch to 1 mile 1:18,000

Compiled & Drawn by the Colonial Branch, Nigeria Survey Oct 1914  
Revised Jan 1921

Boundary of Water Assessment Area  
Boundary of Township  
Township

LAGOS

LAGOS & ENVIRONS

SHEET 4. PROVISIONAL

LAGOS

APAPA

Scale: 1 inch to 1 mile 1:18,000

Compiled & Drawn by the Colonial Survey, Nigeria Survey, Oct. 1914  
Revised Jan. 1915

Boundary of Water Assessment Area  
Boundary of Municipal Corporation  
Township





