

Annual report on the Medical Department / Sierra Leone.

Contributors

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SIERRA LEONE.

Annual Report

ON THE

MEDICAL DEPARTMENT

FOR THE

YEAR ENDED 31ST DECEMBER, 1916.



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SIERRA LEONE.

ANNUAL MEDICAL REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1916.

I.—ADMINISTRATIVE.

STAFF.

The Medical Staff consisted of :—

- Principal Medical Officer,
- Senior Sanitary Officer,
- Provincial Medical Officer,
- 2 Senior Medical Officers,
- Sanitary Officer,
- Medical Officer of Health,
- At first 18, and subsequently 16, Medical Officers.
- 4 Native Medical Officers.

The following changes took place in the staff :—

Dr. Rice, P.M.O., was transferred to the Gold Coast.

Dr. Tweedy was appointed as Principal Medical Officer in Dr. Rice's stead.

Dr. Laurie was appointed Senior Sanitary Officer and took up duties on August 23rd.

Dr. Beringer was transferred to Nigeria, Southern Provinces, as Junior Sanitary Officer, and Dr. O'Hara May, of the Gold Coast, was appointed in his stead, from the 26th August.

Dr. J. S. Pearson was transferred to the Gold Coast for service with the Gold Coast Regiment in East Africa.

Drs. W. A. Nicholson and E. J. Powell were seconded for duty in Nigeria.

Drs. P. A. Clearkin and J. M. Clark were seconded for duty in East Africa.

Dr. F. E. Whitehead was seconded for duty in Somaliland.

Drs. G. G. Butler, R. Semple, and O'Hara May were seconded for duty in the Army.

Dr. E. J. Wright was appointed to the local Staff.

The following Officers served in the Cameroons during part of the year :—Drs. T. F. G. Mayer, R. Semple, W. Allan, J. C. Murphy, G. G. Butler, F. E. Whitehead, W. A. Young, J. McK. Clark, J. M. O'Connell, N. S. Deane.

They received the thanks of H. M. Government for their services.

Dr. D. Burrows acted as P.M.O. from January 12th to May 12th and from December 13th to the end of the year.

Dr. T. F. G. Mayer acted as P.M.O. from May 13th to May 23rd and from December 5th to December 12th.

Dr. C. H. Allan acted as P.M.O. from January 9th to January 11th.

Temporary Medical Assistance.—The services of Drs. M. L. Jarrett and T. C. Maxwell, Temporary Medical Officers, were terminated on the 3rd July and 14th August, respectively.

The following officers of the Colony were mentioned in despatches :—Capts. J. Y. Wood, W.A.M.S., J. C. Murphy, W.A.M.S., F. E. Whitehead, W.A.M.S.

The following officers acted as Provincial Medical Officer for varying periods during the year :—Drs. T. F. G. Mayer, C. H. Allan, E. W. Wood-Mason, J. C. Murphy, J. Y. Wood.

The following Officers acted as Senior Medical Officer :—Drs. J. Y. Wood, E. W. Wood-Mason, J. C. Murphy.

The appointment of Dr. M. C. F. Easmon, Native Medical Officer, was confirmed.

The European Nursing Sisters.—Miss L. R. Stevens, Matron, Colonial Hospital, was in charge from the beginning of the year until the 20th December, when she went on leave. She was confirmed in her appointment as Matron and Senior Nursing Sister, Colonial Hospital, in December.

The following Nursing Sister acted as Matron during the absence of Miss Stevens from the Colony :—

Miss I. Stevens, from 20th to 31st December.

Miss Appleton was in charge of the Nursing Home. Miss Littlewood and Miss Robinson both did duty there.

Native Staff.—The following Officers did duty on Active Service with the Cameroons Expeditionary Force during the year :—

Mr. I. B. Doherty, 3rd Class Dispenser; Mr. T. C. Williams, 3rd Class Dispenser; Mr. A. H. Wyse, Mr. C. T. Cole, Mr. E. A. Cole, Mr. V. M. Turner.

The following extract from the "Government Gazette" of February 19th is worthy of quotation :—

"*Sierra Leone.*—V. M. Turner. Reported on by Lieutenant-Colonel "Cockburn, commanding the Battalion to which he was attached, and "by all Medical Officers he served under, as shewing gallantry and devotion to duty and the wounded in the field."

"E. G. Luke. Rendered continuous good service in the field from "October, 1914, to the date when he was invalided, November 1915."

THE MEDICAL ESTABLISHMENT.

RANK.	No.
Chief Dispenser	1
Assistant Chief Dispenser	1
Storekeeper	1
Assistant Storekeeper	1
Public Vaccinator	1
Laboratory Assistant	1
First Class Dispensers	8
Second Class Dispensers	8
Third Class Dispensers	11
First Class Male Nurses	8
Second Class Male Nurses	4
Apprentice Male Nurses	7
Senior Female Nurses	4
First Class Female Nurses	2
Second Class Female Nurses	8
Female Probationers	5
Dresser, Male, Incurable Hospital	1
Dresser, Infectious Diseases Hospital, Kissy	1
Keeper, Lunatic Asylum, Kissy	1
Assistant Keeper, Lunatic Asylum, Kissy	1
Gatekeeper, Colonial Hospital	1

The above Table represents the entire Establishment for the Colony and Protectorate.

THE CLERICAL ESTABLISHMENT.

P. M. O.'s OFFICE.

RANK.	No.
Second Grade Clerk	1
Third Grade Clerk	1
Fourth Grade Clerks	2
Fifth Grade Clerk	1
Sixth Grade Clerks	4

FINANCIAL.

REVENUE, MEDICAL DEPARTMENT, 1916.

	£	s.	d.
Hospital Receipts	138	19	5
Nursing Home Receipts	186	7	9
Sale of Medicines	356	18	7
Druggists' Fees	1	10	0
Maintenance of Lunatics	581	15	5
Half-salary of M. O., Railway Construction	20	16	8

Total ... £1,286 7 10

Total expenditure £36,017 1s. 11d.

II.—PUBLIC HEALTH.

GENERAL REMARKS.

1. The total number of patients treated in all Hospitals and Dispensaries was 49,368.

2. The Reports on the Colonial Hospital and on the Clinical Laboratory give a general outline of the Health conditions of Freetown.

Malarial Fever.—3,008 cases are reported as having been treated during the year.

1,162 subjected to microscopical examination in the Clinical Laboratory, Freetown, gave the following results:—

Varieties of Parasites.

Subtertian	280
„ Crescents	7
Benign Tertian	30
Quartan	6
Mixed Infection	3
	326

3. The increase in benign tertian fever is remarkable and may be accounted for by the association of the carriers from this Colony with Indian troops during the Cameroons Expedition. Only 3 cases were noted in 1915.

4. *Small-Pox.*—This disease was prevalent in most parts of the Protectorate. As noted in last year's report, the type was not severe and the deaths were comparatively few. It would be misleading to attempt to give statistics, as there are undoubted cases of concealment, but the outbreak was sufficiently serious to enforce compulsory vaccination in some areas, and the figures for vaccination results in the year under report are gratifying to a degree. The effort to vaccinate the entire population is being pushed to the utmost by provision of extra Vaccinators, both for the Colony and Protectorate.

5. The total number of cases successfully vaccinated was 71,744 out of a total of 87,705, of which 9,218 were not seen subsequent to the inoculation. The aggregate totals for the previous four years were 33,061 and 24,126, so that during the year nearly three times as many successes were recorded as the gross total for the previous four years.

6. A system of training Protectorate natives to vaccinate among the people of their own tribes has been started, and greater success is anticipated than in sending strangers among them.

ANNUAL VACCINATION RETURNS.

Year.	Total Vaccinated.	Successful.	Unsuccessful.	Not seen.
1912	10,778	8,516	751	1,511
1913	9,371	6,311	1,191	1,869
1914	6,032	4,323	1,016	693
1915	6,880	4,976	1,278	626
1916	87,705	71,744	6,743	9,218

7. *Bilharziasis*.—Owing to the continuance of War conditions this subject has not been followed up as systematically as would appear necessary. It was not lost sight of, however, and Dr. Murphy found 2 cases among 40 people specially examined at Moyamba. He confirms the opinions expressed in last year's report as to the absence of constitutional signs connected with the infection.

8. *Tuberculosis*.—108 cases are returned from all Dispensaries and Hospitals, of which 70 were diagnosed in Freetown and Clinetown. The majority of the cases were of the pulmonary variety. 28 cases were diagnosed microscopically in Freetown. 8 cases were noted among prisoners in the jail. The individual cell system of incarceration affords a makeshift means of isolation. It was not found practicable to carry out the suggestion made by this Department to erect a proper segregation ward for these cases and for lepers who are sometimes committed to prison. It has been found possible to do this in the prison at Lagos, in Nigeria, where it is recognised that "the question of setting aside special wards in the large centres for cases of this disease is one which will soon become prominent." A warning note, however, has been sounded, which it is hoped will result in some tangible scheme for preventing accidental infection in internal institutions.

9. *Yellow Fever*.—One suspicious case is reported as having been brought from up the rivers to Bonthe, Sherbro. Another undoubted case was brought to Freetown from Blama on the Railway at the end of December, which terminated fatally early in January, 1917.

10. *Dysentery* was rather prevalent during the year, and in Section IV. "Scientific," Dr. Young contributes a useful paper on the disease as noted in Freetown, which indicates the extreme difficulty of coping with it. The subject of Dysentery Carriers is engaging much attention in medical circles, and the facts supplied by Dr. Young show how comparatively useless the adoption of hospital methods is in the face of the wide-spread infection and the indifference manifested by the general population in adopting methods of prevention. The cases seen in hospital practice are generally advanced. They have doubtless infected many individuals before they seek admission as a last resort, and often when it is too late. To the average native any excessive action of the bowels is merely diarrhoea, just as they designate the whole category of skin diseases from prickly-heat to an advanced syphilitic lesion by the convenient term of "Craw-Craw."

11. Many attempts have been made to account for the prevalence of dysentery in the prison. The blame has been laid at times on the water supply, on certain articles of food and on alleged faulty preparation of the same.

12. The new apparatus for cooking and sterilizing all food and feeding appliances, the present system of boiling all water and the provision of shower baths eliminate to the utmost of our ability the likelihood of infection from food and water. The hygienic conditions of the Prison are as perfect as they can be, and the sedulous care exercised by the Administrative and Medical Officers unremitting and particular in their efforts to exclude this unwelcome 'visitor.' I use this term advisedly. It can safely be asserted that the majority of cases are introduced from without. Dr. Young has devoted considerable attention to the thorough examination of new comers. Cases of acute dysentery have been detected, as well as their equally dangerous companions,—the 'Cyst Carriers.' Needless to say, they are treated promptly and isolated, until it is reasonably supposed that they are free from infection.

13. I have alluded to the increase in the number of benign tertian malarial cases as the probable result of a fresh infection from Indian troops in the Cameroons. Dysentery has doubtless received a fresh stimulus from a similar influence. Thousands of carriers went from Sierra Leone on the Cameroons Expedition. It is not unreasonable to suppose that many of these men were 'Carriers' in the dysenteric sense, and soon, under the hard conditions of active service, developed an acute form of the disease and spread the infection among their debilitated companions. Dr. Young, who was in charge of the Base Hospital for Carriers at Duala, treated 74 cases in one month. On their return to Freetown, a place already infected to an unsettling degree, they added a potential and strongly reinforced infection. Cases of dysentery are now being reported in England among people who have never left England, but who have recently associated with invalided soldiers from Gallipoli and Egypt.

14. The means of spreading dysenteric infection, as now recognised by leading authorities, cannot but be considered with growing apprehension in Sierra Leone, and especially in Freetown, where conditions are favourable to its spread, and where the remedy is difficult of achievement. Cesspits and wells are intimate associates. Flies, great and small, are sufficiently numerous to spread infection in the manner recently demonstrated by Wenyon and others. If cysts have been discovered in the dry sand of Egypt, how much more likely are they to be expected in the nutritious dust of Freetown? The tin roofs become thickly coated with dust early in the year. The average inhabitant welcomes the relief afforded by catching the water off his roof as soon as the rains begin, rather than perform a tedious journey to the stand-pipe. The incidence of epidemic dysentery is always a feature at the commencement of the rains.

15. The absence of restrictions of cleanliness and ordinary precautions in cooking and eating, among a people who are governed by no tenets of refinement and education, and who are not even governed by a "caste" system, all tend to spread intestinal infections and parasites.

16. Any medical man who has used his microscope conscientiously is in a position to confirm this statement, that it is the exception to find a person in Sierra Leone free from some pathogenic parasite, whether it be of skin, tissues, blood or intestines. Small wonder is it therefore that when a number of men, mainly of the lower classes, are collected and subjected to close scrutiny, the true health index of the bulk of the population becomes manifest.

17. It may be urged that the incidence of dysentery and its attendant mortality are not noted with equal severity in the community at large. It is, to my mind, only apparent, and for reasons that are as manifold as they are complex.

18. The greater proportion of deaths registered in Freetown are not medically certified.

19. Secondly, the cases of dysentery in the prison are mainly among short sentence men. These very men represent a section of the community whose means of livelihood are precarious to a degree, and whose food is of an ill-chosen nature, and especially so in the case of the very many habitual criminals during their temporary freedom.

20. Thirdly, a brief glance at the attached table, showing the nature of diseases with which some prisoners were suffering on admission during the year 1916, inclines one to wonder that the health of the prison was not infinitely worse. The list is taken at random and could be considerably amplified.

21. It supports my contention, and not my excuse, that it is practically impossible to find a really healthy person in Sierra Leone. The offender who has once experienced the comfort of prison life, and there are many of them, considers a jail a friendly workhouse. No stigma is attached to imprisonment. Lowered mentally and physically by disease, unfit, more or less, for sustained effort and trying labour, petty crime offers to these debilitated creatures a life of ease and plenty. Their sins and misfortunes brand the prison with the undeserved epithet of "unhealthy."

22. All the fatal cases of dysentery during the year had suffered from the disease prior to their imprisonment.

NATURE OF DISEASES WITH WHICH SOME PRISONERS WERE ADMITTED TO PRISON IN 1916.

Hydrocele	...	...	...	...	...	...	3
-----------	-----	-----	-----	-----	-----	-----	---

Cardiac Disease.

Hypertrophy, Dilatation, Valvular Stenosis	...	...	...	...	...	80
Urethral Stricture	...	...	...	...	...	2
Bronchitis	...	...	...	...	...	6
Hernia	...	...	...	...	...	24
Ulcer	...	...	...	...	...	16
Acute Gonorrhœa	...	...	...	...	...	33
Abscess	...	...	...	...	...	2
Septic Foot	...	...	...	...	...	1
Tuberculosis	...	...	...	...	...	5
Secondary Syphilis	...	...	...	...	...	4
Imbecility	...	...	...	...	...	4
Leprosy	...	...	...	...	...	4
Chancroid	...	...	...	...	...	8
Lunacy	...	...	...	...	...	3
Acute Dysentery	...	...	...	...	...	7
Adenitis	...	...	...	...	...	3
Orchitis	...	...	...	...	...	2
Nephritis	...	...	...	...	...	4
Amputated Leg	...	...	...	...	...	2
Unfit for Hard Labour	...	...	...	...	...	58
Advanced cases of Tinea Circin., Crawler	...	...	...	...	...	30

HILL STATION.

23. The total number of Europeans resident at Hill Station during the year was 81. They were divided as follows :—

Government officials	...	...	...	...	...	46
Military	...	...	...	...	...	4
Missionaries	...	...	...	...	...	3
Non-officials (including the wives of civil and military officials)	...	...	...	...	...	28

24. Their health on the whole was good. Unfortunately however, three Europeans (two of them ladies) contracted small-pox. The disease was severe in two of the cases.

GENERAL HEALTH OF EUROPEAN OFFICIALS.

25. The total number of officials resident in the Colony and Protectorate was 272. The average number resident was 172.

26. There was one death during the year. The cause of death was dysentery.

27. Eight officials were invalided during the year. The cause of invaliding in each case respectively was :—Cirrhosis of the liver, Ischio-Rectal Abscess, Pelvic Cellulitis, Chronic Enteritis, Appendicitis, Asthma and Ulcer, Blackwater Fever and Anaemia.

GENERAL EUROPEAN HEALTH.

28. The European residents were composed as follows :—

Officials	...	...	...	...	...	272
Non-officials	...	...	...	...	...	269
Military	...	...	...	...	...	597

There were 16 deaths during the year.

CLASSIFICATION OF DEATH RETURNS OF EUROPEANS.

Government officials, 1 :—

Dysentery...	...	...	...	...	...	...	1
--------------	-----	-----	-----	-----	-----	-----	---

Naval and Military, including arrivals off Transports, Colliers, &c., 9 :—

Fracture of Skull	...	...	...	...	...	...	1
Subtertian Malaria	...	...	...	...	...	...	2
Cerebral Hæmorrhage	..	...	...	...	...	...	2
Pneumonia	...	...	...	...	...	...	1
Heat Apoplexy	...	...	...	...	...	...	1
Heart Disease	...	...	...	...	...	...	2

Non-officials, 6 :—

Malarial Fever	...	...	...	...	...	...	2
Heart Disease	...	...	...	...	...	...	1
Chronic Dysentery	...	...	...	...	...	...	1
Chronic Nephritis	...	...	...	...	...	...	1
Fever and Nephritis	...	...	...	...	...	...	1

EUROPEAN OFFICIALS—1916.

TABLE SHOWING THE SICK, INVALIDING AND DEATH-RATES OF EUROPEAN OFFICIALS.

	1915.	1916.
Total number of Officials resident	258	272
Average number resident	158	172
Total number on the sick list	139	176
Total number of days on the sick list	1,412	1,297
Average daily number on the sick list	3.86	3.54
Percentage of sick to average number resident	2.44	2.05
Average number of days on the sick list to each patient	10.15	7.36
Average sick time to each resident	8.93	7.54
Total number invalided	7	8
Percentage of invalidings to total residents	2.71	2.94
Percentage of invalidings to average number resident	4.43	4.65
Total deaths	2	1
Percentage of deaths to total residents	0.77	0.36
Percentage of deaths to average number resident	1.2	0.58

NATIVE OFFICIALS—1916.

	1915.	1916.
Total number of Officials resident	670	480
Average number resident... ..	657	460
Total number on the sick list	946	670
Total number of days on the sick list	4,453	3,403
Average daily number on the sick list	12.2	9.29
Percentage of sick to average number resident	3.34	2.01
Average number of days on the sick list to each patient	4.70	5.07
Average sick time to each resident	6.7	7.39
Total number invalided	15	18
Percentage of invalidings to total residents	2.23	3.75
Percentage of invalidings to average number resident	2.28	3.91
Total deaths	3	1
Percentage of deaths to total residents	0.44	0.20
Percentage of deaths to average number resident	0.45	0.21

29. A comparison of the more significant features in the above tables is not satisfactory from the standpoint of native health conditions.

30. The percentage of native officials on the sick list is practically the same as the percentage of European officials on the sick list. The average sick time to each European official is 7.54 days; the average for native officials is 7.39. The percentage of invalidings to the total European officials is 2.94, while that of the native officials is 3.75. Considering that the native officials are in their own land and living on the food of the country the comparison is not favourable. It helps to bear out my contention, urged later in the section on dysentery, that they are by no means a healthy community.

III.—HOSPITALS AND DISPENSARIES.

ANNUAL REPORT ON THE COLONIAL HOSPITAL, FREETOWN.

By DR. F. G. MAYER, S.M.O.

31. The following Medical Officers were in charge of the Hospital during the year: Drs. T. F. G. Mayer, C. H. Allan, E. W. Wood-Mason, J. C. Murphy, J. Y. Wood.

32. In addition to these the following Medical Officers were attached to the Hospital during the year: Drs. J. McConaghy, J. McK. Clark, W. A. Young, E. J. Wright.

33. *Government Dental Surgeon*.—Mr. Hardie was resident in the Colony from December 4th to the 31st.

34. *The Clinical Laboratory* was in the hands of Drs. Young, Mayhew and McConaghy. Dr. Young's report on the work done during the year is appended.

35. *Hospital: In-Patients*.—The total number of patients treated during the year in the Hospital wards was 1,096. Of these 89 died, but 33 of the deaths occurred within 24 hours of admission. It was necessary to apportion one of the wards of the hospital for the treatment of European patients from H.M.'s ships, the accommodation at the Nursing Home being no longer adequate for the purpose.

36. *Out-Patients*.—The number of patients treated in the Out-patient Department during the year was 8,749. The total number of attendances was 19,535.

37. *Store*.—It was necessary to increase the store accommodation by utilizing one of the rooms in the basement of the Nursing Home as a supplementary store.

38. *King-Harman's Ward*.—109 patients were admitted to King-Harman's Ward during the year—84 for labour and 25 for complicated pregnancies. 48 of the labours were normal and 36 abnormal.

COMPLICATED PREGNANCIES.

Case.	No.	Remarks.
Abortion	9	Includes both complete and incomplete.
Threatened Abortion	5	Cases in which abortion was averted.
False Pains	4	—
Delivered before admission	3	—
Malaria	2	Pregnancies uninterrupted.
Pre-eclampsia	1	Relieved.
Morbus Cordis	1	Died shortly after admission.

ABNORMAL LABOURS.

Case.	No.	Remarks.
Premature rupture of membranes	3	One still-born; ended in forceps.
Eclampsia	3	(1) Living. (2) Still-born. (3) Twins; 2nd forceps' delivery, dead.
Pre-eclampsia	1	Still-born.
Premature	1	—
Face presentation	1	Forceps; still-born.
Placenta Praevia	3	All still-born.
Impacted Shoulders	2	Both dead; one a forceps' delivery.
Breech	2	One still-born.
Pendulous Belly... ..	1	Forceps.
Twins	4	—
Footling	1	Still-born.
Precipitate Labour	1	Premature; living.
Protracted Labour	4	—
Still-births	2	—
Forceps	5	One still-born; one maternal death on fifth day.
Retained Placenta	2	—

N.B.—In the above list no case has been counted twice. 109 patients spent 272 days in hospital—the day of arrival and departure being counted as separate days. Average number of days in hospital per patient = 2.49.

OPERATIONS.

The total number of operations performed during the year was 192. They are shewn in the following table :—

	Successful.	Not relieved.	Died.	Total.
Abscess of liver	1	—	2	3
Abscesses	26	1	1	28
Ainhum	4	—	—	4
Adenoid vegetations	1	—	—	1
Avulsion of nail	2	—	—	2
Appendicitis Abscess	—	—	1	1
Balanitis	1	—	—	1
Buboec	5	—	—	5
Buboec, inguinal	1	—	—	1
Bullet in thigh	1	—	—	1
Cysts, etc.	3	—	—	3
Cellulitis	5	—	—	5
Carbuncle	2	—	—	2
Crushed foot	1	—	—	1
Chalazion	1	—	—	1
Dislocations... ..	2	1	—	3
Dental Caries	3	—	—	3
Dental Abscess	1	—	—	1
Extravasation of urine	—	—	1	1
Empyema	1	—	—	1
Endometritis	1	—	—	1
Epulis (Fibroma)	1	—	—	1
Elephantiasis	3	—	1	4
Fibroma	1	—	—	1
Fracture	16	1	2	19
Foreign body, removal of	3	—	—	3
Gangrene of hand	—	—	1	1
Ganglion	2	—	—	2
Hernia	15	—	1	16
Injury to toe	1	—	—	1
Inflammation of foot	1	—	—	1
Incised wound	4	—	—	4
Intestinal obstruction	1	—	—	1
Keloids of abdomen	1	—	—	1
Lacerated perineum	1	—	—	1
Lipoma	1	—	—	1
Mastitis, chronic	1	—	—	1
Malarial Crescents, injection of Galyl for	1	—	—	1
Necrosis and Sequestromy	5	2	—	7
Phimosis	7	—	—	7
Pelvis Periostitis	1	—	—	1
Prolapsed uterus	1	—	—	1
Perineal tear	—	—	1	1
Papilloma Pubis	1	—	—	1
Purulent Arthritis	1	—	—	1
Polypus of lower eyelid	1	—	—	1
Retained placenta	1	—	—	1
Retention of urine	1	—	—	1
Septic tumour of eye	1	—	—	1
Septic hand... ..	1	—	—	1
Strictures, etc.	2	—	1	3
Sinuses (lumbar of bone, etc.)	8	—	—	8
Septic finger	3	—	—	3
Septic toe	4	—	—	4
Swelling in back	1	1	—	2
Swelling in muscles	1	—	—	1
Synovitis of ankle	1	—	—	1
Teno-synovitis of wrists of both hands	1	—	—	1
Ulcers	6	—	—	6
Wounds	8	—	—	8
Whitlows	2	—	—	2
Worm in skin of foot	1	—	—	1
Total	174	6	12	192

ANNUAL REPORT ON THE NURSING HOME.

39. The following European Nursing Sisters were attached to the Nursing Home during the year:—

Miss K. G. Appleton, Miss C. Littlewood, Miss E. M. Robinson.

40. The following tables show the nature of the work done during the year. Of the total number of cases 8 were invalided. (*Vide* table in Part II., P. M. O.'s Report.)

NURSING HOME RETURNS, 1916.

TABLE A.

ADMISSIONS.

Diseases treated.	Officials.	Non-Officials.	Total.
Malarial fever	15	16	31
Anæmia	1	—	1
Black water fever	1	—	1
Yellow fever	1	—	1
Chicken pox	1	—	1
Adenitis	1	—	1
Asthma	1	—	1
Dyspepsia	6	—	6
Dysentery	3	—	3
Appendicitis	1	1	2
Nephritis	1	1	2
Alcoholism	1	1	2
Uræmia	—	1	1
Neuritis	2	—	2
Sciatica	1	—	1
Cellulitis	2	—	2
Sunstroke	2	1	3
Other Diseases	8	3	11
Total ...	48	24	72

TABLE B.

DEATHS.

There were two deaths.

No.	Status.	Cause of Death.	Remarks.
1	Official	Amœbic dysentery ...	One case of yellow fever admitted late in December. Died on 7th January, 1917.
2	Non-Official	Uræmia	

Fees Collected.—The total amount of fees collected without extras amounted to £167 16s. 0d.

ANNUAL REPORT OF COLONIAL HOSPITAL LABORATORY FOR 1916.

41. The following Medical Officers have been in charge throughout the year:—

First Quarter	...	...	...	...	Dr. McConaghy
Second Quarter	...	...	...	...	Dr. Mayhew
Third and Fourth Quarters	...	...	...	...	Dr. Young

Mr. J. T. Roberts was the Laboratory Assistant.

42. It might be asked here, if it were wise to draw any conclusions from results which are only got from a part of the population of Freetown; but one can hardly do otherwise, and it is quite likely the results are an average for the town.

43. For example:—The percentage of all faeces examined, containing *Entamoeba histolytica* is 10 per cent. That this is not too high a percentage is easily shown by the large number of deaths supposed to be due to "Diarrhoea" and is probably explained thus:—

44. A large intestine devoid of most of its mucus membrane (lost by numerous attacks of dysentery, which is not regarded in itself as a serious disease by even well educated natives) is not fitted to absorb the liquid contents of the small intestine. This is shown clinically in chronic cases and by the post-mortem examinations made on the same subjects afterwards.

URINE.

	OUT-PATIENTS.				IN-PATIENTS.			
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
Normal	96	44	95	59	33	51	47	57
Trace of Albumen ...	13	6	15	10	37	69	55	80
Cloud of Albumen ...	13	4	20	12	39	15	61	86
Totals ...	122	54	130	81	109	135	163	223
	387				630			
GRAND TOTAL ...	1,017							
Albumen 23 per cent.				Albumen 70 per cent.				

45. One showed Glycosuria in a Male.

It would seem, at first, that the Out-Patients are comparatively free of Albuminuria.

46. This is modified by the fact that 75 per cent. of the urines examined are of candidates for Government Posts (the other 25 per cent. being cases where Albuminuria might reasonably be expected).

47. Of these Candidates, however, no less than 30 per cent. had "Albumen" in their urines.

48. The yellow fever urine, apart from the abundant albumen (·1 per cent.), showed deeply bile-stained granular casts, and is thus differentiated from the ordinary albuminuria one usually sees here.

49. A specimen of urine from a case of Hæmato-lymphuria showed *Microfilaria bancrofti* besides Red and White Cells.

BLOOD EXAMINATIONS.

Type of Parasite.	OUT-PATIENTS.				IN-PATIENTS.			
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
Subtertian	58	30	123	47	2	6	17	22
Tertian	—	—	20	2	—	—	4	4
Quartan	1	2	1	1	—	—	—	1
Tertian and Subtertian }	—	1	2	—	—	—	—	—
Crescents	1	4	4	1	—	—	1	—
Eosinophilia	7	4	3	5	—	—	—	10
Normal and Negative }	91	100	187	87	11	23	85	98
Total	158	137	340	143	13	29	107	135
	778				384			
GRAND TOTAL	1,162							

50. Out-patient cases are those which have a temperature at the time of examination or where it is stated that the patient has had "fever in the night."

57. Under this heading "fever in the night," come many cases who have already taken quinine or a purgative, and so arrive at hospital with little or no temperature, and parasites (malarial) are hard to find or not found at all.

52. But in most of such cases crenated and anæmic appearance of the red cells, the Basophilia and pigmented mononuclears, suggest that parasites were to be seen before the medicine had been taken. These cases are adults.

53. Children, on the other hand, with little or no temperature, may have enlarged spleens and malarial parasites, and children with temperatures and enlarged spleens have always numerous parasites.

54. The malarial crescents were found in one European, two native adults and four native children.

55. Apparently there is more benign tertian fever. The presence of Indian troops in the Cameroons may account for the Sierra Leone soldiers and carriers being infected.

FAECES.

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
Ankylostome Ova	33	32	18	15
Ascaris "	22	23	22	34
Trichocephalus dispar Ova	6	9	8	3
Ankylostome and Ascaris	13	15	6	7
Ankylostome and Trichocephalus	3	5	2	2
Ankylostome Ascaris and Trichocephalus	4	4	1	2
Trichocephalus and Ascaris	2	2	6	6
Strongyloides Larvæ	10	4	4	2
Amœba histolytica	20	14	26	39
Cysts of Amœbæ containing 1 to 4 nuclei	—	—	9	6
Flagellates	2	—	7	11
Tænia Saginata	2	1	2	1
Bilharzia Ova	—	1	—	1
Negative	100	114	136	157
Total	227	224	247	286

56. There were also two cases in which *Balantidium Minutum* was seen.

57. Of the 20 cases where Flagellates were seen the following types were observed :—

Lamblia (Giardia)	2
Cercomosias	5
Tetramitus Mesnili	13

58. To make certain that the dysentery was amœbic and not bacillary, during the months of July and August, dysenteric matter was incubated on Mackonkey's and Drigalski and Conradi Media, and although done on at least 12 occasions, no bacillus, except *B. coli*, was ever grown. Therapeutically this was confirmed by the curative value of emetin hydrochloride.

59. *Microfilaria*.—Examination of night and day blood was only carried out part of the year, *i.e.*, the months of August, September and October.

60. *Microfilaria perstans* showed no periodicity while *M. bancrofti* always appeared in night blood only.

61. In one patient both types were found. During September six slides were examined from each patient, but this did not increase the percentage. Too much work prevented continuation of this method during other months.

62. Most of the cases who harboured *M. f. perstans* had been down in the Cameroons.

Type.	August.	September.	October.
<i>M. bancrofti</i>	2	8	3
<i>M. perstans</i>	3	6	2
Both	—	—	1
Negative	46	110	38
Percentage	102	112	142
Total	51	124	44

Pus Examinations.—

<i>In-Patients.</i>				<i>Out-Patients.</i>			
Gonococcus (urethral) ...	...	13		Gonococcus (from eye) ...	...	1	
Do. (not urethral) ...	...	4		Do. (urethral) ...	...	5	
Tetanus and its spores ...	...	2		Morax-Axenfeld Bacilli ...	...	1	
Pyogenic organisms ...	...	8		Pyogenic organisms ...	...	4	
Total ...	...	27		Total ...	...	11	

A swab from a throat showed the presence of a gram-negative fusiform bacillus and pneumococci—Vincent's Angina.

It will be noticed that pus not of urethral origin, *i.e.*, abscesses in muscle sheaths and the like, showed the exciting organism to be the gonococcus in four cases.

Gonococcal vaccine and serum were of great curative value in these cases.

Three cases of Gonorrhœa were in children aged 5, 9 and 12 years respectively.

In a case of supposed rape, a smear showed no spermatozoa, no blood, but abundant amoebæ, which answer to the description of Baelz, and so would be named *amoeba urogenitalis*.

There was no dysentery present. The patient was 12 years of age.

63. *Sputum.*—

Organism.	In-patients.	Out-patients.	Total.
Tubercle bacillus	16	12	28
Amœba	1 (liver abscess)	—	1
Negative	54	20	74
GRAND TOTAL	...	...	103

64. Out-patients, whose sputa are found to be infected with tubercle bacilli, are not admitted as in-patients, but as tubercle bacilli are sometimes found in the routine examinations of in-patients, the total of 28 infections represents 28 individual cases, none of which were re-examinations.

So far no bronchial spirochaetosis has yet been demonstrated.

65. *Trypanosomes.*—Four examinations of gland juice were negative.

Specimens of blood taken from 11 cattle showed a trypanosome present in four. This trypanosome had a non-free flagellum and conformed to the Nanum-or-Congolense type.

66. *Rats.*—These have been examined more or less regularly throughout the year.

At no time was there any suspicion of Plague.

The following is a list of their endo- and ecto-parasites as frequently found here:—

1. *Trypanosoma lewisi*—Blood.
2. *Xenopsylla cheopis* *Polyplax spinulosus*—Skin.
3. *Cysticerci* of *Tænia Crassicolis*—Liver.
4. Large Nematode—Stomach.
5. Small "—Large Intestine.
6. *Hymenolepis*—Intestine.
7. *Lamblia* (*Giardia*)—Intestine.
8. Tumbu fly Larvæ—at root of tails.

Awaiting
Identification
from home.

67. *Post Mortem Examinations* ... Total 22.

Of these examinations three are of interest and instructive.

(1) *History*.—Deceased first complained 24 hours before death of colicky pains. He vomited several times, but apparently was constipated until just an hour or two before death, when he passed several motions.

P.M.—Suppurative peritonitis and swollen thickened gut from jejunum to rectum, commencing to become gangrenous. Inside lumen were many ulcers. *Entamæba histolytica* found microscopically.

(2) This woman had complained of slight abdominal pain some days before admission to hospital. She felt herself becoming fainter each day, and was at last taken to hospital, where she died a few hours later.

P.M.—Abdomen distended and full of blood. Abundant clot on placental site of uterus. An intact 6-7 months child was removed and the membranes were also intact.

The placenta was diseased and the uterine wall also. Large dilated veins had been ruptured.

N.B.—There had been three children born dead at about the same age.

(3) *History*.—Complained of severe colic, but whether due to the native medicine previously taken or not was difficult to find out.

She died a few hours after admission.

P.M.—Gangrene of small intestine due to a volvulus. There were no adhesions to account for the volvulus.

It would be interesting to know just how much the native medicine had to do with the condition.

68. *Miscellaneous*.—(1) Three autogenous vaccines were made and cured the condition treated.

(2) A scraping from a penile ulcer showed by dark ground illumination the *Treponema pallidum*.

(3) Twenty ankylostome worms examined showed the species to be *Ankylostomum duodenale*.

(4) *Leprosy*.—Nasal discharge on five occasions showed abundant *B. lepræ*. In one patient eleven scrapings and nasal smears were negative, although clinically a leprosy case; after much prolonged searching a twelfth slide was positive. The cases suffering from leprotic fever at the time of examination were those that showed bacilli easily.

(5) Salinity of the Freetown Harbour water.

Specimens taken at end of rains, *i.e.*, 8, 12, 16.

At low water ... 1,760 parts per 100,000.

„ between tides ... 1,775 parts per 100,000.

„ high water ... 1,988 parts per 100,000.

Average ... 1,841 parts per 100,000.

(6) Erythrocytic and leucocytic counts, also hæmoglobin estimations were done as required. Differential white counts were also made when necessary.

WATER ANALYSIS.

69. As far as it was practicable and when time allowed a chemical analysis of the Freetown water was made weekly.

70. At the end of July a complete analysis was made and the following is a summary of results:—

Physically.—

- (1) Suspended matter—nil.
- (2) Colour—nil, or very slight yellowish green.
- (3) Taste—palatable.
- (4) Odour—nil.
- (5) Minerals—slight presence of iron.

Chemically.—

- (1) Hardness temporary and permanent—1·5 degrees.
Permanent—1·0 „
- (2) Chlorides—0·3 parts per 100,000.
- (3) Free ammonia—0·002 parts per 100,000.
- (4) Albuminoid ammonia—0·001 parts per 100,000.
- (5) Organic matter, *i.e.*, oxygen absorbed—0·04.
- (6) Nitrites—nil.

Bacteriologically.—Number of colonies per c.c.—20.

No colon, no typhoid, no dysentery organisms found.

No amœbae found in 4,000 c.c.

Conclusion.—Freetown Water Supply is a safe and potable water. Since this analysis was made a chemical analysis has only been done monthly.

(Sgd.) W. A. YOUNG,

M. O. Laboratory.

16th January, 1917.

ANNUAL MEDICAL REPORT ON THE PRISON DEPARTMENT FOR THE YEAR ENDING 31ST DECEMBER, 1916.

71. Drs. McConaghy, Mayhew, Ward and Wright were in charge for varying periods up to November, when Dr. Young took charge.

72. Mr. Nylander has been Senior Dresser throughout the year.

HEALTH OF PRISON STAFF.

European.—One on sick list for one week.

Native.—61 treated, of whom 24 were admitted to Colonial Hospital, and of these three were invalided out of the Service.

Prisoners.—

Admitted to prison during 1916	...	...	...	1,043
In custody 31st December, 1916	...	...	...	268
				1,311

Deaths.—There were 30 deaths; percentage death-rate ... 2·3

Hospital.—

In hospital 31st December, 1915	...	...	...	30
Admitted to hospital	...	...	...	448
				478

Percentage death-rate for hospital only ... 6·3

The admissions were mainly for amœbic dysentery, ankylostomiasis and cardiac disease.

Total dysentery cases treated	...	...	...	...	161
Ankylostomiasis	...	...	...	...	75
Daily average of sick in hospital	...	...	...	...	23

Nine prisoners were certified insane. Three lepers and one advanced syphilis were isolated.

461 vaccinations were performed, 350 of which were successful.

Out-patients.—2,742 new cases, with 3,668 subsequent attendances.

From these out-patients the really serious cases are admitted for observation in hospital.

Operatic operations under general anæsthetic, four:—

- (1) Extraction of teeth.
- (2) Evacuation of psoas abscess.
- (3) Abscess of hand (opening and draining).
- (4) Abscess of abdominal wall ditto.

Improvements.—(1) To prevent possible spread of amœbic infection by prisoners who might be infected, or carriers, and who were washing themselves in baths common to others, a spray system has been adopted. The reason for this is, that the native has a habit of rinsing out his mouth with his bath water.

(2) A completely new cooking house and plant have been installed. It is after the type of cooking apparatus used in the British prisons. So far it has given every satisfaction. The fon-fon, by its much more thorough cooking, has now lost its stringy nature, which was once its great characteristic.

(3) A warder has now been made head cook and is responsible for the sanitation of the cook-house.

SANITARY CONDITION.

73. This is exceedingly good. The Statistical Return for the year 1916, and also an appendix commenting on the dysentery in the prison are attached.

I have the honour to be, Sir,

Your obedient Servant,

(Signed) W. A. YOUNG,

January 10th, 1917.

M. O. Prison.

STATISTICAL RETURN FOR THE YEAR ENDING 31ST DECEMBER, 1916.

FREETOWN PRISON HOSPITAL.

In-Patients.

In hospital at end of year	...	...	...	...	30
Admitted during 1916	...	...	...	...	448
Total	..	...	...	...	<u>478</u>

Discharged:—

Admitted	...	...	...	...	448
Cured	...	...	...	...	215
Relieved	...	...	...	...	212
Not relieved	...	...	...	...	7
Died	...	...	...	...	30
In hospital at end of year	...	...	...	...	14

Causes of death :—

Chronic nephritis	...	...	...	...	5
Pulmonary tuberculosis	...	...	...	...	2
Amyloid disease (Psoas abscess)	...	...	...	...	1
Cerebral hæmorrhage	...	...	...	...	1
Cardiac failure	...	...	...	...	3
Chronic amœbic dysentery	...	...	...	...	15
Aortic incompetence	...	...	...	...	1
Fatty degeneration of heart	...	...	...	...	1
Cardiac failure under anæsthetic	...	...	...	...	1

Out-Patients.

New cases	...	...	...	...	2,742
Subsequent attendances...	...	...	...	...	3,608

Daily average number of prisoners :—

Males	...	...	...	...	254
Females	...	...	...	...	7
Total	...	...	...	...	<u>261</u>

New comers examined	...	...	...	...	929
Remands and trials	...	...	...	...	345
Examined for solitary confinement	...	...	...	...	267
Examined for corporal punishment	...	...	...	...	19
Examined and found insane	...	...	...	...	9
Executed	...	...	...	...	3

I have, etc.,

(Signed.) W. A. YOUNG,

*Medical Officer.*APPENDIX TO ANNUAL REPORT ON THE PRISON,
FREETOWN.

74. It is hardly necessary to comment on the presence of amœbic dysentery in the Freetown Prison, since necessarily there must come inside the prison walls people who have been infected outside. Suffice it to state that, with an occasional exception, the prisoners who have amœbic dysentery are "short sentence" men, and as such, are roughly an index of the dysentery in Freetown itself. Of the prisoners who died this year from dysentery, all had had dysentery before their admission to prison. Unfortunately when the prison hospital was built large wards were made, instead of isolated beds open to the corridor only and protected from communication therewith by a grille, as I understand is the case in the prisons in Britain. To cope with known cases of malingering and to prevent any direct spread of the disease, the following procedure was tried during the last six weeks of the year with success. A certain number of ordinary cells were put at the Medical Officer's disposal by the Superintendent of Prisons. All prisoners were told to report immediately if they even thought they had dysentery. If a prisoner did so, he was asked to defæcate in the presence of the Medical Officer, and the specimen was examined microscopically at once. If positive, he was put in the special cell as a dysentery patient and treated as such. (If negative, he was also put in the cell for observation and given a prophylactic dose of emetin. If he was a malingerer the hypodermic injections and solitary confinement were always sufficient deterrents and prevented his trying to escape hard labour in that guise!). Solitary reflection made him realise that dysentery was not a

pleasant thing to contract often. As a result of such reflection visions of future evasion of hard labour by malingering became less attractive. Any direct infection, such as is possible in an open ward of 10 to 20 beds, was prevented. The patient could not steal another man's full diet, when he was only supposed to be on low diet. He was also glad to help the Medical Officer by trying to get better, for he knew he could not get out otherwise. The Medical Officer gave the emetin hydrochloride injections, and saw that other drugs he ordered were given in his presence. This method has worked very well. It takes time and trouble, but the results more than justify the means. All the drinking water is boiled and kept in locked tanks which have taps, and hence the water cannot be infected by the immersion of dirty hands and receptacles. The cooking arrangements are splendid; all cooking baskets, receptacles, boards, etc., can be and are sterilised each day. It may therefore be safely stated that the food is not the source of any spread of disease. The cooking staff have a prophylactic injection of emetin at intervals as an additional precaution. It is hardly necessary to state that many prisoners, when admitted to prison, are more or less chronic invalids, and either at once or within a short period have to be admitted to hospital; *e.g.* of the 14 prisoners in hospital on December 31st, 1916, two are lepers, one has advanced rupia, one gonorrhoeal rheumatism, one advanced cardiac disease with dropsy, one chronic asthma and facial paralysis, and two have mitral regurgitation.

75. In consideration therefore of these and other factors equally disadvantageous, a death rate of 2.3 per cent. for all prisoners cannot, I think, be regarded as high.

76. It would not be fair to close this report without acknowledging the ready and able assistance one received from both the Superintendent and the Acting Superintendent of the prison, especially in maintaining an effective level of sanitation, always a difficult matter, even in so well equipped a prison as that of Freetown.

(Signed) W. A. YOUNG,
Medical Officer,
PRISON.

31st December, 1916.

CLINE TOWN.

REPORT BY DR. J. Y. WOOD, W.A.M.S.

77. The following Medical Officers were in charge for varying periods,—Drs. Nicholson, Mayhew, Ward, Young and Wood.

78. *Public Health.*—Owing to frequent changes of control a comprehensive statement is difficult. Subtertian malaria was diagnosed generally, and diseases of the digestive system were numerous. The cases of dysentery were practically always amoebic.

79. *European Officials.*—The general health showed an indication towards improvement. Of a total of 44 Europeans, 56 entries on the sick list are noted, with 295 days lost—almost a week per man. Diarrhoea and amoebic dysentery among them suggests the necessity for improving the quality of the drinking water in the workshops. All cases of serious illness are removed to the Nursing Home in Freetown.

80. *Native Officials.*—There were 19 West Indians and 95 Natives employed in 1916. 95 appear on the sick list for 308 days. The more serious cases from among them are sent to the Colonial Hospital for treatment.

There are, besides Railway Native Officials, resident in Cline Town many officials belonging to other Government Departments. These are also attended by the Medical Officer, Cline Town.

81. *Sanitation.*—The general trend of the control by the Railway authorities is in the direction of anti-mosquito measures, which Dr. Wood states are most effectively carried out, considering the great facilities for breeding which exist in a locality where old machinery, etc., lies about and is capable of holding water. His suggestion of covered sheds for the storing of scrapped machinery should be considered. Grass and bush growth are kept well in hand.

82. *Epidemics and Special Diseases.*—None are reported on. There were 697 successful vaccinations performed.

83. *Hospital and Dispensary.*—The various buildings, including the Medical Officer's house, are being connected by telephone with the main system.

84. *Out-Patients.*—520 officials of all Departments were treated. Of the general public there were 2,771 cases with 2,278 subsequent attendances, a considerable falling off on the numbers for 1915. This may be accounted for by the frequent changes of Medical Officers. The ordinary diseases hitherto noted were prevalent.

KISSY INSTITUTIONS.

REPORT BY DR. W. F. CAMPBELL.

85. Dr. Taylor was in charge until June, when he was relieved by Dr. Campbell.

86. *Public Health.*—A mild epidemic of small-pox with 13 cases occurred in the village.

87. *Native Officials.*—The general health has been good. As a large number of officials employed in Freetown live in and around Kissy, it is practically impossible to give the number falling within the control of the Medical Officer, Kissy.

125 officials were placed on the sick list for 660 days.

88. <i>Lunatic Asylum.</i> —				Males.	Females.
Remained over from 1915	...	...	...	110	27
Admitted during 1916	...	...	...	51	14
Relieved	"	"	...	24	7
Deaths	...	...	...	24	

The total number of admissions shows an increase of 29 over the number for 1915.

2 cases of chicken-pox occurred among the inmates.

89. *Female Incurable Hospital.*—

Remained over from 1915	...	...	...	...	24
Admitted during 1916	...	...	...	...	75
Discharged	...	...	...	...	42
Died	...	...	...	...	26
Remaining at end of 1916	...	...	...	...	35

90. *Male Incurable Hospital.*—

Remained from 1915	...	...	...	...	30
Admitted during 1916	...	...	...	...	188
Discharged	...	...	...	...	99
Died	...	...	...	...	68
Remaining at end of 1916	...	...	...	...	73

91. The high death rate of the above two hospitals is due to the advanced stage of illness and other adverse conditions in the majority of admissions. It is the last resort of the destitute and despairing.

92. *Leprosy*.—The cases are segregated.

Remained at end of 1915	...	...	...	...	2
Admissions in 1916	...	...	...	...	11
Absconded	...	...	...	...	8
Died	...	...	...	...	2
Remaining January, 1917	...	...	...	...	2

93. *Infectious Diseases Hospital*.—

Small-pox—Admissions	...	...	...	...	110
Discharged	...	...	...	...	79
Died	...	...	...	...	27
Remaining January, 1917	...	...	...	...	4
Chicken-pox	...	...	...	...	112 cases.
Measles	...	...	...	...	5 cases.

94. *Dispensary Out-Patient Department*.—1,257 new cases were seen, and 969 subsequent attendances registered. No special diseases were noted.

95. *Vaccinations*.—293 cases were done, of which 189 were successful.

BONTHE.

REPORT BY DR. E. H. MAYHEW, W.A.M.S.

96. This Station was under the charge of Dr. Arbuckle for the first three months of 1916; from April to end of June under that of Dr. C. H. Allan, Senior Medical Officer; from July to the end of the year under Dr. Mayhew.

97. *Public Health*.—The health of the population has been fair; there were 76 burials in Bonthe Cemetery (exclusive of seven still births); of this number 16 were children of five years and under. The worst month was June. In York Island there were 21 interments, eight of these being children of five years old and under; April was the worst month.

98. *Malaria* was the commonest disease amongst children. Of those diagnosed microscopically nine were benign tertian, 34 quartan and 65 sub-tertian. The quartan appeared in larger numbers towards the end of the year, when the heavy rains had finished.

99. *Ankylostomiasis* seems very prevalent. 30 cases were admitted to hospital, mostly in an advanced state of anaemia. The ova are to be found in the stools of practically all the natives admitted to hospital.

Small-pox.—There was a small outbreak of small-pox in April, the first case being imported from the Kittam River, the others being contact cases. The cases were isolated at Bonthe Bai, and extensive vaccination was carried out.

100. *European Officials*.—The number of European officials resident here in the course of the year was six. None were placed on the sick list.

101. *Native Officials*.—The health of the native officials has been good. There were only ten cases on the sick list, with an absence from duty of 39 days.

102. *Non-official Europeans*.—The health of the non-official Europeans has been good. There was one death, a case brought down from the Rivers in a moribund condition, who died within 24 hours; the history and symptoms

pointed to yellow fever. Two were invalided, one for loss of memory and one for pyorrhoea alveolaris. The majority of Europeans take quinine regularly, sleep under a mosquito net and wear mosquito boots.

103. *Meteorological*.—The rainfall for the year was 145·70 inches compared with 192 inches for 1915 (this latter, however, was phenomenal). Rain fell during every month of the year. July had the heaviest fall with 37 inches.

104. *Hospital and Dispensary*.—During the year 2,440 new cases were treated; there were 281 in-patients and 18 deaths. Anaesthetics were given in 63 cases. Ulcers are the commonest complaint. Many heal with merely cleanliness and external applications.

105. Constipation and dyspepsia, as usual, take a high place amongst the out-patients. Round worms are very common in children.

106. The hospital roof has been repaired, and the whole building has been re-painted; a skylight has been put into the roof of the operation room. The fence round the hospital has been renewed; the Dispenser's and Male Nurse's quarters have been painted and whitewashed. The buildings at Bonthe Bai have been repaired, the roof mended and the whole place put into a habitable state.

107. The chief needs at the hospital are (1) to have the latrines moved away from the verandah, where they are in close proximity to the wards, (2) to have the male and female wards partitioned off from one another.

MOYAMBA.

REPORT BY DR. J. C. MURPHY, W.A.M.S.

108. Drs. Pearson, Butler, Clark, and Murphy were in charge for various periods.

109. *Public Health*.—The general health is reported as fair. There is evidence that the main and branch lines of the railway are taken advantage of by the people to obtain medical relief at Moyamba.

110. *Malaria*, judging from cases seen, is not very common, considering the favourable conditions which exist for its presence.

111. *Blackwater Fever*.—Two cases, both European females, occurred towards the end of the rains at Moyamba. Both were invalided.

Filaria, both Nocturna and Diurna, were noted.

Small-pox.—There were isolated outbreaks which spread from town to town, but only a small percentage of the people were attacked, and the deaths, chiefly among old people and children, were few.

112. *Dysentery*.—There were not many cases.

113. *Helminthic Infection*.—Round worms in great numbers are found in children. Tape worms are infrequent.

Three cases of *Bilharzia* were found in 40 cases examined, but they presented no signs attributable to the infection.

Ankylostomes.—*Trichocephalus* present to some extent.

The rains incidentally, also "the hungry season," are stated to be the most unhealthy period of the year, possibly by lowering of vitality due to insufficient food.

114. *Health of European officials*.—There are usually six in the station, ten on the railway and two in an outlying agricultural settlement. The general health

was fair. There appears to have been a great improvement in the health of the officials in Moyamba, due no doubt to the fine new bungalows on elevated ground, in each of which there is a mosquito-proof room, and to a good pipe-borne water supply.

115. The Railway Junction at Boia has an average white population of 10. They are chiefly engine drivers, fitters and platelayers, the nature of whose occupation is trying in a tropical country.

116. *Health of Native Officials.*—The total number in the District is about 82. The health of the railway officials calls for special comment, and the sick rate is stated to be out of proportion to its own numbers. The men allege loneliness as the cause of debility and illness.

117. *Court Messengers and Warders.*—There are about 42 men. Their work is trying, and they are hard worked. The appointment is much sought after, and on the whole the men are healthy.

Their barracks are reported as being condemned, and new ones are to be erected.

118. *Prisoners.*—Average number, 50. Rheumatism and constipation are common. Bilharzia and filarial infections have been noted; also dysentery and ankylostomiasis. The prison buildings are not very satisfactory, and their confinement affects their health generally. They assist in general sanitary work.

119. *Non-Official Europeans.*—These are chiefly missionaries and traders, whose tour of residence is invariably longer than that of officials, with the natural results. Malaria was chiefly noted among them, and two cases of blackwater fever occurred in two females engaged in missionary labours. Both recovered and were invalided.

Non-Official Natives.—No special diseases or outbreaks other than small-pox were noted. The estimated population of the District is 26,000.

2,362 patients were treated.

BO DISTRICT.

REPORT By DR. E. WARD, W.A.M.S.

120. This District comprises 70 miles of railway with a Medical Officer at Bo and two Dispensaries at Kennema and Sumbuya respectively.

Drs. Clearkin and Ward have been Medical Officers in charge during the year.

121. *Public Health.*—No special features are reported.

122. *European Officials.*—There were 25 European officials resident during the year. Of these 17 were placed on the sick list, with a total number of 116 days thereon. Four cases were sent to the Nursing Home, Freetown, viz:—blackwater fever, pernicious anaemia, bronchial asthma and ischio-rectal abscess.

123. *Native Officials.*—There were 41 native officials resident during the year. Of these 29 were placed on the sick list for an aggregate period of 235 days. No special diseases appear to have been treated.

124. *Non-Official Europeans.*—The general health is reported as good. One case of yellow fever was discovered at Blama, which terminated fatally on transfer to the Nursing Home, Freetown. The total number resident was five.

125. *Non-Official Natives, including Syrians.*—Their general health is reported as good, but Dr Ward, in judging from the meagre attendance of the latter, whose health is notoriously poor in Sierra Leone, considers that their apparently improved health is not real, but that it arises from a growing disinclination to consult a doctor, when panaceas in the shape of patent medicines, the use of which is unfortunately on the increase, are readily available.

126. *Meteorological.*—The returns indicate normal conditions.

DARU.

REPORT BY DR. H. E. ARBUCKLE, W.A.M.S.

127. Dr. McConaghy was appointed to this station in March; until then the Medical Officer, Bo, paid a fortnightly visit. Dr. Arbuckle took over charge from Dr. McConaghy in October.

128. The station of Daru is of interest, mainly because it is the Headquarters of the Sierra Leone Battalion, West African Frontier Force.

129. *European Officials.*—These numbered 39 during the course of the year. Of these—(a). The number on the sick list was 18; (b). The total number of days on the sick list was 170.

Native Officials.—The total number resident was 10; (a). The cases on the sick list numbered 11; (b). The total number of days on the sick list was 27.

130. The total number of men with their families numbered about 800, among whom the complaints common to the general population of the Protectorate were the most in evidence.

European Non-Officials.—The general conclusion was that this section of the community enjoyed fair health. One case of blackwater fever at Segbwema treated in Freetown returned to his station and enjoyed subsequent good health.

Non-Official Natives.—It is reported that, with the exception of treatment for local lesions, there is a tendency among the natives to resort to primitive methods of treatment.

Special Diseases.—No small-pox was reported in this District, but the vaccination returns are nevertheless satisfactory.

	1915	1916
Total number	35	565
Total successful	22	498

No other "Special Disease" is reported.

Hospital and Dispensary.—

Intern patients numbered	593
Out-patients	2,999
Subsequent attendances	3,415

131. The diseases treated presented no extraordinary features over the average returns.

132. The figures for 1916 are more than double those of the previous year, and are attributable largely to the presence of a resident Medical Officer, and also to the return of the Battalion from the Cameroons Expedition.

BATKANU.

REPORT BY DR. N. S. DEANE, W.A.M.S.

133. A permanent Medical Officer, Dr. Deane, was stationed here from October to the end of the year. Dr. Maxwell, a local Practitioner, who was temporarily engaged, resided at Batkanu for short periods in February and March, and Dr. Easmon, who was stationed at Makene, paid monthly visits for a time.

134. *Health of Officials.*—The health of the two permanent European officials, the District Commissioner and an Assistant District Commissioner, was good. The native staff enjoyed only fair health, one death occurring among them from hepatic cirrhosis.

135. *Intern Patients.*—There were 86 intern patients and two operations were performed.

136. *Out-Patients.*—1,770, with 2,976 subsequent attendances.

The prevailing diseases were:—digestive disorders, bronchitis, ulcers, rheumatism, intestinal worms, malaria, syphilis, yaws and gonorrhœa.

137. *Special Diseases.*

(a) Syphilis—53 cases were treated, chiefly tertiary.

(b) Leprosy—One case of anæsthetic leprosy.

138. *Epidemics.*—Small-pox was very prevalent during the year. 614 cases were seen. The Medical Officer is of the opinion that direct inoculation is practised by the natives, thus tending to spread the disease.

139. *Vaccination.*—Of the 2,081 cases done 1,815 were successful. There was an outbreak of epidemic pleuro-pneumonia among the cattle in the District in September and October at the end of the rains. It was successfully dealt with.

KABALLA.

REPORT BY DR. W. O. TAYLOR.

140. A Dispenser was in charge during the first six months of the year, when Dr. Taylor assumed charge.

141. *Health of Officials.*—There was only one European official, the District Commissioner, who had a mild attack of small-pox, otherwise his health is reported as good.

The native staff consisted of the Medical Officer, the Dispenser, three clerks and 43 Court Messengers, Warders, etc. Among the Court Messengers an aggregate of 166 days off-duty is shown, on account of ulcers and malarial fever principally.

142. *In-Patients.*—There were 24 cases with one death. Five operations were performed.

143. *Out-Patients.*—There were 1,168 out-patients, an increase of 152 over the number for 1915, with 1,034 subsequent attendances.

The prevailing disorders were of the general type met with all over the Protectorate.

144. *Special Diseases.*—No cases of yellow fever or trypanosomiasis.

Leprosy is said to be "not at all uncommon."

Venereal disease is common.

Small-pox.—An outbreak with 11 cases was noted, of which two died. It was promptly dealt with.

145. *Vaccination.*—5,143 vaccinations were performed. 4,336 of these were successful, 346 unsuccessful, and 461 not seen.

KANRE LAHUN.

REPORT BY DR. M. C. F. EASMON.

146. This station was re-opened in May on the return of the West African Frontier Force from the Cameroons. A dispenser was in charge until August, when Dr. Easmon assumed charge.

147. *European Officials.*—There were four civil officers and five officers of the West African Frontier Force resident during various periods of the year. One was on the sick list for two days.

148. *Native Officials.*—The Medical Officer, two dispensers and four others. The strength of the company of the West African Frontier Force was 105 rank and file, and their general health is reported as good. Of the native officials one was on the sick list for six days.

149. *Non-Official Europeans.*—One only.

150. *Non-Official Natives.*—The estimated population is 600. No special disease occurred.

151. *Vaccination.*—460 cases were done, 383 being successful. Being a newly opened area, vaccination has not yet become quite popular.

SCIENTIFIC.

A FEW NOTES ON DYSENTERY AS SEEN IN FREETOWN.

By DR. W. A. YOUNG.

152. It is as well that disease is accompanied by pain, for although not pleasant to the individual concerned, it is a safeguard for the remainder of the community. In Freetown, this is well demonstrated in such a disease as dysentery. Here blood and mucus may be passed in quantity in the faeces, and nothing more be thought about the matter, were it not that sooner or later the pain and griping make the affected inhabitant of Freetown realise that such a state of health is not good. The conditions are such that amœbic carriers are plentiful in Freetown, and the habits of the people tend most effectively to the spread of the disease. That the number of dysentery cases has increased during the past two years is not difficult to understand. Hundreds of carriers left Sierra Leone for the Cameroons. Whether they had already the pathogenic amœbæ within them, or whether they became easily infected owing to adverse conditions, cannot be stated, but it is a fact that many suffered from severe dysentery while in the Cameroons. As some of these came back to Sierra Leone there is every reason to suppose that they had become "amœbic carriers" on their return. In the Carrier Division of the Duala Base Hospital during August, 1915, out of a total admission list of 474 for that month, 74 cases were dysentery. Of these 69 were definitely amœbic dysentery cases and recovered under emetin and ipecacuanha treatment. I know this, because I was in charge of the Carrier Division for that particular month. One has only to watch such carriers eating their rice to realize that the spread of amœbic cysts is exceedingly difficult to control. Although amœbic dysentery may and can be spread by water contamination, the water supply of Freetown, as it arrives at the stand-pipes and taps, at the present moment, does not

contain *Entamoeba histolytica* or its cysts. Since so far no case has been shown by bacteriological methods to be due to Shiga and Flexner's Bacilli, it may safely be assumed that the dysentery here is spread more or less directly from person to person. ("Water Supply" does not include the Freetown wells).

MICROSCOPIC.

153. A fresh specimen from an acute case of dysentery showed large active amœbæ which always appeared to travel in one direction. The ectoplasm was slightly refractile, and they varied in size from 50μ — 20μ . Red cells were abundant, and often considerable numbers had been phagocytosed. Some pus cells were present also. As the acute case got better under treatment, the erythrocytes quickly diminished, while the pus cells increased until the lesion had healed. In chronic or recurring cases, or acute cases which were 4-5 days old, specimens showed:—

1. { (i.) Motile amœbæ (more sluggish than in acute and fresh cases),
and rarely a red cell phagocytosed.
(ii.) Few erythrocytes (may explain (i).)
(iii.) Abundant leucocytes and pus cells.

or

2. { (i.) Encysted amœbæ (with 1, 2, 3 or 4 nuclei).
(ii.) An occasional or no red cell present.
(iii.) Abundant pus cells.

154. The dangerous type of case to the community at large is the "Cyst Carrier." He evinces no clinical manifestation of "dysentery," but a microscopical examination of his fæces made in the routine examination of his secretions, etc. when he seeks admission to hospital for some incidental ailment, readily reveals the latent nucleated cysts and his potentialities as a dysenteric apostle. In recognising the almost universal local prevalence of helminthic infections, a feature was noted with interest, and indeed was one which might reasonably have been accepted as an index of the progress of a patient towards recovery from dysentery. The presence of the ova of various intestinal worms is almost an invariable quantity in the examination of fæces otherwise regarded as normal. Now, during the stage of acute or sub-acute dysentery these ova were rarely noted, but as soon as a convalescent patient's fæces reached the stage of containing "a few pus cells and a little mucus and no erythrocytes and amœbæ" the ova began to re-appear, the presumption being that the morbid condition of the intestinal tract was inimical to the egg-laying function of the parasite. All the amœbæ examined have answered to the combined description of *histolytica* and *tetragena* as given by Darling, James, Craig, Wenyon and others, and therefore *Entamoeba histolytica* is the cause of the dysentery as seen in Freetown. (Whether bacillary dysentery exists as such in Freetown cannot yet be stated, because, as far as I am aware, the necessary organisms have not been cultured from dysenteric fæces. Many attempts were made during the latter months of 1916, but only *B. coli* could be grown. After some practice the amœbic nucleus was seen quite easily in most fresh specimens, being characterised by blocks of chromatin under the nuclear membrane and a centriole. It was always eccentric. Lack of time prevented the more elaborate methods of staining, but dry fixation, staining 1 hour in Leishman's stain and overnight in Giemsa's stain and decolorising to the necessary amount in 1 per cent. ammoniated alcohol, was done in many cases, and the specimens showed the points necessary to diagnose the amœbæ as the pathogenic species. Flagellates are often found, but so far do not appear to cause dysentery, though patients who have large numbers thereof frequently suffer from diarrhoea at intervals, with the passage of more or less

mucus. Occasionally fulminating types are seen, *e.g.*, where the patient only complained about 48 hours before death. Amœbæ were found in the stools, but emetin, etc., were unavailing. At the post-mortem the transverse colon showed all the pathological signs of amœbic dysentery, also including the necessary amœbæ, but the actual cause of death appeared to be an acute toxæmia, whose action showed itself in the liver, which was in a state of fatty degeneration. Fortunately these cases are rare. Apart from such, the treatment of the ordinary acute case by emetin hydrochloride and ipecacuanha, combined with tannic acid to prevent vomiting, is efficacious.

"The type of case in which any recognised method of treatment appears to be of no avail is that in which, as a result of long continued ulceration and necrotic changes, the large intestine has degenerated into an inflamed tube lost to all sense of physiological response. The patient seeks relief for what has become, to his way of thinking, an intolerable diarrhoea, but the post-mortem reveals the true condition."

155. It is hoped shortly to be able to note the results of the treatment of cyst carriers by the combined "bismuth, iodide and emetin" method.

(Sgd.) W. A. YOUNG,

Medical Officer,

LABORATORY.

15/1/17.

KABALLA (DR. TAYLOR).

156. *Malaria*.—50 blood films were examined, and sub-tertian parasites were found in 5 cases. In 20 cases pigmented mononuclear cells were found. Eosinophilia was noted in 3 cases. Of 1,098 children examined 251 had enlarged spleens.

157. *Helminthic Infections*.—The common worms were noted in the few cases examined.

158. *Dysentery*.—2 cases of amœbic dysentery were diagnosed microscopically.

BATKANU.

159. Dr. Deane reports that a case of leprosy was placed under the care of a bush "medicine-man" who claimed to be able to cure it. The man has been encouraged in his effort and promised a reward if successful. At the time of writing, the disease was still in evidence, though some minor improvement was noted.

Dr. Deane also makes the statement that inoculation for small-pox is practised by the natives.

DARU.

160. It was necessary to send an additional dresser to Daru, as the men of the West African Frontier Force were considerably affected by ill-health after their return from the Cameroons Expedition.

KANRE-LAHUN.

161. Dr. Easmon reports that mosquitoes are "relatively few." 91 children were examined, and 31 exhibited spleens in varying stages of enlargement. The mosquitoes seen were anophelines and stegomyia. Simuliidæ, tabanids and hæmatopota were among the biting flies caught by the Medical Officer.

BONTHE.

162. Dr. Mayhew records successful treatment of chronic ulcers with an oil emulsion of galyol, an easier method, and especially so when distilled water cannot be had. Other chronic ulcers which did not respond to the galyol treatment did well on a mixture of tartar emetic and potassium iodide.

MOYAMBA.

163. Report on 40 cases specially examined by Dr. Murphy.

<i>Blood</i>	..	M. Filaria Nocturna	...	...	...	14
		M. " Diurna	..	...	...	4
<i>Urine</i>	...	M. " resembling "Nocturna"	...	...	...	1
		Bilharzia	...	...	...	3
<i>Fæces</i>	...	Ascaris ova	...	...	...	8
		Ankylostome ova	...	...	...	6
		Trichocephalus dispar	..	...	...	2

M. f. diurna and nocturna were found together in 1 case. The m. f. resembling m. f. nocturna was found in the urine. Symptoms of treatment but marked hæmato-chyluria were noted.

164. *Bilharzia*.—3 cases were found among Mendis who had no other symptoms. 16 Timnees were examined with negative results. Arising out of this examination and that conducted by the Medical Officer, Bo, in 1915 (*vide* Annual Report, page 25), Dr. Murphy makes the following suggestion as a possible reason for the comparative immunity evinced by the Timnees from bilharzia. In the Timne country there are large grass areas annually destroyed by fire. This probably interferes with the spread of the molluscs which act as intermediary hosts. A *dry* country does not necessarily interfere with the process, *e.g.*, Egypt. The infection is noted equally in a "wet" country, *e.g.*, the Konnoh district of many perpetual streams (*vide* Annual Report for 1915). The infection does not seem to have been noted in the Timne country, composed largely of extensive grass plains and of few constant streams, not unlike Egypt in this latter respect. However, in an intensively cultivated country like Egypt, there are probably no large stretches of waste grass lands in the more densely populated areas. Consequently there are no annual grass fires. The predominant features of the Mendi and Konnoh countries are dense bush and forests. There are no extensive fires. The inference then is that in Konnoh, as in Egypt, there are no "cleansing fires," and consequently ever present bilharziasis and its means of propagation, while in the Timne country, visited annually by devastating grass fires, we have practically no bilharziasis.

165. Dr. Murphy also made a collection of biting flies when attached to the Cameroons Expeditionary Force. One specimen of *Tabanus* is probably a new *Hæmatopota*, as it was unknown in the British Museum Collection.

166. Drs. Murphy and Wood investigated the supposed action of the enzymes "Amylopsin and Trypsin" in effecting a cure in malarial infections. The general results were not convincing. One case showing a large infection with "crescents" was not at all affected by the treatment. Quinine similarly had no effect, but an intra-venous injection of "galyd" completely sterilized the blood.

D. BURROWS,

Acting Principal Medical Officer.

SIERRA LEONE,

March 31st, 1917.

GENERAL DISEASES—

Anæmia ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...</
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LOCAL DISEASES.

DISEASES OF THE NERVOUS SYSTEM—

Sub-section 1.

Neuritis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...</
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Sub-section 2.

Apoplexy ...	...	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
Paralysis ...	...	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43
Chorea ...	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Epilepsy ...	...	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Neuralgia ...	...	113	14	1	3	1	—	34	22	15	8	—	—	—	—	3	2	—	—	—	—	—	—	—	—	—	—	29
Hysteria ...	...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Others ...	...	7	3	1	17	19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Sub-section 3.

Idiocy ...	...	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mania ...	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Melancholia ...	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dementia ...	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Delusional Insanity ...	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Others ...	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

DISEASES OF THE EYE—

Conjunctivitis ...	...	81	28	20	2	31	19	23	14	13	6	—	18	4	20	7	11	—	7	5	2	10	11	24	8	9	3	376
Keratitis ...	...	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ulceration of Cornea ...	...	5	5	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

DISEASES OF THE DIGESTIVE SYSTEM—continued.

[illegible]

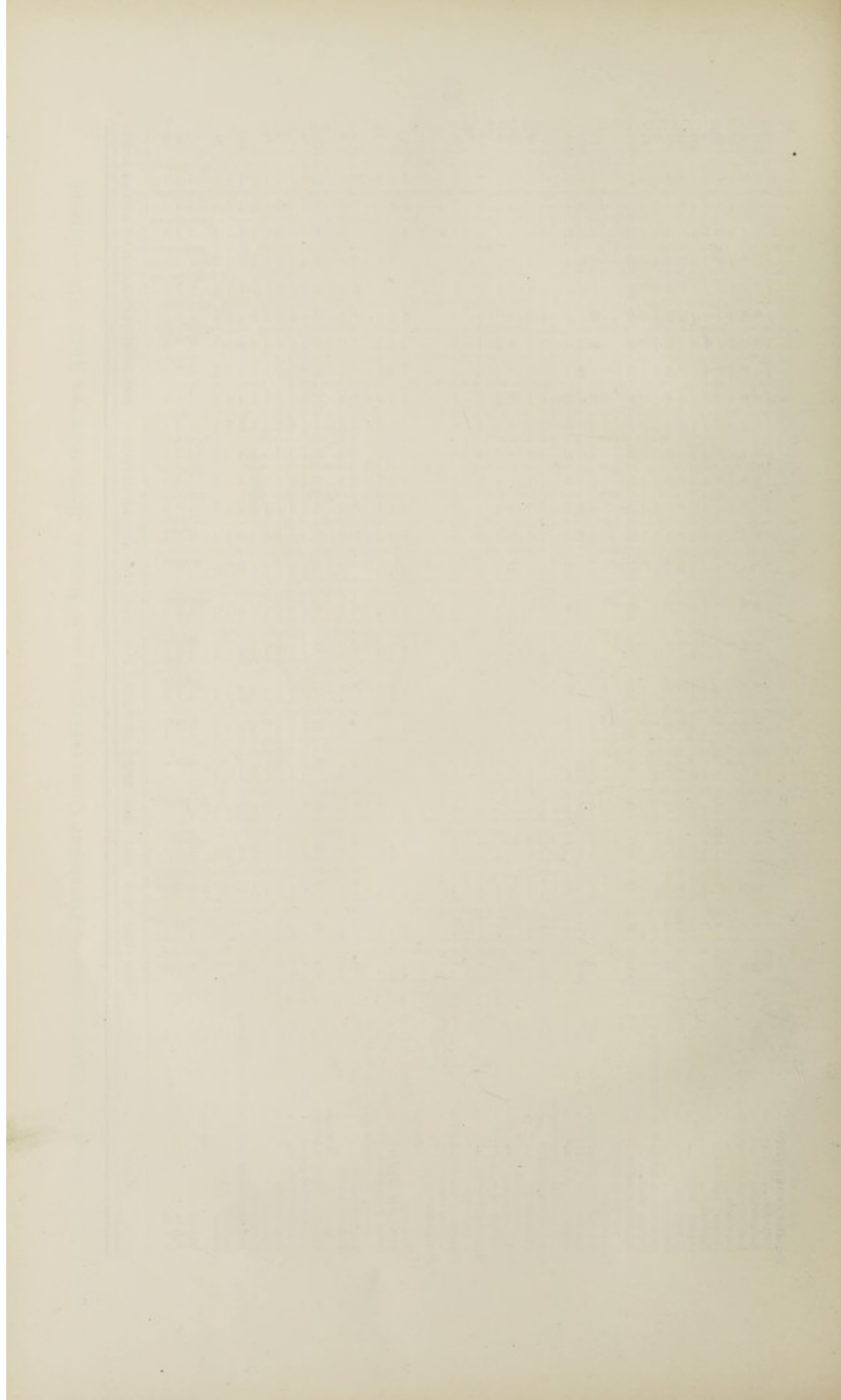
DISEASES OF THE LYMPHATIC SYSTEM—

[illegible]

DISEASES OF THE URINARY SYSTEM—

DISEASES OF THE GENERATIVE SYSTEM—
Male Organs.

DISEASES OF THE SKIN—		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		2373		2374		2375		2376		2377		2378		2379		2380		2381		2382		2383		2384		2385		2386		2387		2388		2389		2390		2391		2392		2393		2394		2395		2396		2397		2398		2399		2400		2401		2402		2403		2404		2405		2406		2407		2408		2409		2410		2411		2412		2413		2414		2415		2416		2417		2418		2419		2420		2421		2422		2423		2424		2425		2426		2427		2428		2429		2430		2431		2432		2433		2434		2435		2436		2437		2438		2439		2440		2441		2442		2443		2444		2445		2446		2447		2448		2449		2450		2451		2452		2453		2454		2455		2456		2457		2458		2459		2460		2461		2462		2463		2464		2465		2466		2467		2468		2469		2470		2471		2472		2473		2474		2475		2476		2477		2478		2479		2480		2481		2482		2483		2484		2485		2486		2487		2488		2489		2490		2491		2492		2493		2494		2495		2496		2497		2498		2499		2500		2501		2502		2503		2504		2505		2506		2507		2508		2509		2510		2511		2512		2513		2514		2515		2516		2517		2518		2519		2520		2521		2522		2523		2524		2525		2526		2527		2528		2529		2530		2531		2532		2533		2534		2535		2536		2537		2538		2539		2540		2541		2542		2543		2544		2545		2546		2547		2548		2549		2550		2551		2552		2553		2554		2555		2556		2557		2558		2559		2560		2561		2562		2563		2564		2565		2566		2567		2568		2569		2570		2571		2572		2573		2574		2575		2576		2577		2578		2579		2580		2581		2582		2583		2584		2585		2586		2587		2588		2589		2590		2591		2592		2593		2594		2595		2596		2597		2598		2599		2600		2601		2602		2603		2604		2605		2606		2607		2608		2609		2610		2611		2612		2613		2614		2615		2616		2617		2618		2619		2620		2621		2622		2623		2624		2625		2626		2627		2628		2629		2630		2631		2632		2633		2634		2635		2636		2637		2638		2639		2640		2641		2642		2643		2644		2645		2646		2647		2648		2649		2650		2651		2652		2653		2654		2655		2656		2657		2658		2659		2660		2661		2662		2663		2664		2665		2666		2667		2668		2669		2670		2671		2672		2673		2674		2675		2676		2677		2678		2679		2680		2681		2682		2683		2684		2685		2686		2687		2688		2689		2690		2691		2692		2693		2694		2695		2696		2697		2698		2699		2700		2701		2702		2703		2704		2705		2706		2707		2708		2709		2710		2711		2712		2713		2714		2715		2716		2717		2718		2719		2720		2721		2722		2723		2724		2725		2726		2727		2728		2729		2730		2731		2732		2733		2734		2735		2736		2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ANNUAL SANITARY REPORT

FOR THE YEAR ENDING 31st DECEMBER, 1916,

BY THE

SENIOR SANITARY OFFICER.

ANNUAL REPORT

FOR THE YEAR ENDING 31st DECEMBER 1900

BY THE DIRECTOR

III.—SANITATION.

I.—ADMINISTRATION.

1. The Sanitary Department of Sierra Leone was extremely unfortunate in losing, by his retirement on the 13th March, 1916, the services of Dr. Kennan, Senior Sanitary Officer, who had been connected with the Department since its inception in 1910, and who before and subsequent to that time had always been deeply interested in the sanitary history, progress and development of the Colony and Protectorate.

2. From the 30th October, 1915, when Dr. Kennan went on leave to England until the 22nd July, 1916, Dr. Beringer, Sanitary Officer, acted as Senior Sanitary Officer, and from the 23rd July, 1916, the responsibility for carrying on the work devolved upon me.

COLONY AND PROTECTORATE.

3. The entire area of the Colony and Protectorate is 24,908 square miles with a population of 1,403,132 persons. The area of the Colony is 257 square miles, with a population of 75,572, over one-third of which is composed of small traders and persons employed in cultivating the land.

4. Only in the Colony are members of the Sanitary Staff posted, and only to the Colony previous to 1916 was a Public Health Ordinance applicable. In 1915 the Public Health Protectorate Ordinance was passed, but no part of it was applied to any district, town, or village of the Protectorate until the latter half of 1916, when Port Lokko and Bo, after being declared to be Sanitary Districts, had certain sections of the Ordinance applied to them. By this Ordinance the Chief is constituted the Sanitary Authority of the District, and it is hoped he may become much interested in the sanitation of his chieftdom.

5. Apart from the Quarantine Ordinance and the Public Health Protectorate Ordinance, both of which are of comparatively recent origin, the Health Laws of the Colony are so scattered, so complicated and so unsuitable for application that sanitary development is very much hampered at present, and will always be until the Laws are simplified, consolidated and brought more into harmony with those of other Colonies. The only thing afterwards remaining to be done will be to enforce them judiciously, for there is no place on the Coast where the wise and firm application of just laws could do more good to the people, who would in time be forced to admit that fact and who, without such compulsion, constantly oppose themselves to the simplest sanitary reforms.

FREETOWN AND BONTHE.

6. Freetown and Bonthé, the former the chief port in the Colony of Sierra Leone, the latter a port in the island of Sherbro, also included in the Colony, have all along practically formed the Alpha and Omega of sanitary development, and it is not to be wondered at, as, apart from being the most important ports in either Colony or Protectorate, the funds available for sanitary requirements have not been able to extend much beyond them.

7. Each of these towns was administered by a Council or Board which controlled their sanitation, but the Sherbro Municipal Board was dissolved in 1913, when its duties were handed over to the District Commissioner of Sherbro; and although the City Council of Freetown still exists, its sanitary responsibilities have been taken over by the Government Sanitary Department.

FREETOWN.

8. The Medical Officer of Health of Freetown, assisted by two European Sanitary Inspectors and eighteen natives, has been responsible for the sanitary work, including scavenging and conservancy of the town with a population of 34,000 inhabitants and containing close on 7,000 huts and houses.

9. Freetown is divided into 14 sanitary areas, and 15 of the Native Inspectors are employed in the inspection of streets, houses and compounds and the general supervision of labourers in their sections, the remaining 3 being engaged in performing special duties. As most of the Inspectors are not very expert at their work and, on account of the smallness of their number, have so many and such varied duties to perform, it is only possible to visit each hut or house once in five weeks, thus allowing ample time for anything of an insanitary nature to appear in the interval.

VILLAGE SANITATION.

10. Most of the towns and villages within the Freetown Police District have had simple sanitary regulations drawn up and signed by the members of the village committees appointed under the Headmen Ordinance of 1906, and an attempt was made to have similar regulations signed and approved for Allen Town, Bathurst and Regent, which had been overlooked; but up to the end of the year it did not prove successful.

11. As a result of complaints received from the inhabitants of some of these villages with regard to undue interference on the part of Sanitary Inspectors, and the loss of time involved by their being summoned and having to appear before the Police Magistrate for trivial matters which they did not regard as being offences against the Public Health Ordinance, a meeting of the headmen of the various villages was called, at which Mr. Evelyn, the Acting Colonial Secretary, and myself were present, for the purpose of putting the village sanitation on a more satisfactory basis. The responsibility of the headmen and their committees to their own villages was pointed out to them, and they were shown the evil results which might ensue to Freetown and the rest of the community if they neglected to keep their villages in good sanitary condition.

12. Two out of three Sanitary Constables, who had during the small-pox epidemic of 1916 replaced Sergeants of Police, who formerly acted in the capacity of Sanitary Inspectors of villages besides doing their other duties, were withdrawn, and the headmen and their committees were charged with the care of their own villages which are inspected periodically.

13. It is too early yet to say how the new arrangement will work, but if the headmen and their committees cannot be relied upon to keep their villages clean, it may become necessary to treat the latter as part of the Freetown Sanitary District.

NATIVE SANITARY STAFF.

14. An important improvement effected during the year was the abolition of dual control of the native sanitary staff. By the Police Ordinance of 1907, Section 30, the Native Inspectors were constituted Supernumerary Constables and had been handed over to the Sanitary Department as such by the City Council of Freetown and the Sherbro Municipal Board. They were thus, in so far as their police duties were concerned, under the control of the Commissioner of Police and, as to their Sanitary duties, under the Sanitary Department. It being desirable to discontinue this system, a recommendation was put up and approved relieving the Native Inspectors of any of the functions exercised by members of the Police Department. This alteration was to come into force after the 31st December, 1916.

15. The regrading scheme for Sanitary Inspectors has not yet been put into operation, and it is unlikely that any such scheme will produce more efficient Inspectors than those at present employed, unless it is intended to select youthful candidates, and give them a preliminary course of instruction to qualify them for their work. To pass untrained, untested and uneducated men from the lower to the higher posts would be as obviously unfair to the men as to the public, who require to be taught their obligations to themselves and their neighbours before real sanitary progress can be maintained.

II.—(a) PREVENTIVE MEASURES AGAINST INSECT-BORNE DISEASES.

MALARIA.—ANTI-MOSQUITO WORK.

16. Owing to the small number of Sanitary Inspectors employed, the great variety of their duties and the relatively large area for which each one is responsible, it was not possible to form special anti-mosquito gangs and give them the requisite amount of supervision, but much useful work preventive of mosquito-breeding was nevertheless accomplished by the Inspectors and labourers in conjunction with their ordinary duties.

17. The Eastern and Western low-lying portions of the Freetown District, which in the rains become favourite breeding grounds for anopheles and stegomyia, received special attention, pools being filled with earth or regularly treated with a mixture of kerosene or mosquito oil and crude petroleum or tar, two parts of either of the former to one of either of the latter being the proportion found to yield satisfactory results at least cost.

18. Houses and compounds in Freetown are inspected about once in five weeks, which is not frequently enough, considering the fact that including water-bearing trees and plants the mosquito index is comparatively high; and even excluding these when pressure of other work, such as the smallpox epidemic in the early part of the year, caused a considerable diminution in the frequency and number of visits to compounds by the Sanitary Staff, the index rose to 19·7% in June, whereas in March and December it was 1·14% and 1·43% respectively.

19. Wells and cesspools are favourite breeding places for mosquitoes, and in Freetown close on 200 of the former and 600 of the latter are regularly oiled, wells once a week, cesspools once a fortnight. This work absorbs a great deal of money and a large proportion of the time of Inspectors and labourers, and although the people do not make use of the water of the wells so treated, as they generally have no pump, they are in most cases quite averse to having them filled up with earth.

20. It is proposed at an early date to have special oiling and mosquito gangs so as to facilitate the progress of the work.

21. The inspection of trees occupies a great deal of time, some of the cavities of large cotton-trees containing anything up to 130 gallons of water. These holes, which in the cotton-tree are usually formed by the huge buttresses, are chiefly found in the softer wooded varieties and in trees the centre of whose stems, when cut or broken, is hollow or easily decomposed.

22. The method of treating holes in trees, whether they contain larvæ or not, is to have channels cut so that they cannot retain water, or the cavities are cemented up. The larger holes, which sometimes take two or three days to fill up, are oiled after specimens of larvæ have been taken from them. They are then filled up with rubble, and the top is cemented over.

23. A large proportion of the larvæ taken from trees has been found to be *stegomyia*, which is usually associated with some other kind, such as the larvæ of *Culiciomyia nebulosa*, *Toxorhynchites* or even *Anopheles costalis*, whereas in wells *Culex decens* is found to be most abundant.

24. Cavities in the rocky beds of streams and ditches and isolated patches of water found in their courses or elsewhere, during the dry season, have not been overlooked, neither have the borrow pits and quarries from which stone has been extracted for building purposes. Wherever possible channels have been cut to allow the water to pass off, or they were filled up or oiled.

QUININE PROPHYLAXIS.

25.—Quinine is issued free to Government Officials, but is not distributed to public institutions. The native, in most cases, is quite alert to the advantages it confers upon him.

MOSQUITO NETS AND PROOFING.

26. Mosquito nets are not, in this Colony, distributed free to all officials independently of their rank, but are provided for second class officers. It seems to me that where nets are supplied by Government, there is less likelihood of their being retained long after they are riddled with holes and have become quite useless as a means of keeping out mosquitoes. The life of a net in this country is not a long one if it is sent to be washed, as the ingenious methods employed by the natives soon convert a safe net into a positive death-trap.

27. The advantages to be obtained from the mosquito-proofing of rooms do not seem to be well understood or find much favour, meat-safes serving, even in hospitals, as substitutes for them. In my opinion a mosquito-proof room or house has decided advantages over a mosquito net, and any officer showing a marked preference for the former should be provided to the extent that, in the opinion of the Medical or Sanitary Authorities, may be necessary.

28. Mosquito-proof barrels for the storage of water are not much in use, but would be advantageous to the people of Bonthe, York Island, and other low-lying places, where good wells are few in number and the storage accommodation is not great.

YELLOW FEVER.

29. The only authentic case of yellow fever which came under our notice occurred near the end of the year at Blama, some 168 miles up the Railway from Freetown, and judging from previous reports of severe illnesses and deaths among Europeans, who are few in number at this place, one concludes that this is one of the yellow fever endemic foci of the Protectorate.

30. The most stringent precautions were taken to prevent the disease from spreading, and every house and compound was searched for mosquito-breeding places. It is regrettable that in one European compound twelve vessels containing mosquito larvæ were discovered, and from the compound where the yellow fever patient lived two receptacles containing water and *stegomyia* larvæ were obtained.

31. The Syrian and Native quarters and compounds were found to produce much fewer mosquito breeding places than the compounds occupied by Europeans; but it is significant that just before this case of yellow fever made its appearance, a Syrian child living only a few hundred yards away from the house where the European case occurred died after a short severe illness from an undiagnosed disease.

32. By Section 2 of the Quarantine Ordinance No. 16 of 1914, where a place is an infected place within the meaning of Article I. of the Regulations in the Schedule to this Ordinance, the Governor may by Order declare such place to be an infected place, but there is no authority given in this or any other Ordinance to evacuate an infected area, keep contacts under observation if necessary, and so facilitate the work of disinfection and other measures regarded as essential to check the spread of the infection.

TRYPANOSOMIASIS.

33. I have dealt in Section III. of this report with what efforts were put forth for the extermination of the *Glossina palpalis* in an area which Professor A. Warrington Yorke and Dr. Blacklock found to be infested with them, and have shown the results obtained. More clearing of tsetse fly areas was done during 1916 than perhaps had ever before been undertaken, and an endeavour will be made to keep the ground won from reverting to its former condition and to increase its extent as opportunity arises. It is well known, however, that when Glossinæ are compelled to vacate one area they become more numerous elsewhere, and it is not difficult for them to find a congenial habitat near to their former breeding ground, so extensive is the high bush and so thick the underbrush.

FILARIASIS.

34. Filarial infection does not seem to occur so frequently in this Colony and Protectorate as in some other parts of the Coast. Its distribution is difficult to ascertain, and no special measures have been undertaken for its suppression.

II.—(b) PREVENTIVE MEASURES AGAINST INFECTIOUS AND EPIDEMIC DISEASES.

CEREBRO-SPINAL MENINGITIS.

35. Fortunately cerebro-spinal meningitis has only appeared in imported cases, and through the energetic action of the Military Medical Authorities and the rapid and careful transport and isolation of the patients, combined with the adoption of the necessary prophylactic measures, there was no spread of infection to the civil population.

DYSENTERY.

36. This disease is of frequent occurrence and is not entirely confined to the native population, which is careless alike with regard to what it eats and drinks, and although there may be a scarcity of pipe-borne water at times for ordinary domestic purposes, there is no necessity whatever to use any other than pure water for potable purposes.

37. With the compulsory closure of every well and the large majority of cesspools in Freetown, after the water supply has been augmented to meet all requirements, a great diminution in the number of cases of dysentery would be likely to follow, but the necessary legislation must be forthcoming.

38. The introduction of potable water-supplies to out-stations and villages which do not, at present, possess them is receiving attention, as is also their protection from pollution.

PLAGUE.

39. Active measures for the suppression of the rat population of Freetown are always in operation, particular attention being paid to warehouses, markets, stores and other buildings near to the harbour. The varieties of rats most frequently found are *Mus rattus* and *Mus decumanus*.

40. A large number of traps are in constant use, and two consignments of Danysz Virus have been tried, but the latter, very active at first, soon seems to lose its virulence.

41. No evidence of plague infection was discovered in any of the rats examined during the year.

LEPROSY.

42. Apart from the authority which the Governor has under the Prisons Ordinance to remove a case of leprosy from a prison to a hospital for incurables or other suitable place, there is no legislation whatever on the subject, and lepers cannot be brought under any kind of restraint, unless they are agreeable to it, which few, except very advanced cases, are; but something should be done for the protection of the general public, for leprosy is not an unknown disease in this country, and lepers should at least be hindered from having access to public institutions.

SMALL-POX.

43. At the end of the first quarter of the year and throughout the second quarter, a number of small-pox cases made their appearance in Freetown, which caused the city to be declared infected on the 23rd March, 1916; and as the epidemic soon spread beyond its limits, it was found necessary on the 11th April to also declare the Police District of Freetown outside of the City of Freetown to be an infected place. It was not until the 10th day of June that the City, and the 22nd day of July that the Police District outside it, were declared to be no longer infected places.

44. Concurrently with small-pox in Freetown, an epidemic of chicken-pox was running, which necessitated the two diseases being treated alike.

45. All necessary precautions were taken to prevent the disease from spreading. Vaccination stations were established and European and Native Medical Officers and a few Dispensers, the latter having been appointed Assistant Public Vaccinators, attended at certain hours every day. Vaccination was made compulsory, and more Assistant Public Vaccinators were appointed.

46. In the Protectorate also an outbreak of serious dimensions made its appearance, particularly in the Karene District, a large portion of which was declared to be an infected place on the 20th March; but as this and the Freetown epidemic have been fully dealt with in special reports little more need be said regarding them.

47. As a result of experience gained in these outbreaks several important improvements have been effected, viz. :—

(1) A new, efficient and rapid means for disinfecting huts and houses has been introduced; (2) the Colony and Protectorate Staff of Vaccinators has been greatly increased, specially selected natives, representative of the more important tribes, having, at the suggestion of His Excellency, been trained and appointed Assistant Public Vaccinators among their own people in the Protectorate; (3) District Commissioners have also been taught the art of vaccination, and been appointed Assistant Public Vaccinators, so that in the absence of a Medical Officer they could undertake the duty, and so aid in suppressing the disease before it should assume epidemic proportions.

48. That both of the epidemics referred to above should have terminated as satisfactorily as they did was, I am convinced, due to the help that the Medical and Sanitary Department received from Officers of the Royal Army Medical Corps stationed in Sierra Leone, the District Commissioners and their Assistants, the Native Medical Practitioners, and I should say most of all to the French Government at Dakar and their Medical and Sanitary Staff, which

generously supplied us with large quantities of pure, fresh lymph, and thus enabled vaccination work to be carried on without intermission, which contributed largely to the saving of many lives, as well as the speedy suppression of the epidemic.

VACCINATION.

The following vaccinations were performed :—

	1914.	1915.	1916.
Total number vaccinated	6,032	6,880	87,705
Total number successful	4,323	4,976	71,744

The difference between the figures for 1916 and the previous years shows that vaccination was not only more energetically pushed in the Colony and Protectorate, but also that the people showed less opposition than formerly to its being carried out; but there is still an idea prevalent in their minds that young children and infants should not be vaccinated, and it is difficult to disabuse them of this opinion, although young children are no doubt more involved in spreading the infection than adults.

II.—(c.) PREVENTIVE MEASURES AGAINST HELMINTHIC DISEASES.

ANKYLOSTOMIASIS.

49. Infection by ankylostomes is of very frequent occurrence and widespread distribution, but for many obvious reasons no means were adopted for its eradication outside prisons and hospitals. By gradually enlightening the native and persuading him to follow a more rigid sanitary existence and dispense with some of his unhealthy institutions, a great deal of good may result, by which the younger generation will benefit, but it will be a long and tedious process.

BILHARZIA.

50. Bilharzia has been shown to be prevalent in certain sections of the country, but like ankylostomiasis it may be present without seriously inconveniencing the host, although it may markedly influence the course of other diseases; hence very few cases come to light.

51. Only by educating the people and providing pure and ample water supplies can any reform be effected. In this connection it may be stated that the idea of moving Bo School to Kennema (which was shown by Dr. Butler to be a Bilharzia-infected area, although the station is provided with a splendid water supply) has been abandoned.

III.—GENERAL MEASURES.

I.—CLEARANCE OF BUSH, UNDERGROWTH, ETC.

52. Owing to the recommendations put forward by Professor Warrington Yorke and Dr. Blacklock for the extermination of the *Glossina palpalis*, Dr. Beringer, who during the first half of the year was Acting Senior Sanitary Officer, continued the work of stripping the oil palms of their lower petioles, which was begun in 1915 on the peninsula on which stand the Lighthouse and the Cape Sanitary Station; and as half of the peninsula had been dealt

with in that year, almost the whole of the remaining portion was similarly treated in the early part of 1916; but there was ample evidence to show that the number of tsetse flies had not been markedly reduced, which was perhaps due to the cut petioles being left between the trees, the underbush not being cut and grubbed, and to the superabundance of small and large palms on the area. It became necessary, therefore, if the peninsula were to be prevented from continuing to be a breeding ground for the flies, to adopt more drastic measures; and with the approval of His Excellency a large gang of men was employed towards the end of the year in effectually diminishing the number of palms and other trees as well as the number of petioles on the remaining palms, collecting and burning the petioles and bush and clearing the underbush. As soon as the place assumed an open appearance and the light was able to penetrate freely to every part of the ground, there was not only a marked reduction in the number of tsetse flies, but they entirely vacated the peninsula as a breeding ground, and even ceased to frequent the place, except at odd times, when they might follow up a Native or European, and their presence was then only of temporary duration. The natives, who have a constant dread of tsetse flies (more, perhaps, from the inconvenience caused them than from their knowledge of the ill results produced by *Glossina palpalis*) declared and still maintain that no biting flies are now to be found on the peninsula. However valuable this testimony and that of Europeans may be, it would be useless to suppose that further work in this area will be unnecessary, for, to maintain this result, the young palms and other trees which are constantly making their appearance will require to be similarly treated, and the area not already cleared of roots will need to be grubbed.

53. The stretch of thick bush between the peninsula and the village of Aberdeen still remained to be done, but thanks to the energetic measures adopted by Major Balch, Senior Medical Officer, Royal Army Medical Corps, and his staff, a very large extent of clearing was carried out in this area by means of labour at the disposal of the Military Authorities, and the results cannot be different from those obtained on the peninsula; but unless the native, who is usually not slow to appreciate the advantages accruing to him from having work done at Government expense, provided it does not interfere with his family traditions and practice, sets himself to cultivate the land at present cleared, and thus prevent its being overgrown again by dense dark bush, it must be an expensive matter keeping this immense tract clean and therefore free from these noxious insects, although it may be regarded as obligatory on the part of the Government to maintain the land in order, and even increase the extent of clearing; and, I believe, if the whole of the Aberdeen peninsula were cleared, many natives, such as fishermen and mechanics, who are often obliged to spend a great part of their time in idleness, would find useful employment in cultivating the land. This area is of quite as much importance as the Lighthouse peninsula and harbours just as many *Glossinae*, but the same may be said of the whole of the thickly wooded region west of Murray Town.

54. The clearing of bush and grass in outstations was continued as usual, the amount of labour employed from year to year for this purpose remaining practically constant. In some stations ordinary sanitary labour is supplemented by prison labour, the latter being generally insufficient in itself to carry on the whole sanitary work of the station, and this utilization of prison labour by District Commissioners is an important adjunct in keeping in good sanitary condition places where it is employed. A noticeable feature in stations such as Daru, where Military Forces are posted, is the scrupulous cleanliness of the entire area occupied, which is due to the unremitting care and energy of the Officers in command and the aid given by them to Medical Officers.

55. In some places the uprooting of elephant grass, which may grow to a height of 11 feet or more, just previous to seeding time, has been resorted to in preference to cutting it, and as in other countries it will no doubt be found that the extra labour involved in this process is amply compensated for by the less frequent appearance of this grass and the growth of other shorter and more useful varieties in its place. All underbrush, grass and weeds when cut or uprooted, are carefully dried in the sun, collected in heaps and burned before the approach of the next rains.

II — DISPOSAL OF REFUSE.

56. In the majority of places refuse is collected from dust-bins or galvanized sanitary bins, and is sorted out into heaps according as it is found to be combustible or incombustible, the former being burned usually in simple incinerators of the vertical type and the latter buried in holes or dumped into the sea or a large river, when either of these is easily accessible.

57. In Freetown, which has a number of dust-bins of various types, refuse is collected and transported in oxen or mule carts, and in hammocks (locally known as "giggers") to the incinerators, chutes or dumping grounds, and from the latter two it is either taken out in canoes or thrown directly into the sea, often to be returned to the beach.

58. The ideal method of refuse disposal for Freetown is by incineration, but unfortunately the lay-out of the town is such that there are few open spaces available as sites for destructors where the process can be carried out without much discomfort to the surrounding inhabitants, who generally suffer severely from the smoke nuisance set up, which is also partly due to faulty design; and in a few instances the condition has become so intolerable as to force us to abandon the incinerators, but the refuse can usually be dealt with by others not quite so badly situated.

59. That this nuisance can be partially abated has been demonstrated by the alterations recently carried out on an incinerator at Campbell Street, near which stands a church which was stated to be at times filled with smoke from smouldering refuse, and the houses in the street itself were frequently seen to be wreathed in clouds of smoke. The improvements consisted in extending the chimney 12 feet, and feeding the furnace through a door placed well above the firebars, instead of passing the refuse directly on to them from the side, an additional advantage gained being that much more refuse can be dealt with as, previous to the alterations being carried out, it was only possible to make small use of the large internal capacity provided.

60. Until better and really sanitary incinerators can be provided, such as those manufactured by some of the British firms for the destruction of tropical refuse, only alterations similar to the above can be carried out, but Freetown, which occupies a long and comparatively narrow strip of ground with a railway line running through it from end to end, and a branch line extending along Campbell Street to the Public Works Department yard at the back of the town, could well be served by two large incinerators, one placed outside each end of the town. Small railway sidings could be made where the refuse could be deposited in trucks, to be eventually hauled out to the destructors placed in such a position that the incinerated materials could be utilised for filling up swamps or low-lying ground found at the east and west ends of the town.

61. One of the chief difficulties experienced at present is bad roads, and in some places lack of culverts, so that mule and oxen carts cannot be everywhere utilised in the transport of refuse; but this is now being slowly remedied, and in the near future we may hope to be able to dispense with the more costly and somewhat insanitary method of hammock transport.

62. In Bonthe and other places possessing a large area of swamp land which can be reclaimed, an endeavour is made to use the burned refuse for that purpose, but with the small quantities of material at our disposal the process is slow. Incinerated refuse is also employed for filling disused wells, where the owners are agreeable and the law cannot be applied, for replacing rock which has been quarried for building purposes, and for filling isolated pools and hollows.

III.—DRAINAGE.

(a) *Subsoil.*

63. Apart from the deep intercepting drain or ditch, cut at the suggestion of Professor Simpson between the George and Congo Rivers, which carries off a large amount of subsoil as well as surface water, nothing further has been attempted in the way of subsoil drainage, which owing to the necessity for cutting into practically solid laterite makes the construction of deep and shallow ditches very expensive, and, without properly grading and concreting their beds, the advantages gained in the rainy season are almost, if not entirely counteracted by the production of water-retaining mosquito-breeding holes, through the scooping out of the softer parts and the necessity for having these constantly inspected and treated by the application of larvicides, which, in the case of deep ditches, where the water at places is almost but not quite stagnant, do not always prove efficient.

64. If Professor Simpson's scheme had been completed, or a herring-bone system of drainage established in the lower swampy and water-logged areas in the Eastern and Western parts of Freetown, where anopheles and stegomyia find congenial breeding-grounds, an improvement would have been effected, the value of which could not have been over-estimated. Failing the construction of either of these drainage systems, the only alternative which one can suggest for the removal of the swamps and pools is the reclamation of the entire low-lying areas by the superposition of earth obtained from the foot of the mountains, and the construction of a subsoil drainage system by the introduction of earthenware pipes.

65. In Bonthe and a few other places ditches connecting up water-logged areas have been cut, or concrete drains constructed and continued to the river. Some of these ditches are tidal.

(b) *Surface.*

66. Surface drainage has consisted mainly in the laying down of concrete drains, some of which end abruptly before reaching the end of the street or another drain, and the cutting of channels in the laterite rock. Judging from the size and design of drains, little attention seems to have been paid to the dry weather flow or the amount of storm water to be carried off.

67. In the Cline Town Railway Reservation a type of concrete drain similar to the Simpson drain (which, with its glazed earthenware invert and varying capacity, provides a self-cleansing velocity for a dry weather flow of slop water and effectively deals with storm water,) has been constructed; and in Freetown itself a half egg-shaped concrete drain (fairly deep and becoming very narrow towards the bottom) has been introduced at places to serve the same purpose, but the latter is not so easily swept clean of any solid matter as the former.

68. Outfalls in Freetown have not received the attention they deserve, the consequence being that much erosion of the cliffs has resulted, which might easily have been obviated by the introduction of intercepting drains and the judicious selection of suitable outfalls.

69. It is regrettable that an up-to-date contour plan of Freetown has not been completed (Mr. Simms, Sanitary Engineer, was engaged on this work before he assumed his new duties), so that drainage areas could have been established and each section completed with reference to its requirements and those of adjacent sections. This seems to be the only way out of the present difficulty, and with a view to its early introduction I do not feel justified in approving of large expenditure of funds on merely temporary sections of drain, which may not fit into a comprehensive drainage scheme or fulfil its proper function during the time it is required. It is estimated that altogether 24,441 lineal feet of concrete drain, 16,224 lineal feet of masonry drain, 228,774 lineal feet of earth drain and 125,217 feet of cut channel drain have been constructed in Freetown.

IV.—REGULATION OF BUILDINGS.

70. An elaborate set of building regulations for Freetown has been drawn up by Mr. Simms, the Sanitary Engineer, but owing to various causes, among them Mr. Simms' absence from the Colony, it has been considered advisable to postpone their revision and simplification until after the war.

71. New building regulations are undoubtedly required for such places as Freetown and Bonthe, the necessity for drafting those for the latter port having also come up for consideration. The housing in Freetown is anything but good, there being a large number of tumbledown, insanitary, wooden structures with mat or grass roofs, and these are not confined to any particular area, but are interspersed freely among more substantial buildings, even in the zone where inflammable roofs are prohibited by law: also in many areas there is considerable irregularity and congestion, which are evidently innovations of more recent times.

72. Previous to the passing of the Public Health Ordinance of 1905, which was amended in 1910, 1911, 1912 and 1913, the regulation of buildings in Freetown was vested in the City Council by the Freetown Improvement Ordinance of 1899, but in 1913 all powers, rights and duties thus conferred on that body were transferred to the Public Works Department, which has had little opportunity of rectifying the irregularities that have been allowed to spring up before it assumed responsibility.

73. In 1908 the Sherbro Municipal Board was empowered to grant permission, after certain formalities had been gone through, for the erection of buildings in any road or street in Bonthe and York Island, and in 1909 the construction of external inflammable coverings to roofs of new buildings in course of construction was prohibited in a certain specified area in the Port of Sherbro. A bye-law was passed in 1912 disallowing the erection of any building in a low-lying part of the township of Bonthe known as "King Jimmy," but, beyond the foregoing, buildings have not been regulated in Freetown or the Port of Sherbro.

V.—SANITARY INSPECTIONS AND PROSECUTIONS.

74. Inspections were regularly carried out over the various sections of Freetown, most of the surrounding villages, and in Bonthe, to which places only Sanitary Inspectors have been appointed. In a few outlying villages the local Police sergeant did the work of inspection, but not a great deal of benefit accrued from this arrangement, and it was not considered advisable to continue it.

75. In out-stations Medical Officers do the work of inspection, but their duties are of such a nature as to confine them to one or two places only.

76. In addition to the inspection of huts, houses, compounds and markets, the Inspectors were responsible for seeing that streets, drains and gutters were

cleaned; dust-bins and latrines emptied; pools, cesspits, wells, boats and canoes containing mosquito larvæ, oiled; and in the latter half of the year the examination of trees in which mosquitoes might breed was added to their duties, which also, in the case of a few selected men, included the inspection of meat.

77. The number of huts, houses and compounds inspected in Freetown was 72,204, resulting in 4,960 notices being served to abate nuisances, from which followed 158 prosecutions; 361 mosquito-breeding places, apart from trees, wells, and cesspits, were discovered; and 359 summonses were issued, from which 305 convictions resulted.

78. The inspection of meat in the Imperial and Municipal Slaughter Houses of Freetown led to the seizure and destruction of 32 carcasses infected with cysticerci. Food inspection was carried out by the Medical Officer of Health, and several articles were condemned as unfit for human consumption.

VI.—SEWAGE DISPOSAL.

79. Neither in Freetown nor elsewhere in the Colony or Protectorate has a proper system of sewage disposal been established. Many and varied types of surface drains and ditches have been constructed without regard to the requirements of the particular section from which they are employed to remove liquid sewage, and were it not for the more or less general use of cesspools—which in themselves are frequently grave sources of danger to the inhabitants through mosquito and other fly-breeding, the necessity for periodical removal of their contents, for which no sanitary scheme has been introduced, and their close proximity in many compounds to wells which the inhabitants are very loth to have closed—the nuisance set up in the dry season would be quite intolerable.

80. Freetown (which may be regarded as a non-water-closet town, two or three firms only having constructed in connection with their premises a water-borne sewage system, one of them using a separate septic tank installation) is admirably situated and adapted for a simple, inexpensive water-carriage gravitation system; but the chief drawback to its introduction is the insufficiency of the water supply, although there is abundance of water going to waste from the mountain streams.

81. This scarcity of water, together with lack of funds, is chiefly responsible for the continuance of the present means of disposing of solid and liquid filth, which is mainly got rid of in the manner described above and by the pail system, which is mostly confined to Government Institutions and the non-native and wealthier native sections of the community, the material from the pails being dejected into the harbour or trenched. Even at Hill Station, where reside a large number of Government Officials and two European firms have erected bungalows, and where, in my opinion, the separate septic tank installation would prove comparatively cheap and efficient, slop water is removed by concrete surface drains which end abruptly outside the compounds, or after passing through other compounds, and excremental matters are removed in pails and disposed of by trenching.

82. While at Bonthe, the Port of Sherbro, a bye-law dealing with the manner, time and place of depositing night-soil in the river has been promulgated, I am not aware of any such provision having been made for Freetown, the result being that at certain parts along the foreshore nuisances are set up, especially at King Jimmy, where stand the Hospital, Slaughter houses and a market. Suitable sites for the erection of dejection jetties could be found at King Tom and Falconbridge and elsewhere if necessary.

83. In villages in the Protectorate the habits of the people vary to some degree, depending on whether the village consists of a series of isolated huts having no yards, or whether the compound system is in existence. In the former case it is necessary for the inhabitants to go far afield, the males

resorting to certain sections of the bush and the females to a stream, if one happens to be in the neighbourhood. It is obvious that while such villages may appear to be scrupulously clean, the surroundings are in anything but a sanitary condition, and the danger to other villages along the watercourses so polluted is obviously great. Where yards are attached to huts cesspools are generally in use.

84. The public latrine accommodation in the more important places is much below requirements, and when more can be provided there will, no doubt, be less opposition to the closing of cesspits, and a corresponding improvement in the health of the populace must result.

VII.—TOWN PLANNING.

85. Only in connection with proposed new villages, extensions to towns and the utilisation of spaces denuded of houses by fire, can a correct lay-out be accomplished without a great deal of expense and much opposition on the part of the public; yet to provide the proper means for drainage and sewage disposal alone, many of the older parts of existing towns would require to undergo considerable alteration and improvement.

86. His Excellency the Governor, who is interested in the construction of new towns and villages, has intimated his desire that sites should be selected and plans constructed showing the areas to be allotted to natives and settlers and presenting the lay-out of each section, and as opportunity presents itself effect will be given to this proposal. Later, it is the intention that some of the existing places shall also be improved by rearrangement and reconstruction, and the benefits accruing from them will soon make themselves felt in the improved health and comfort of the inhabitants. District Commissioners have also shown themselves to be equally keen on having model plans of a suitable arrangement which could be applied to old as well as new villages.

VIII.—WATER SUPPLY.

87. The water-supply of Freetown and contiguous places being collected from various sources (any one of which could almost, if not entirely, supply the regular demand if ample storage facilities were provided), has been a constant source of worry to the Government and annoyance to the inhabitants, who have at certain times during the dry season to fall back on other sources of supply which are almost certain to be contaminated. This is very regrettable, as purer water cannot anywhere be found, and it would seem to be desirable so to increase the quantity available at present that there should be abundance to meet every conceivable need.

88. The necessity for obtaining supplementary supplies in the dry season is no doubt responsible for many of the intestinal troubles from which so many people continuously suffer, and the unsatisfactory state of the water-supply is also a great hindrance in many other ways to true sanitary progress and development.

89. The Catchment Areas could be easily contaminated from animal sources, as they are not properly protected by fences, some of them not at all, and there are no inspection paths outside the areas which could enable them to be regularly patrolled.

90. The new pumping station in the Babadori Valley is just above and much too close to the intake, and the dam needs to be further improved, so as to prevent the water from stagnating. Much good work has been done by the European in charge of the Station, and to properly guard and keep that supply safe, a European Official will always require to be placed in charge of it.

91. A few of the outstations have good water-supplies, but others are very badly off, and efforts are being put forth to provide reliable supplies for all.

92. Bonthe is mainly dependent in the dry season on large concrete storage tanks, the roofs of which are themselves the collecting areas, but the supply often runs short, and there are few good wells in the place, which is low-lying and swampy.

93. At York Island, which is also low and swampy, a well was sunk quite near the graveyard and provided with a pump, but the people do not use it and are content to take water from the many holes which they have dug around it. So numerous are these holes that one counted 32 in a space 30 yards square, and scarcely one hole was found to be free from mosquito larvæ. The people were informed that these holes would be oiled, and they were advised to use the well provided by Government.

Distillation Apparatus.

94. Where there is a difficulty in obtaining pure water and a stream or river exists, a great deal of anxiety could be avoided by the erection of distillation plants at stations occupied by Europeans, the water obtained being distributed according to the needs of the community, but, cheap as they are, no steps have been taken to provide them.

Railway Sanitation.

95. I have not been over the whole of the railway, but judging from what I have seen I should say that the stations and the land belonging to them are kept very clean, the sanitary work at the larger stations being carried out by special gangs of labourers.

96. During construction, when there is ample European supervision, borrow pits are generally either drained or so dug that they cannot retain water, but later, when construction days are done, platelayers come along who have little idea of the harm they do by obtaining earth and ballast from the nearest place they can get it, the result being that the original borrow pits, which might not retain water, have been deepened instead of being extended, and are thus converted into mosquito-breeding grounds. There are many such places, and it is not possible to have them all oiled, nor can some of them well be drained, and filling up is rather expensive, but that should be done to the extent of obliterating the water-retaining hollows where drainage is impossible.

97. The formation of local sanitary committees at such places as Boia, Bo, Daru, etc., consisting of a Medical Officer, Traffic Officer and Engineer, to consider and report on the sanitary condition of their sections and make the necessary recommendations, would be a useful aid to sanitary progress.

Prisons.

98. The prisons which I have visited have always been found to be clean and in good order, but the ventilation and other requirements of some of them are much below the standard allowed by practical sanitarians, although the health of the prisoners seems to be comparatively good. It would appear to be desirable that no place should be declared to be suitable for a prison until it has been inspected and reported satisfactorily upon by a member of the Sanitary Department.

Infectious Diseases Hospital.

99. The only Infectious Diseases Hospital of importance is that established at Kissy, a very long journey from Freetown, and it is in such an unsatis-

factory state, the buildings being old, dilapidated and quite unsuited for infectious cases, that it is hardly worthy of the name it bears. Other features of the place are its association with the Hospital for Incurables and its burial ground in the bush in the heart of the compound.

100. Great credit is due to Dr. Campbell, the Medical Officer of Kissy, and his staff for the way in which the Hospital is kept, a vast amount of time and labour being spent on it to make it look presentable at all times.

Sanitary Station.

101. The Sanitary Station, occupying as it does a considerable extent of ground at Cape Sierra Leone, absorbs a fair amount of money each year in its upkeep. Most of the buildings are of a very temporary and unsubstantial type, and it is fortunate that it is not occupied a great deal, although it has been more frequently used during the past nine months than it had been previous to that time.

102. Access to the station is not always easy, even by boat, but the construction of a good road in its direction, which Government has in hand, will make it easier to get at.

Slaughter Houses.

103. Slaughter places have been established in several towns, but they generally do not fulfil sanitary requirements. That in Freetown is situated in a hollow between the Hospital and Messrs. Elder, Dempster and Company's palatial offices. High above it is the Imperial Slaughter House, where animals are killed for the use of the Military Authorities.

104. It has been decided that a new slaughter house for Freetown is necessary and should be built near the Market, and before anything is done in that direction I would suggest it be built over the water, and that there should be a separate place for the slaughter of pigs, and shelters erected for the reception of all animals previous to being slaughtered.

Markets.

105. Markets have been erected in many places, but the buildings are so constructed that in the larger towns they develop into very chaotic structures which it is almost impossible to sanify.

106. Nothing is more pleasing to visit than a well-designed, well-kept, wholesome market, and it is not to the advantage of Freetown that it has so long been kept without one. A new market has been designed and approved for a section of the town where no market exists, but its construction has not yet been begun.

Filters.

107. Instructions for the cleaning of filters were drawn up and printed, but as Government insists on officials paying for broken filter candles it is unlikely that even in this country, where dysentery is not uncommonly met with, the necessary cleaning will be done; the net result being that officers will go down with intestinal troubles and cost the Government much more than would the free distribution of filter candles.

III—(b) MEASURES TAKEN TO SPREAD KNOWLEDGE OF HYGIENE AND SANITATION.

I.—LECTURES.

108. A course of lectures covering a large portion of Prout's Hygiene was delivered to teachers by the Acting Senior Sanitary Officer, and the Medical Officer of Health continued to give his Inspectors theoretical and practical instruction in sanitation.

II.—SCHOOL TEACHING.

109. Sanitation was an optional subject in all Colony and Protectorate Schools last year, but it was taught in about two-thirds of the Colony schools and in some schools in the Protectorate, and in 1917 it is to be a compulsory subject in all schools.

110. At the Bo School, where sons of Protectorate Chiefs receive their education, and in the Model School, Freetown, Sanitation is taught both theoretically and practically.

III.—(c) RECOMMENDATIONS.

111. In the body of the report I have indicated a few things that need special attention, and though much more requires to be done it would be as difficult to indicate anything that has not already appeared in some form or another in former Annual Reports, as it would be obviously unfair to attach a list of recommendations which had not previously been put up to Government.

R. LAURIE,

Senior Sanitary Officer.

2nd July, 1917.

No. .

**SUMMARY OF ROUTINE SANITARY WORK DONE DURING THE YEAR
IN THE TOWN.**

1. Name of Town :

—	Approximate area.	Number of proclaimed open spaces.
... ..	2½ square miles.	2 Public Recreation Grounds.

2. Population.

—	No. of Natives.		No. of Europeans.		Total.
	Males.	Females.	Males.	Females.	
Census of 1911	33,363 and 169 Asiatics.		558		34,090

3. Housing.

—	Number occupied by Europeans.	Number occupied by Natives.
Number of Houses :—		
1914	84*	—
1915	98*	6,033
1916	112*	5,608

Including
all non-
Europeans.

Number of Huts :—

1914
1915
1916

4. Mosquito Protection of Houses.

—	1914.	1915.	1916.
Number of European houses wholly mosquito-protected	—	—	—
Number of European houses with mosquito room	—	—	—
Number rendered during the year wholly mosquito-protected	—	—	—
Number rendered during the year partially mosquito-protected	—	—	—

5. Erection of New Buildings during the Year.

—	1914.	1915.	1916.
Number of public buildings erected with sanction as to site, construction, and relation to other buildings.	—	—	—
Number of houses erected with sanction as to site, construction, and relation to other buildings.	—	—	—
Number of huts erected with sanction as to site, construction, and relation to other buildings.	—	—	—
Number of houses built without sanction	—	—	—
Number of huts built without sanction	—	—	—

* Excludes Hill Station, Cline Town Reservation and Barracks.

Action taken :—

	Number of Prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1914	—	—	—	—
1915	—	—	—	—
1916	—	—	—	—

6. Markets.

	Total Number.	Number paved and drained.	Number unpaved.
1914	10	8	2
1915	10	8	2
1916	10	8	2

7. Slaughter-houses.

	Total number.	Total paved and drained.	Number unpaved.
1914	2	2	—
1915	2	2	—
1916	2	2	—

8. Latrines.

	For Males.		For Females.	
	Number.	Number of seats.	Number.	Number of seats.
Number of Public Latrines :—				
1914	9	23	9	21
1915	9	23	9	21
1916	9	47	9	24
Number of New Public Latrines erected during year :—				
1914	—	—	—	—
1915	—	—	—	—
1916	1	12	1	12
Number of Public Latrines repaired during year :—				
1914	—	—	—	—
1915	—	—	—	—
1916	6	—	6	—
Number of Public Latrines demolished during year :—				
1914	—	—	—	—
1915	—	—	—	—
1916	1	4	—	4

	1914.	1915.	1916.
Number of Private Latrines	132	184	229
Average number of pails of nightsoil removed daily	212	251	271
Average number of soiled pails removed and clean pails substituted	—	—	—
Number of nightsoil men employed to clean latrines and remove excreta	—	—	—
Number of cesspools	3,182	4,135	4,140
Number of cesspools cleansed	1,348	972	796
Number of new cesspools constructed during the year	95	135	85
Number of old cesspools abolished	732	150	50
Number of cesspools oiled regularly by Department	705	560	657

9. Removal of refuse.

	1914.	1915.	1916.
Number of dust-bins	74	91	73
Number of carts (if employed) at work, etc. (working intermittently)	3	5	5
Amount of refuse removed daily from streets	35 tons.	35 tons.	35 tons.
Number of carts (if employed) at work daily, etc.	—	—	—
Amount of refuse removed daily, etc.	—	—	—
Number of men employed for moving refuse (average)	175	175	175

10. Mode of disposal of excreta, refuse and offal.

	Daily average number of pails of excreta.			Daily average number of cartloads of refuse.			Daily average number of cartloads of slaughter-house and market offal.		
	1914.	1915.	1916.	1914.	1915.	1916.	1914.	1915.	1916.
Buried or trenched									
Burnt									
Thrown into Sea									
*Otherwise dealt with									

* State mode of disposal.

11. Average daily number of canoe-loads of tin cans, bottles, broken crockery and other incombustible material removed from houses, huts and compounds and dumped into the sea.

1914.	1915.	1916.
	9	10

12. Water Supply.

Nature of Water Supply.	1914.	1915.	1916.
Pipe-borne water :—			
Source (river, lake or spring)	—	—	—
Number of linear yards	—	—	—
Number of stand pipes along roads	—	—	—
Number of stand pipes in compounds and houses	—	—	—
Wells :—			
Public :—			
Number	—	—	1
Number with pumps protected against surface water and mosquito-protected	—	—	—
Private :—			
Number	—	638	745
Number protected against surface water and mosquito-protected	—	8	61

12. Water Supply—continued.

Nature of Water Supply.	1914.	1915.	1916.
Tanks :—			
Public :—			
Number underground	—	—	—
Number mosquito-protected and served by pumps ...	—	—	—
Number above ground	—	—	—
Number mosquito-protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Private :—			
Number underground	—	—	—
Number mosquito-protected	—	—	—
Number above ground	43	43	25
Number mosquito-protected	11	11	8
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Nature of tanks :—			
Wood	—	—	—
Iron	—	—	12
Concrete	—	—	13
Barrels :—			
Number	1,025	—	—
Number mosquito-protected	12	—	—

13. Drainage.

Nature of Drainage.	Public.	Private.
Masonry Drains :		
Lineal yards of masonry drains :—		
1914	—	—
1915	—	—
1916	13,555	—
Lineal yards reconstructed during the year :—		
1914	—	—
1915	—	—
1916	168	—
Lineal yards repaired during the year :—		
1914	—	—
1915	—	—
1916	3,557	—
Lineal yards of new drains constructed during the year :—		
1914	—	—
1915	—	—
1916	—	—
Earth drains or ditches :—		
Number of linear yards of ditches cleaned :—		
1914	—	—
1915	—	—
1916	117,997	—
Number of linear yards of ditches dug and graded :—		
1914	—	—
1915	—	—
1916	1,500	—
Average frequency of clearing ditches of grass :—		
1914	—	—
1915	—	—
1916	—	—

14. Clearance of undergrowth, long grass and jungle.

	1914.	1915.	1916.
Number of square yards of weeds, grass, and vegetation cut and removed	—	—	—
Average frequency of clearance of rank vegetation on same area	—	—	—

15. Excavations and low-lying land.

	1914.	1915.	1916.
Number of pools and excavations	—	—	—
Number of excavations filled up	—	—	—
Amount of low-lying and marsh land raised and drained	—	—	—
Number of pools, marshes, streams, etc., fish-stocked	—	—	—
Number of cubic yards of material used for filling up pools and excavations	—	—	—
Number of persons fined for making new excavations	—	—	—
Average number of men daily employed in filling up pools, etc. ...	—	—	—

16. Oiling.

	1914.	1915.	1916.
Number of drains oiled... ..	28,341	13,742	15,040
Number of pools and excavations oiled			
Number of tanks and barrels oiled	92	130	—
Average number of men daily employed for oiling drains, pools, water-tanks or barrels	*7	*5	*5

17. Inspections and Prosecutions.

	1914.	1915.	1916.
Number of inspectors employed	19	19	19
Number of houses inspected	87,259	94,760	72,204
Number of houses where larvæ were found	847	624	361
Number of notices served to remove conditions causing the breeding of larvæ	35	6	20
Number of persons fined for having mosquito larvæ on premises ...	595	530	305
Number of notices served to remove insanitary conditions on premises	4,915	5,597	4,960
Number of persons fined for not removing insanitary conditions after notice	372	414	132
Number of soda and aerated water factories inspected	1	1	—

* These men may be employed on other duties.

SANITARY REPORT ON FREETOWN FOR THE YEAR 1916.

I.—SANITARY PROGRESS.

The history of sanitation in Freetown for the last eighteen or twenty years practically resolves itself into a series of reports on the insanitary condition of the City, and recommendations for its improvement. In the year 1898 Dr. Prout, Medical Officer of Health, submitted to the Municipality a report on "the Sanitary Department and the health of the City for the year 1897." This report contained a number of excellent recommendations for improving the sanitary conditions, *few of which have however been carried into effect.* Sir Ronald Ross in his book "The prevention of malaria," commenting on the disappointments experienced about the year 1900 that so little was being done in British possessions to combat malaria, makes the following statement:—"Even in Sierra Leone where the way had been pointed out exactly, and where the disease was the principal enemy of the colony *little had been done.*" In 1902, in spite of the work done, the object lessons given, and the assistance rendered by men sent out from England, the work was stopped for financial reasons, and it was reported "that the local authorities did not appear very anxious to continue." The Medical Reports for Sierra Leone since that time have contained suggestions and recommendations, but in spite of these and other reports (including Professor Simpson's), *sanitation in Freetown does not seem to make very rapid progress.* The chief reason has of course been lack of funds, and with the present unsettled state of affairs in Europe, it cannot be said that the sanitary outlook of Sierra Leone will be particularly bright for some time to come. A vast amount of good can be, and has been done by rigid sanitary inspection, the execution of minor sanitary works, the introduction and subsequent increase of a pipe-borne water supply, etc.; but, without the expenditure of large sums of money on drainage (surface and subsoil), the universal adoption of the pan latrine system, or the introduction of a water carriage system, the closure of all wells so that the pipe-borne supply becomes the only water available, etc., conditions must remain unsatisfactory.

II.—STAFF.

Dr. W. Allan performed the duties of Medical Officer of Health during the current year.

Mr. D. S. Bowen, Superintendent Sanitary Inspector, was on leave from the 3rd of July until the end of the year.

Mr. E. T. E. Nash, Senior Sanitary Inspector, took up his duties on the 26th of June.

It is necessary for two non-native Sanitary Inspectors to be always in Freetown, and as a European Sanitary Inspector is out of the Colony for nearly five months of the year, the need for a third non-native Sanitary Inspector has been felt. The native staff at its full strength consists of one Sanitary Inspector, two assistant Sanitary Inspectors, one 1st class, seven 2nd class, and seven 3rd class Sub-Inspectors (formerly called Sanitary Constables). The recruiting of suitable men for the native staff has been one of the greatest difficulties with which this department has had to contend. It is of prime importance that the men be of such a character and in such a position that questions regarding their integrity should seldom if ever arise. It is expected that the standard will be raised when the new scheme for the re-grading and re-organising of Sanitary Inspectors comes into force.

III.—LECTURES.

Lectures on very elementary sanitation were given during the year to the Sanitary Inspectors and Sub-Inspectors by the Medical Officer of Health.

IV.—ANTI-MOSQUITO MEASURES.

The eradication of mosquitoes continues to be one of the most important sanitary questions in Freetown.

(a) *House to House Inspection*.—Reports with notifications of the existence of nuisances are submitted daily by the Sub-Inspectors, and action is taken on these reports. All complaints received from outside sources are investigated and a record kept. 72,204 house inspections were made by the Sub-Inspectors during the year, resulting in the discovery of 361 mosquito-breeding places (not including trees or mosquito-breeding plants). 359 prosecutions followed with 305 convictions. The total amount in fines collected was £76 6s. 4d., an average of 5/- each. 1,808 native boats and canoes were inspected for mosquito larvæ, and where found to contain water were oiled. No larvæ were discovered. A mosquito larvæ index was taken at the end of each quarter by one of the senior officials of the department. The results were as follows (taking compound as unit):—

March	...	...	1.14 per cent.
June	...	...	19.7 per cent.
September	...	...	No larvæ found.
December	...	...	1.43 per cent.

The above examinations did not include trees or mosquito-breeding plants. 350 compounds were examined in each case. The June index is exceedingly high, and can only be accounted for by the reduction in the staff engaged in anti-mosquito measures, and the difficulty of efficiently supervising this work during the small-pox epidemic.

(b). *Inspection of Wells*.—In an examination of the wells in Freetown made during the months of May, June, July and August, 1913, it was found that about 22.5 per cent. of the wells acted as breeding places for mosquitoes. As a result of the examination made in 1913, between 90 and 100 wells (nearly all mosquito breeders) have been oiled regularly. As this examination was conducted during the rains, it was considered necessary to find out the conditions in the dry season. This was done during the months of January and February of this year by the Medical Officer of Health and the Superintendent Sanitary Inspector. The same method was employed as in 1913, namely, a net consisting of a barrel hoop 2 feet in diameter and covered with a layer of book muslin. This was lowered to the bottom of the well and then pulled up rapidly. The larvæ were examined for by washing the net in a large basin of water. The total number of wells examined was 483. (The wells which were being oiled regularly were not examined). The examination showed that 67 wells or 13.8 per cent. of those examined contained mosquito larvæ. The larvæ found were as follows:—

Culex decens in 54 wells,
Stegomyia fasciata in 8 wells,
Culex insignis in 2 wells,
Anopheles in 1 well,
Culicomyia nebulosa in 1 well,
Culex tigripes in 1 well.

(All the species were diagnosed by the Imperial Bureau of Entomology). The examination excluded practically all the wells in which larvæ were found in 1913, but included about 160 not then examined. As the infection was found to be general, and not restricted to those not previously examined, one concludes that mosquito breeding in wells (amongst certain kinds of mosquitoes at least) is more common in the dry season than in the rains. It is interesting that the larvæ of *Culex Decens* should again be the species most frequently found. As the height of the subsoil water was lower than in the

rains, it was to be expected that the number of anopheles-breeding wells would be smaller, but such a diminution was not anticipated. (In the rainy season of 1913, 21 wells were discovered to be breeding anopheles). The absence in the dry season of grass or water weed growing round the edges of the wells had doubtless some effect in reducing the number. The main reason why these examinations were undertaken was to prove to the people, in order that measures might be taken, that mosquitoes could actually breed in wells. Although there is still a certain amount of resistance to the oiling of all wells, this is decreasing, and I am glad to say that the whole question is now on a more satisfactory basis, and practically all the wells in which larvæ were found are being oiled regularly. No legal action has been taken during the year to have the wells closed.

(c) *Oiling of cesspools.*—Over 600 cesspools, the majority of which are known to contain water during the rains, and which act as breeding-places for mosquitoes, are treated once a fortnight with a mixture of kerosine oil and tar, or kerosine oil and crude petroleum. An effort to get the householders themselves to oil the cesspits regularly was not a success.

(d) It has been discovered that cavities in trees are a very fertile source of mosquitoes. The cavities were usually found at the angles formed by the branches, or at places where branches had been broken off. A local prevalence of mosquitoes has on more than one occasion been traced to a broken paw-paw tree, whose hollow stems can retain water for a considerable period. Altogether 506 cavities containing mosquito larvæ have been discovered. Specimens, the majority of which came from the outskirts of the town, were diagnosed by the Imperial Bureau of Entomology.

Tube No.

1. *Stegomyia luteocephala*, Newst.—1 larva.
2. *Ochlerotatus apicoannulatus*, Edw. 2 larvæ (2 stages, probably of the same species). *Stegomyia luteocephala*, Newst. 1 larva.
3. *Stegomyia simpsoni*, Theo., or *S. fasciata*, F.—1 larva, 1 pupa.
4. *Stegomyia luteocephala*, Newst.—2 larvæ.
5. *Ochlerotatus apicoannulatus*, Edw.—1 larva.
6. *Culiciomyia nebulosa*, Theo.—2 larvæ. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—2 larvæ.
7. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—1 larva. *Culex decens*, Theo.—1 larva.
8. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—2 larvæ.
9. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—2 larvæ. *Culiciomyia nebulosa*, Theo.—1 larva.
10. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—4 larvæ.
11. *Culiciomyia nebulosa*, Theo.—7 larvæ. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—1 larva.
12. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—1 larva. *Culiciomyia nebulosa*, Theo.—4 larvæ.
13. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—3 larvæ.
14. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—1 larva. *Stegomyia* sp. incert. *luteocephala*, Newst.—3 larvæ.
15. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—5 larvæ.
16. *Ochlerotatus apicoannulatus*, Edw.—4 larvæ slightly different from Nos. 2 and 5, but probably of the same species.
17. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—2 larvæ.
18. *Stegomyia simpsoni*, Theo. or *S. fasciata*, F.—5 larvæ 1 pupa. *Stegomyia luteocephala*, Newst.—2 pupæ.

It is of importance that the most common larva found was that of *Stegomyia fasciata* or *Stegomyia simpsoni*. Mr. Edwards pointed out that "he was unable to find any reliable character by which to distinguish the larvæ of *Stegomyia fasciata* and *Stegomyia simpsoni*." Out of twenty specimens of mosquitoes bred out from larvae taken from twenty different tree cavities in the centre of the town, fifteen were found to be *Stegomyia fasciata*. (The diagnosis was checked by Dr. W. A. Young, Medical Officer in charge of the Laboratory). In consequence of these discoveries, measures have been taken to deal with the breeding-places. The holes were filled with cement, or were cut open to allow the water to run off. Broken paw-paw trees were cut down. 609 cavities, irrespective of whether they contained water or not, have been dealt with since June of this year, but the amount of work to be done in this direction is unlimited, and it is hoped that much more will be accomplished during the coming year.

(E) *Mosquito-breeding plants*.—Mr. A. W. Bacot, in his report undertaken for the Yellow Fever Commission, comments on the breeding accommodation provided by the axils and central whorl of leaves of certain plants for mosquitoes during the rains. No legal action has been taken by this department, but the danger in the use of a certain species of *Dracena* as a hedging plant has been pointed out, and frequent trimming of the leaves advised.

(F) *Treatment of cavities in rocks*.—The cavities in rocks along the course of the streams within the city area have received attention, by the cutting of channels, to prevent the accumulation of water. The work, although of an elementary nature, is both economical and beneficial.

(G) *Canalisation of Streams*.—As a result of the visit of Sir Ronald Ross and others to Sierra Leone, work of inestimable value in canalising and regulating the streams was done. Some of it still remains, but a large proportion of it has been destroyed and no attempt has been made to replace it. The work is of an extremely important nature and should, if possible, be continued. A certain amount has been done by the Sanitary Gang in regulating the various streams within the city area, and in keeping open the channels which have already been made, but the work, although useful, cannot be of a permanent character.

(H) *Filling up of low lying land, quarry pits, etc.*—No legislation at present exists for the regulation of the making of excavations or quarries. The consequence is that new quarries are being continually opened, which become a source of anxiety to the department during the rains. When no longer utilised for the supply of stone, they are useful for the disposal of incinerator ash.

(I) *Dumping Stone*.—For some years the scheme of dumping stone in the Grassfields area to enable householders to fill up depressions in their compounds was carried into effect. For financial reasons this exceedingly useful measure has had to be discontinued.

(J) *Oiling of Stagnant Pools, etc.*—A total of 15,040 drains and pools, etc. were treated with a mixture of kerosine and crude petroleum, or kerosine and tar.

(K) *Report of malaria cases from the Colonial Hospital*.—Returns are received from the Medical Officer in charge of the Laboratory of all cases of malaria (microscopically diagnosed) which have been treated in hospital. Action is taken on the returns, but, as was mentioned in a previous report, legal proceedings are deferred as long as possible. 313 cases were reported. The importance of registration of certain forms of sickness is universally recognised, and the registration or notification of all malarial cases would be of inestimable value, besides forming a ground-work on which to base anti-malarial work.

V.—INFECTIOUS AND EPIDEMIC DISEASES.

(A) *Anti-plague measures*.—The measures commenced in 1915 have been continued; the number of rat-catchers was increased to two. Chiefly on account of the amount of refuse, etc., available as food, the results obtained by the use of traps cannot be described as brilliant, although a great deal certainly depends on the care with which the traps are set. The number of rats brought to the Colonial Hospital and paid for was 1,976. The number of rats caught by the Sanitary Authorities was 2,700. The Medical Officer in charge of the Laboratory reports as the two most common species *Mus rattus* and *Mus decumanus*. A routine examination of rats for evidence of plague-infection was made. No plague-infected rats were discovered. At the end of the year a consignment of Danysz Virus was received from England. The contents of 100 tubes were set at different parts of the town, especially near the wharf and along the foreshore. It has not been possible yet to ascertain to what extent the virus has been effective.

(B) *Anti-Small-pox measures*.—During the months of March, April, May and June an outbreak of small-pox, which did not reach any serious dimensions, occurred in Freetown. An account of the measures taken to combat the outbreak is contained in a special report. 69 cases of small-pox with 12 deaths occurred during the year.

VACCINATION RETURNS.

	1915.	1916.
Total number vaccinated	6,880	33,685
Total number successful	4,976	29,327

Although these figures appear to be high, there are still a large number of unvaccinated persons to be seen in the town.

(c) During the outbreak of small-pox there also occurred a fairly extensive outbreak of chicken-pox. This outbreak, existing as it did practically simultaneously with the small-pox outbreak, was treated as part of the latter. Whenever a case of chicken-pox was reported, exactly the same action was taken as if the case had been one of small-pox, except that the chicken-pox cases were isolated in huts some distance from the small-pox hospital. 113 cases of chicken-pox occurred during the year, with no deaths.

(D) *Dysentery* is not a notifiable disease under the Public Health Ordinance, but there is reason to believe that it is very general throughout the town, and reports by the Medical Officer in charge of the Laboratory show a number of pathogenic-amœbæ-infected stools. The question is certainly becoming one of some magnitude, and to assist in ascertaining the true condition of affairs it is recommended strongly that it should be made compulsory for medical practitioners to report all cases of dysentery (amœbic and bacillary).

(E) *Leprosy* in all stages is frequently met with. On account of the difficulty of guarding these cases at the leper hospital, isolation of all cases has not been possible.

(F) *Enteric Fever*, although not unknown in Freetown, is not very common. No cases have been discovered during the year.

(G) *Tuberculosis*.—There is a general feeling that pulmonary tuberculosis is on the increase, but it is doubtful whether the increase is real or due to the improved methods of diagnosis.

(H) *Measles*.—Five cases, with one death, were reported during the year. More cases of this disease seem to be cropping up.

(I) *Cerebro-Spinal Meningitis*.—Only one case (imported) was reported during the year.

(J) No cases of cholera have been reported.

(K) *Sleeping Sickness*.—One case, imported from the Belgian Congo, was reported.

Examination and removal of cases of infectious disease. When patients suffering from infectious disease report at the Colonial Hospital, they are isolated in a small hut near, until the diagnosis has been determined. This hut is used for all cases of infectious disease and is totally inadequate. There is only one compartment, and only cases of a similar nature can be isolated at the same time. It is disinfected after each occupation. A building on a much larger scale is required with two or three compartments, in which suspicious cases of a different nature can be accommodated until the diagnosis is made.

The cases are removed to the Infectious Diseases Hospital at Kissy on stretchers which may or may not be fly and mosquito-proof. A mosquito-proof vehicle is necessary for this purpose.

VI.—SCAVENGING.

An average of 175 men has been allowed during the year for scavenging, anti-mosquito measures, etc. This number is reduced during the dry season, as the streets and drains, owing to their condition, require much more attention during the "rains."

The refuse is deposited by the householders in immovable dustbins, of which there are 73. The earlier types built previous to 1913 were composed of wood and galvanized iron, with or without a roof. The late patterns are made of concrete and are an improvement. It becomes more difficult as time goes on to locate suitable sites for dust-bins. It is necessary that they should be situated within easy access of those by whom they are intended to be used without being an obstruction on the street. This difficulty would be removed by the purchase of suitable plots of land.

The present dust-bins, although of great benefit, are unsatisfactory, as they tend in themselves to become nuisances, owing to the difficulty of training the natives to place the rubbish inside instead of outside. The only solution of the question is house to house collection of refuse, which, with the transport facilities at present at our command, is quite out of the question. Five new dust-bins were erected during the year.

The chief method of transport is by mule or bullock carts, of which an average of 5 are working daily. A certain amount of refuse is removed as "headloads," the state of some of the streets at present precluding the use of any form of cart or waggon. It is to be hoped that the time is not far distant when it will be possible to have some form of mechanical transport. It is calculated that between 30 and 40 tons of combustible refuse are removed daily.

VII.—DISPOSAL OF REFUSE.

No satisfactory means at present exist for the disposal of refuse. During the dry season, as the bulk of refuse is dry, no trouble is experienced, but during the rains the question becomes one of some difficulty. The methods of disposal are as follows :—

(i) By incineration. Owing to the present type of incinerator, this method in the rains is objectionable, large heaps of damp refuse, which cannot be dealt with, tending to accumulate near incinerator sites. An alteration in the present type of incinerator, introducing the use of wood as fuel, has been suggested by Dr. Laurie, which it is hoped will obviate to a large extent this nuisance. There are at present 17 incinerators distributed throughout the town.

(ii). During the rainy season, refuse is dumped into the sea from chutes. This method is very objectionable, a large amount of refuse being apt to be washed up on the foreshore by the tide.

(iii). Incinerator ash is used for filling up pools, marshes, excavations, etc., and a large amount has been usefully disposed of in this way.

(iv). Tins and bottles, etc., are dumped from canoes into mid-stream. 3668 canoe loads were disposed of during the year.

There is no doubt that the only solution of this at present very difficult problem lies in the erection of a refuse destructor, built on modern lines ; but one doubts the wisdom of recommending this until the possibility of centralising the refuse (one of the most important points in destructor practice) becomes more apparent.

VIII.—DRAINAGE.

The drainage system still remains in an unsatisfactory state. That nothing of an extensive nature can at present be attempted is recognised, but conditions are so bad, and the realisation of a complete drainage system seems so far away, that one feels justified in suggesting either the incurrence of more expenditure under "Maintenance and Repairs of Drains," or the complete reconstruction of the drains in certain areas of the town as part of a comprehensive scheme. This refers particularly to the Eastern and Western Wards. The same holds good now as in 1909, when Dr. Forde made the following remarks in his annual report :—"The stand-pipes have been up to now a constant source of insanitary conditions in their immediate neighbourhood, owing to the presence of stagnant pools fed by waste water from them, there being no drainage to carry it off. With such a glaring defect in the present drainage of the town it becomes a delicate and difficult matter for the Sanitary Authorities to attempt to enforce, by the Police Court, compliance with the Public Health Ordinance, especially in regard to Anti-Malarial Sanitation." The extension of the water supply and the consequent increase in the number of public and private stand-pipes with very little improvement in the drainage system has not tended to improve matters. There are at present 193 public stand-pipes in the city.

The Acting Sanitary Engineer (Mr. O. G. Price) has very kindly furnished a statement showing the length of the different types of drains in Freetown, and where they are to be found.

FREETOWN DRAINAGE.

Lengths in concrete, masonry, earth and channel cuts.

Name of Street.	Concrete Drains.	Masonry Drains.	Earth Drains.	Channel Cut Drains.
	Ft.	Ft.	Ft.	Ft.
Pademba Road ...	762	—	9,354	—
Westmoreland Street ...	1,600	164	3,600	—
Waterloo Street ...	—	—	3,936	—
Wellington Street ...	—	—	4,070	—
Bathurst Street ...	320	—	1,554	—
Liverpool Street ...	—	—	3,200	—
Percival Street ...	—	2,714	—	—
Pultney Street ...	—	1,448	—	—
Walpole Street ...	—	1,620	—	—
Trelawney Street ...	—	1,734	—	—
George Street ...	452	1,742	—	—
Gloucester Street ...	800	1,762	—	—
Charlotte Street ...	500	1,100	—	—
Howe Street ...	1,408	1,408	—	—
Rawdon Street ...	1,484	1,484	—	—
Wilberforce Street ...	846	—	3,200	—
East Street ...	1,088	—	1,088	—
Garrison Street ...	1,289	—	1,014	—
Oxford Street ...	1,200	—	3,267	—
Water Street ...	—	—	4,407	—
Saunders Street ...	—	—	—	5,253
Campbell Street ...	—	—	—	5,200
Dundas Street ...	—	—	—	5,189
Point Street ...	—	—	—	269
West Street ...	—	—	—	881
Thomas Street ...	600	—	1,263	—
Williams Street ...	—	—	1,156	—
Charles Street ...	3,500	—	—	—
John Street ...	3,460	—	—	—
Richard Street ...	—	—	—	921
George Street ...	—	—	—	2,804
Kroo Street ...	—	—	—	616
Cole Street ...	—	—	—	1,718
Clarke Street ...	—	—	—	422
Jones Street ...	—	—	—	2,126
Robert Street ...	—	—	—	2,136
Andrew Street ...	—	—	—	800
Guy Street ...	—	—	—	1,130
King William Street ...	—	—	—	800
Nana Kroo Street ...	—	—	—	850
Little Kroo Street ...	—	—	—	1,600
Settra Kroo Street ...	—	—	—	1,700
Grandcess Street ...	—	—	—	1,560
Steward Street ...	—	—	—	1,718
Edward Street ...	—	—	—	2,023
Cline Street ...	—	—	—	700
Victoria Street ...	—	—	—	2,637
Adelaide Street ...	—	—	3,140	—
Berwick Street ...	—	—	—	3,360
Priscilla Street ...	—	—	—	1,638
Kroo Town Road ...	—	—	3,748	—
Chapel Street ...	—	—	560	—
Upper Waterloo Street ...	—	—	1,314	—
Upper Brook Street ...	—	—	2,948	—
Carried forward ...	19,309	15,176	51,819	48,101

FREETOWN DRAINAGE—continued.

Name of Street.	Concrete Drains.	Masonry Drains.	Earth Drains.	Channel Cut Drains.
	Ft.	Ft.	Ft.	Ft.
Brought forward ...	19,309	15,176	51,819	48,101
Mends Street ...	—	—	—	2,830
King Street ...	—	—	—	694
Albert Street ...	—	—	—	693
Queen Street ...	—	—	—	695
Duke Street ...	—	—	—	684
Prince Street ...	—	—	—	851
Earl Street ...	—	—	—	640
Clarence Street...	—	—	—	720
Salter Street ...	—	—	—	1,030
Soldier Street ...	274	—	4,808	—
Fort Street ...	—	—	3,718	—
Hill Street ...	—	—	2,645	—
Benjamin Lane...	—	—	—	3,500
Edward Lane ...	—	—	—	1,148
John Lane ...	—	—	—	1,140
Peter Lane ...	—	—	—	1,160
Dillet Street ...	—	—	—	1,064
Fergusson Street	—	—	—	3,478
Smythe Street ...	—	—	—	1,703
Edward Street ...	—	—	—	600
Macdonald Street	—	—	—	3,491
Watson Street ...	—	—	—	300
Dougan Street ...	—	—	—	2,288
Aitkin Street ...	—	—	—	800
Pike Street ...	—	—	—	540
Berry Street ...	—	—	6,108	—
Badge Street ...	—	—	200	—
Rush Street ...	—	—	575	—
Macauley Street	—	—	1,492	—
Ball Street ...	—	—	1,000	—
Mary Lane ...	—	—	100	—
Mary Street ...	—	—	960	—
Truscott Street ..	—	—	—	800
Pyne Street ...	—	—	4,170	—
Alcock Street ...	—	—	—	3,200
Ranger Street ...	—	—	—	1,662
Fifth Street ...	—	—	1,114	—
Sackville Street	—	—	300	200
Block Lane ...	—	—	—	670
Rocklyne Street	—	—	1,200	—
Horton Street ...	—	—	1,400	680
Devere Street ...	—	—	800	—
Ambrose Street	—	—	400	800
James Street ...	—	—	1,704	—
Frederick Street	—	—	600	—
Henry Street, W.	—	—	300	—
Regent Street ...	—	—	400	2,200
Bancara Spring	—	—	600	75
Goderich Street...	—	376	—	1,300
Free Street ...	—	—	—	1,324
Lumley Street ...	—	—	—	1,780
Short Street ...	—	—	—	400
Back Street ...	—	—	415	—
Rock Street ...	250	—	—	400
Meheux Street ...	—	—	664	—
Fisher Street ...	—	—	—	600
Seventh Street ...	—	—	316	—
Sixth Street ...	—	—	314	—
Owen Street ...	—	—	100	—
Carried forward ...	19,833	15,552	88,222	94,151

FREETOWN DRAINAGE—continued.

Name of Street.	Concrete Drains.	Masonry Drains.	Earth Drains.	Channel Cut Drains.
	Ft.	Ft.	Ft.	Ft.
Brought forward ...	19,833	15,552	88,222	94,151
Peters Street ...	—	—	800	—
Havelock Street ...	—	—	1,025	—
Foulah Street ...	—	—	—	1,124
Stephen Street ...	—	—	—	300
Wilson Street ...	—	—	—	608
Elibank Street ...	—	—	632	—
Third Street ...	—	—	—	1,142
Second Street ...	—	—	—	1,110
First Street ...	—	—	1,000	—
New Street ...	—	—	760	—
Elk Street ...	800	—	1,000	—
Rowe Street ...	—	—	350	—
Dunkley Street ...	—	—	360	—
Annie Walshe Street ...	—	—	785	—
Peterson Street ...	100	—	—	120
Fetter Lane ...	—	—	666	—
Tarlton Lane ...	—	—	1,062	—
Percival Lane ...	—	—	—	668
Bailey Street ...	—	—	—	1,720
Beccles Street ...	—	—	—	618
Elliott Street ...	—	—	—	2,640
Hall Street ...	—	—	—	1,800
Savage Street ...	—	—	—	1,350
Mannah Street ...	—	—	—	1,000
White Street ...	—	—	—	1,412
Morgan Street ...	—	—	—	3,400
Hagan Street ...	—	—	—	1,400
Bishop Street ...	—	—	—	244
Martin Street ...	—	—	—	2,124
Magazine Cut ...	500	—	—	500
Magazine Street ...	500	—	—	500
Lower Bombay Street ...	200	—	600	—
Upper Waterloo Street ...	—	—	—	1,600
Boyle Street ...	—	—	1,200	—
Cardew Street ...	—	—	1,064	—
Montague Street ...	—	—	1,076	—
George Street, E. ...	—	—	1,078	—
Jenkins Street ...	—	—	1,200	—
Terry Street ...	—	—	186	—
Upper Patton Street ...	—	—	800	—
Patton Street ...	—	—	2,200	—
Locust Street ...	—	—	2,300	—
Bethel Street ...	—	—	1,400	—
Pownall Street ...	—	—	2,600	—
Crook Street ...	—	—	1,800	—
Mercer Street ...	—	—	500	—
Crook Lane ...	—	—	680	—
Oldfield Street ...	—	—	500	—
Oldfield Lane ...	—	—	200	—
Lucas Lane ...	—	—	675	—
Upper Bombay Street ...	300	—	1,200	—
Lawson Lane ...	—	—	—	1,500
Doherty Street ...	—	—	1,900	—
Langley Street ...	—	—	1,200	—
Kendall Street ...	—	—	1,700	—
Leah Street ...	—	—	676	—
Winton Street ...	—	—	1,500	—
Morgan Street ...	—	—	300	—
Easton Street ...	—	—	1,000	—
Carried forward ...	22,233	15,552	126,197	121,431

FREETOWN DRAINAGE—continued.

Name of Street.	Concrete Drains.	Masonry Drains.	Earth Drains.	Channel Cut Drains.
	Ft.	Ft.	Ft.	Ft.
Brought forward ...	22,233	15,552	126,197	121,431
Lucas Street ...	—	—	2,560	—
Malta Street ...	—	—	2,600	—
Savage Square ...	—	—	3,700	—
Green Lane ...	—	—	800	—
Huggins Street...	—	—	800	—
Huggins Lane ...	—	—	600	—
Brass Street ...	—	—	2,680	—
Ansley Street ...	—	—	3,200	—
Abbott Street ...	—	—	538	—
Abbott Lane ...	—	—	420	—
Dan Street ...	—	—	3,786	—
Rowan Street ...	—	—	824	—
Ansley Lane ...	—	—	589	—
Davies Street ...	—	—	230	—
Foster Street ...	—	—	600	—
Orange Street ...	—	—	100	—
Oxley Street ...	—	—	2,020	—
Lombard Street ...	—	—	304	—
Lardner Street ...	—	—	978	—
McCarthy Street ...	—	—	300	—
Taylor Street ...	—	—	916	—
Scotland Street...	—	—	960	—
Gheirwani Lane ...	—	—	670	—
Fly Street ...	—	—	2,122	—
Kennedy Street ...	—	—	4,952	—
Ross Road ...	1,568	—	2,844	—
Alfred Street ...	—	—	846	—
George Lane ...	—	—	728	—
Elba Street ...	—	—	200	—
Wesley Street ...	—	672	612	—
Tower Hill Road ...	—	—	815	—
Circular Road ...	600	—	16,264	—
Regent Road ...	40	—	7,090	—
O'Neill Street ...	—	—	1,200	—
Sackville Street ...	—	—	8,264	—
Allan Street ...	—	—	1,600	—
Gilpin Street ...	—	—	800	—
Dick Street ...	—	—	780	—
Metzger Street ...	—	—	795	—
Summer Street ...	—	—	789	—
West Brook Street ...	—	—	—	3,786
Syke Street ...	—	—	6,789	—
Kissy Road ...	—	—	12,560	—
Fourah Bay Road ...	—	—	7,896	—
Right Path ...	—	—	456	—
TOTAL ...	24,441	16,224	228,774	125,217

Concrete Drains, 8147 yards.

Masonry Drains, 5,408 yards.

Earth Drains, 76,258 yards.

Channel Cut Drains, 41,739 yards.

The following drains were reconstructed by the Sanitary Engineer :—

- (A) At Ross Road, 1,500 feet.
- (B) At Charlotte Street, 452 feet.
- (C) Rawdon Street, 132 feet.

Repairs to drains were executed as follows :—At Rawdon Street, Fourah Bay Road, Charlotte Street, George Street, Percival Street, Trelawney Street, Walpole Street, Pademba Road, Gloucester Street, Howe Street, Garrison Street, East Street, Pultney Street, Hill Street, Wesley Street, Westmoreland Street, Steward Street, Priscilla Street, Wellington Street, Oxford Street, Government Wharf, Dove Cot Station, Truscott Street, Pyne Street.

Although as an anti-mosquito measure the intercepting drain at Brookfields has been of the greatest benefit, this area during the rains still remains in an unsatisfactory condition, which can only be remedied by the application of a form of subsoil drainage to the whole of the Brookfields area.

It is necessary for the bottom of the intercepting drain to be levelled, graded and concreted, to prevent the formation of mosquito-breeding pools during the dry season. The bore-holes recommended by Dr. Kennan in the Medical and Sanitary Annual Report for 1913 have been completed.

No subsoil drainage has been carried out during the year. This form of drainage might with advantage be introduced in certain parts of the Eastern and Western Wards.

IX.—REGULATION OF BUILDINGS.

Under the present Building Ordinance, buildings may be erected without any reference to the Sanitary Branch of the Medical and Sanitary Departments.

X.—SANITARY INSPECTOR.

As a result of the house to house inspections made by the Inspectors and Sub-Inspectors 4,960 notices were served to abate nuisances. 158 prosecutions followed with 132 convictions. 86 prosecutions were undertaken against persons for committing nuisances in the public street, with a conviction in 79 cases.

The carcasses of 32 bullocks slaughtered in the Public and Imperial Slaughter-houses were seized on account of infection with *Cysticerci bovis* and were destroyed by order of the Magistrate.

Fifty bags of onions were seized on the Government Wharf and condemned as being unfit for human consumption.

A consignment of flour infected with *Calandra granaria*, the property of the Marshal of the Prize Court, was condemned as unwholesome.

XI.—PUBLIC LATRINE ACCOMMODATION.

There are 9 public latrines on the dry earth system containing 71 pails, and 1 urinal. The number is totally inadequate and should be increased as soon as possible. The older types are composed of wood and galvanized iron and are not very satisfactory. Pails are used in all, except in one water latrine at Falconbridge.

Two concrete latrines have been built on more sanitary lines, and are a great improvement.

In the centre of the town especially, the absence of public latrine accommodation is very marked. The same difficulty in the location of suitable sites is felt as in the case of other sanitary buildings. One new public latrine was erected during 1916.

XII.—SEWAGE DISPOSAL.

The general method of disposal amongst natives is by means of cesspools or cesspits, of which there are over 3,000 in Freetown. The depth varies from 15 to 30 feet. It is not usual for these to be lined with stone or brick, except perhaps for a few feet. They can be erected without any reference to this branch, and consequently many of the sites are unsatisfactory. There is a marked disinclination to keep them in a satisfactory state of repair. The general

impression seems to be that a hole in the ground with a seat meets all sanitary requirements. They act as breeding grounds for mosquitoes, flies, etc., and are at present the greatest nuisances which Freetown possesses. Their close proximity to wells constitutes a grave menace to the public health, and they are undoubtedly the chief cause of the marked prevalence of intestinal disorders.

Amongst the better class natives and the Europeans the earth closet is chiefly used. The pans are emptied into the sea during the night, or taken to the trenching ground (under the control of the prison authorities). These two methods are fairly satisfactory, although complaints have been received regarding the obnoxious effluvia arising at the entrenching ground when the pails are being emptied. There are at present 229 dry earth latrines in use.

One or two European firms have introduced a water carriage system. The premises of the African Direct Telegraph Company are fitted with water closets, which are flushed with salt water pumped from the sea into a tank situated at the upper part of the building. A pipe carries the sewage into the sea. The water carriage system of the Cie Francaise de l'Afrique Occidentale receives its water from the town supply. The Grand Hotel (Messrs. Schumacher and Straumann) is also supplied from the town, but the sewage is disposed of by means of a combination of a septic tank and an absorption filter on the premises. The sewage first runs into the septic tank where nitrification takes place. The effluent passes into the filter which consists of a compartment filled with stones, the material of whose walls in the lower two-thirds is not bound together by mortar or cement. The effluent from the septic tank percolates through the filter and soaks into the soil. So far, no nuisance has arisen, and the arrangement seems to be satisfactory.

So long as cesspools are allowed to exist, it is out of the question to expect any marked reduction in the amount of intestinal disease, which is becoming one of the most acute problems the Sanitary Branch has got to deal with. The elimination of all well water as a domestic supply might improve matters, but the cesspits would still continue to contaminate the soil, to breed flies and so spread infection.

The solution lies in the closing of all cesspits, and all wells, and the general adoption throughout the city of the dry earth pan closet or the introduction of a water-carriage system. The latter would, I am afraid, on account of its cost, be prohibitive. The earth closet is hygienic and free from nuisance if properly used. At present the removal and consequent disposal would be a matter of some difficulty, on account of the condition of the streets and the absence of transport facilities.

The adoption of the pan system ought to be accompanied by a large increase in the number of public latrines.

XIII.—WATER SUPPLY.

The extension of the Freetown Waterworks is practically complete, and all that remains is a commencement to be made with the running of the pumping station.

The increase in the size of the Tower Hill Reservoir will bring the total service capacity up to one million gallons. Well water is still drunk by the inhabitants. From a public health point of view it is imperative that this source be cut off, and it is hoped that now, with the extension of the water catchment area, there will be sufficient to make the pipe-borne water the only supply available for consumption.

Examinations of the water were made from time to time by the Medical Officer in charge of the Laboratory, and the results were forwarded to the Sanitary Branch. They are on the whole very satisfactory. The following is the result of an analysis made in August, 1916:

- (i) Turbidity—Nil.
- (ii) Colour—Faint green.
- (iii) Odour—Nil.
- (iv) Reaction—Neutral.
- (v) Free N H_3 .—006 parts per 100,000.
- (vi) Albuminoid N.H_3 .—005 parts per 100,000.
- (vii) Chlorine—.4 parts per 100,000.
- (viii) Oxygen consumed—.05 parts per 100,000.
- (ix) Nitrites—Absent.

Regarding the steps taken to protect the water reservation during 1916 the Superintendent of Waterworks reports as follows:—

(A) That the watchmen were as usual employed to protect the water reservations, *i.e.*, one for the Congo Brook Valley and one for the Edeoroko and George Brook Valley.

(B) That the Northern and Western boundaries of the Edeoroko Valley were securely fenced with barbed wire; this completes the fencing, except where it adjoins the George Brook Valley.

XIV.—LAUNDRIES.

Public laundries are eleven in number, of which only two are actually in use. The two receive water from the town supply, and, during the rainy season and part of the dries, when there is plenty of water available, are well patronised. During one or two months of the dry season, however, on account of the shortage of water they have to be closed. The other nine were originally supplied with water from streams in the neighbourhood, with the exception of one which was supplied by the overflow from the reservoir at Tower Hill, but for some years (chiefly on account of the pipes and their connections having been stolen) their use has had to be discontinued. The consequence is that, in the rains, the street drains are by far the most popular washing places.

It seems a great pity that these public laundries have been allowed to fall into disuse. There is enough water in the neighbouring streams during the rains to supply laundries for the whole of Freetown, and quite an appreciable amount in the dry season. If not sufficient during the dry season the washer-women would be compelled as at present to have recourse to streams outside the town.

Washing (except in private premises) might only be permitted outside the town, but one feels it is placing a certain amount of hardship on the people, and it is recognised that it is a matter of some delicacy to attempt to put a stop to a practice which has been so long tolerated, without the substitution of something in its place, and for this reason no action has been taken by the department.

There is no gainsaying the fact, however, that the custom of washing in the street drains is a bad one, and undoubtedly the silting up of the drains which is so common, is to a large extent due originally to blockage for washing purposes.

To stop the nuisance, the present disused laundries ought to be increased in size and number and reconnected up with the various streams in the neighbourhood. They would at least be available during the rainy season

when washing in the drains is practised. It is expected, with the increased supply, that the water from the George Valley stream will not be required. If this proves to be the case, the water from this source might be available for the supply of certain laundries.

XV.—PUBLIC MARKETS.

It is unlawful for meat to be sold anywhere except in public markets, and during the year four private meat shops were declared public markets, under the Public Health Ordinance of 1905. This has increased the number of public markets to ten, five of which are the property of the City Council and five the property of private individuals. In three meat is not allowed to be sold. The declaration of the private meat shops as public markets has placed them on a more satisfactory basis from a sanitary point of view, but it still remains necessary to license the butchers in order that better control may be kept over the slaughtering of animals and the sale of meat.

On account of the unsatisfactory condition of the meat market at Fourah Bay Road and the urgent necessity for a public market in the East Ward, it was the intention of the City Council to erect a new market at Bombay Street during the year. Unfortunately this work could not be carried out for financial reasons.

XVI.—BAKEHOUSES.

Bakehouses, of which there are between 30 and 40, are not under control, except as far as the existence of nuisances is concerned. Inspections made during the year did not reveal a very sanitary state of affairs. In the majority the ventilation and lighting were found to be inadequate, and the internal arrangements were not so satisfactory as they might have been. Earthen floors were the rule, but a few were laid with concrete. The roof and the walls were in most instances composed of galvanised iron. Very few ovens were provided with a chimney.

These bakehouses are somewhat akin to what are described as "Retail Bakehouses" in the English Factory and Workshop Act of 1901. It is difficult to bring them up to European standard, but they ought to be placed under more adequate control. Regulations might be drawn up regarding their cleanliness, structure, ventilation, drainage, etc., and no place should be used as a bakehouse unless certified fit for such.

XVII.—SLAUGHTER-HOUSES.

The Public Slaughter-house is at present one of the most unsatisfactory buildings under the control of the City Council. The site is bad, and for this reason it is difficult to keep the place in a sanitary condition. A public latrine is situated within a few feet of the building, and a public market is only a few yards away. No lairage accommodation has been provided, and the animals have to wait either outside or inside the building while others are being slaughtered.

On its present site, the slaughter-house will always be a nuisance, but one hesitates to recommend the erection of a new one, unless money is available for erection on more modern lines.

As one or two undesirables have been found in the slaughter-house while slaughtering was in progress, it has been recommended to the City Council that all butchers should be medically examined once a month, and that no butcher should be allowed to slaughter unless he is in possession of a medical certificate. Slaughtering takes place between the hours of 9 p.m. and 5 a.m. The meat is inspected between the hours of 5 a.m. and 6 a.m. It has been

recommended that inspection should not take place until 7 a.m., in order that the meat might be examined in daylight. The animals slaughtered during the year number as follows :—

Bullocks	...	...	...	6,224
Sheep	...	...	...	669
Goats	...	...	...	17
Swine	...	...	...	69

XVIII.—OFFENSIVE TRADES.

Offensive trades are few in number. They can be dealt with as nuisances under the Public Health Act, but have not been the subject of special legislation.

The principal offensive trades in Freetown are :—

- (A) Fellmongering.
- (B) Leather-dressing and tanning.

(A) *Fellmongering*.—Hides are as a rule dried before they can give rise to any nuisance. The majority of dried skins are exported, but some are kept for local use.

(B) *Leather-Dressing and Tanning*.—The hides go through the process of liming and tanning and the leather is sold locally. The smell in most of the tanneries is very strong, and the vats containing the tanning liquid are uncovered. The greatest nuisance arises from the unsatisfactory drainage of the premises, and as the street drains are not all that could be desired, the construction of a soak-away pit is usually advised as being the most satisfactory method of getting rid of the fluid.

XIX.—HOUSING ACCOMMODATION.

Owing to the inducements offered to the aboriginal native to take up residence in Freetown, a certain amount of overcrowding would seem to have existed during the time of brisk trade which preceded the war. Investigations made during the year under review, although failing to expose any very flagrant case of overcrowding, certainly pointed to the fact that with an appreciable increase of the population, overcrowding was certain to occur.

The houses occupied by the aboriginal natives, especially those who have not taken up permanent residence in Freetown, can, I think, best be described as tenement houses. A house is divided up into a number of rooms, each intended to be let out to a separate family. One house (including the basement) may have four to six or more of these rooms, which are usually separated from one another by a wooden partition. If the housing accommodation tends to become limited, as in the years of brisk trade, these rooms are divided up into smaller rooms or cubicles, which are let out as sleeping rooms, and in this way there may be 30 or 40 persons sleeping in one house, under conditions which can only be described as prejudicial to health.

It appears that there are a number of such houses in Freetown. Very close supervision is necessary for the detection of the very common offence of overcrowding, and with a view to more efficient control the registration of all houses let out to more than one family would seem to be advisable.

XX.—VITAL STATISTICS.

(a) *Population*.—The population of Freetown varies. According to the Census of 1911 (taken in May) the population was 34,090, a decrease since 1901, and as the previous ten years had been years of great trade development, this decrease is somewhat remarkable. During the rice planting season (March, April and May) large numbers of natives leave Freetown for the Protectorate,

returning when the season is over. The absence of trade and the consequent reduction in the number of structural works, tend towards a decrease in the population of any town, and doubtless the war with its attendant diminution in trade has for the last two or three years exercised a marked influence on the number of natives from the Hinterland residing in the town. During the years 1915 and 1916 there have been at times temporary increases in the population owing to the return of large numbers of carriers from the Cameroons, many of whom were for a time allowed to take up residence in Freetown before going back to the Protectorate. Subsequently, action was taken to have these men sent up country as soon as possible after their arrival. To estimate with any degree of accuracy the population for 1916 is practically impossible, and an estimate from calculations based on the population at the last two censal years is, on account of the migratory tendency of the people, bound to be fallacious. With a view to ascertaining the housing accommodation at present obtaining in different parts of the town, a house to house visitation was made during December by the Sanitary Inspectors, who, amongst other things, made enquiries into the numbers of persons residing in each house. It was found that the number of inhabited houses was 5,720, the average number of persons residing in each house 5·49, giving a population of 31,416. This is a marked reduction compared with the population as ascertained in the 1911 Census. It can only be taken as a very rough and ready method of estimation, but there seems to be little doubt that for the reasons afore-mentioned, and on account of the fact that large numbers of labourers have been engaged by the military authorities for service, there actually is at present a very appreciable decrease.

(b) *Birth Rate*.—Owing to the very unreliable data available the calculation of the crude birth rate with any degree of accuracy is practically impossible. There is reason to believe that in the operation of the Act, the registration of births is defective, and it has been arranged that the Sanitary Sub-Inspectors should assist in checking the birth returns in order that importance of registration should be brought more forcibly to the notice of delinquents. The crude birth rates for the last 5 years, taking the population according to the 1911 Census as 34,090, are as follows:—

1912	...	...	17·22 per 1,000
1913	...	...	17·30 per 1,000
1914	...	...	19·53 per 1,000
1915	...	...	21·15 per 1,000
1916	...	...	20·61 per 1,000

The above figures show a tendency to an increase in the birth rate, but this is probably more apparent than real, as year by year the native becomes more alive to the obligations required of him by law. The total number of births registered in Freetown for 1916 was 706, of which 379 were males and 327 females.

(c) *Death Rate*.—The recorded death rates in Freetown for the last five years, taking the population according to the 1911 Census, are as follows:—

Year 1912	...	...	22·03 per 1,000
„ 1913	...	...	22·85 per 1,000
„ 1914	...	...	29·24 per 1,000
„ 1915	...	...	29·09 per 1,000
„ 1916	...	...	31·03 per 1,000

According to the Registrar's returns as published in the "Sierra Leone Gazette," the total number of deaths registered during 1916 was 1,058. It would appear, however, that the method of calculation was fallacious. On enquiry it was found that, although all deaths at the Kissy Asylum and Freetown Gaol (*i.e.*, cases on which inquests were held), irrespective of

whether they belonged to Freetown or not, were published in the returns for Freetown, the deaths at the Infectious Diseases and Incurable Hospitals at Kissy of persons who had gone from Freetown were not included. All deaths at the Kissy institutions of persons who had gone from Freetown should be included in the Freetown returns, and deaths in Freetown institutions of persons who had been resident in another place should be excluded. I would advise in the case of deaths in public institutions, either at Kissy or in Freetown, that particular attention be given to eliciting information regarding the previous residence of the deceased. The statistical returns attached do not include deaths in the Incurable Hospital at Kissy, but comprise the deaths at the Infectious Diseases Hospital and Asylum, Kissy, and at the Freetown Gaol, of patients who were said to have previously resided in Freetown.

(D) Analysis of the death rate.—

(i) *Infantile Mortality*.—During the year 1916 there were 237 deaths amongst children under one year of age, compared with 210 in 1915. The figures do not seem to have altered much since 1897, when, according to Dr. Prout, the number was 235. In 1903 it was 254. On account of the doubtful nature of the data available, due to faulty registration, the infantile mortality rate for 1916 (335·6 per 1,000 births) may be taken with a certain amount of reserve, but the figure nevertheless is exceptionally high, and merits some attention.

Referring to Table III. it will be seen that the excessive mortality of the first three months of life is almost entirely due to premature birth and enfeebled vitality (marasmus, atelectasis, convulsions). Although a large number of deaths in the early days of infancy is due to the immature condition of the child at birth, a number of deaths undoubtedly occur through the carelessness and inefficiency of the local midwives in attendance. The number of deaths from *Trismus Neonatorum* certainly points to absence of aseptic measures at birth. In 1912 a committee of medical men and ladies interested in the subject formed for the purpose of enquiring into the causes of the high infantile mortality in this colony made the following statement in their report:—"Whilst the treatment of normal cases by native midwives seems to be satisfactory on the whole, in abnormal cases there is much improvement to be desired." Under the Medical, Midwives, Dentists and Druggists (Amendment) Ordinance, 1914, legislation has been extended to midwives, and it is hoped that in this way more adequate control and supervision will be exercised over the training and work of the midwives, thereby leading to a decrease in the infantile mortality in the colony. Anything pointing to carelessness or inefficiency of the local midwives should at once be investigated. Convulsions include diverse conditions, of which some at least are connected with parturition; but they are as a rule after the first few weeks the results of errors in feeding. Diarrhoea does not reach its maximum until between the sixth and ninth months, and the figures are practically the same for the first two years. In the early years this condition is also as a rule due to some digestive trouble. It appears there is a tendency for the natives, especially the creoles, to commence artificial feeding far too early, and doubtless the presence of convulsions and diarrhoea can to a large extent be attributed to this. I am strongly of opinion that the recommendations made by the same Committee "that girls in the higher standards of the schools be taught as a routine work the management of children in the same way as hygiene is being taught," be carried into effect. A number of deaths appear from fever. Although in some cases this refers to malarial fever, the term is used loosely, and is applied to any illness with a high temperature which has not been diagnosed.

(ii.) Mortality at age-period 1-5 years (Table III.). After the first year the mortality rate gradually decreases. Convulsions and diarrhoea remain fairly high during the second year and continue to fall during the following years. There is a marked absence of any of the ordinary zymotics of children in this age period, only three cases, all whooping cough, appearing. It is difficult to discern whether all the deaths entered as dysentery are true dysentery or not, as only one was certified by a medical officer.

(iii.) Mortality at age-period 5-15 years and 15-25 years (Table II.) does not call for any comment.

(iv.) Mortality at age-period 25-60 years (Table II.) shows a large number of deaths from diseases of the digestive system. Over 25 per cent. of these, many of which are uncertified, are due to diarrhoea. Diarrhoea, so far as it is fatal, is eminently an infantile disease, and when it is stated as the cause of death in persons say over 10 years, one is inclined to feel there are a number of fatal cases in the town with diarrhoea as their principal symptom, and, taking into consideration the number of cases, probably of an infectious nature. Taken in conjunction with the prevalence of dysentery the point is worthy of note. The total number of deaths at this age period is extremely high, and points to lowered vitality at what should be an extremely healthy age period.

It is unfortunate that on account of the large number of deaths uncertified by a medical officer our information regarding the causes of death is not more precise, but it is to be expected that as time goes on, and the native becomes more educated, the attendance of a qualified medical officer will be more often sought after.

(E) The cause of sanitation has been greatly advanced by the registration of deaths with their causes. The two subjects are intimately connected, and it is suggested that a medical Registrar of Births, Deaths and Marriages, preferably the Senior Sanitary Officer, be appointed.

XXI.—PORT SANITARY WORK.

During the year 1916 the Medical Officer of Health was appointed Health Officer under the Quarantine Ordinance of 1914.

Owing to the outbreak of smallpox, Freetown was declared an infected port on the 23rd March, 1916, and continued so until quarantine was raised on the 10th of June. The line of action taken during this period is contained in a special report on the outbreak. It has not been possible during the year to have a medical inspection of all ships arriving at this port, but forms containing a number of questions (copies attached) relating to the health of the ship have to be filled up and signed by the surgeon or captain. If there is anything of an infectious nature on board, an inspection is made by the Health Officer. As a general rule all cases of fever not certified by a Medical Officer are investigated. One case of scarlet fever was reported on the S.S. "Elmina," outward bound. The case was isolated on shore and disinfection, etc., carried out. On the 19th September two cases of plague having been reported from Liverpool, a medical inspection of all ships arriving from that port was made until quarantine was raised. No case of plague was discovered.

W. ALLAN,

Medical Officer of Health.

QUESTIONS TO BE ASKED BY THE HARBOUR MASTER ON VISITING
A VESSEL ARRIVING AT THIS PORT.

1. Name of Vessel :

Answer _____

2. Name of Master :

Answer _____

3. Where from and date of departure :

Answer _____

4. Did any infectious or contagious disease prevail in any degree at any port with which you have had communication ; if so, what disease prevailed, and at what port ?

Answer _____

5. Were any Officers, Crew, Passengers or other persons taken on board at that port ?

Answer _____

6. Has there been any abnormal or excessive mortality amongst rats on board ?

Answer _____

7. Have there been any deaths on board during voyage ? (If " Yes " proceed according to Death Form).

Answer _____

8. Has there been or is there at present any illness on board ? (If " Yes " proceed according to Illness Form).

Surgeon.

Master.

QUESTIONS TO BE ASKED BY THE HARBOUR MASTER WHENEVER ILLNESS
IS OR HAS BEEN PRESENT ON BOARD ANY SHIP ARRIVING AT THIS PORT
OTHER THAN WHEN A DEATH HAS OCCURRED.

1. How many cases of illness have there been on board ?

Answer _____

2. What were the most prominent features of illness in each case ? (If a surgeon on board, state his diagnosis).

Answer _____

3. What was the date of commencement of the illness in each case ?

Answer _____

4. What was the duration of the illness in each case ?

Answer _____

5. At what port did the sick person or persons embark ?

Answer _____

6. Did you observe anything of an infectious or epidemic nature about the illness on board ?

Answer _____

Surgeon.

Master.

QUESTIONS TO BE ASKED BY THE HARBOUR MASTER WHENEVER A DEATH
HAS OCCURRED ON BOARD ANY SHIP ARRIVING AT THIS PORT.

1. State name of Ship :
Answer _____
2. State name of Master :
Answer _____
3. State where from and date of departure :
Answer _____
4. Name of deceased :
Answer _____
5. What was the profession of deceased ?
Answer _____
6. Give the date of death :
Answer _____
7. How many days had deceased been ill previous to death ?
Answer _____
8. State nature of illness and cause of death :
Answer _____
9. Give position of ship at time of death :
Answer _____
10. Where was deceased buried ?
Answer _____
11. At what port did deceased embark ?
Answer _____
12. Was deceased quite healthy when he came on board ?
Answer _____
13. Has there been or is there at present any other case of illness on board ?
Answer _____
14. If so, what was or is the nature of the illness in each case ?
Answer _____
15. What was the date of commencement of illness in each case ?
Answer _____
16. At what port or ports did those persons who developed illness on board embark ?
Answer _____
17. Did you observe anything of an epidemic or infectious nature about the illness on board ?
Answer _____

Surgeon.

Master.

TABLE I.—MORTALITY IN EACH MONTH FROM VARIOUS CAUSES.

Month.	All Causes.	Infectious Diseases.												Respiratory Diseases.		Circulatory Diseases.	Diseases of the Urinary System.	Blackwater Fever.	Nervous Diseases.		Diseases of the Digestive System, including Diarrhoea.	Malignant Diseases.	Developmental Diseases.	Accident and Violence.	MALARIA, DEBILITY, ETC.		Miscellaneous.
		Cerebro-Spinal Meningitis.	Dysentery.	Fever.	Mumps.	Measles.	Trypanosomiasis.	Pneumonia.	Tetanus.	Tuberculosis.	Smallpox.	Whooping Cough.	Leprosy.	Bronchitis.	Other Respiratory.				Convulsions.	Other Nervous.					Under 1 year.	Above 60 years.	
January ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
February ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
March ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
April ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
May ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
June ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
July ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
August ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
September ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
October ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
November ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
December ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE II.—MORTALITY AT VARIOUS AGE PERIODS FROM VARIOUS CAUSES.

Age.	All Causes.	Infectious Diseases.												Respiratory Diseases.		Diseases of the Urinary System.	Blackwater Fever.	Nervous Diseases.		Malignant Diseases, including Diarrhoea.	Developmental Diseases (except old age).	Accident and Violence.	MARASMUS, DEBILITY, ETC.		Miscellaneous.	
		Cerebro-Spinal Meningitis.	Dysentery.	Fever.	Mumps.	Measles.	Smallpox.	Pneumonia.	Tetanus.	Tuberculosis.	Sleeping Sickness.	Whooping Cough.	Leprosy.	Bronchitis.	Other Respiratory.			Convulsion.	Other Nervous.				Under age of 1 year.	Above age of 60 years.		
Under 1 year	...	...	1	47	—	—	5	17	—	—	—	—	23	—	—	—	44	—	16	—	59	—	18	—	7	
1 — 5 years	...	...	8	30	—	—	3	1	—	3	—	—	4	—	—	—	29	—	24	—	1	—	1	—	8	
5 — 15 years	...	...	1	6	1	1	5	2	3	—	—	—	8	—	—	1	3	—	9	—	—	—	—	—	3	
15 — 25 years	...	...	5	12	—	1	9	1	9	—	—	—	3	—	12	5	1	3	4	—	—	3	—	—	12	
25 — 60 years	...	...	1	22	18	—	11	37	27	1	—	—	23	6	46	22	1	—	13	69	—	8	—	—	48	
60 years upwards...	...	...	9	7	—	—	3	1	2	—	—	1	3	2	27	11	—	—	6	15	2	1	—	87	11	
All Ages...	...	1,013	46	120	1	1	12	62	41	1	3	1	64	8	85	39	1	77	22	137	2	60	12	19	87	89

TABLE III.—FREETOWN.—CAUSES OF DEATH AMONG CHILDREN UNDER 5 YEARS OF AGE FOR 1916.

CAUSES OF DEATH.	AGE.																
	Weeks.					Months.					Years.					TOTAL.	
	0-1	1-2	2-3	3-4	0-1	1-2	2-3	3-6	6-9	9-12	0-1	1-2	2-3	3-4	4-5	0-1	0-5
Premature Birth ...	42	1	—	—	43	—	—	—	—	—	43	—	1	—	—	43	44
Marasmus ...	14	2	—	—	16	—	—	1	1	—	18	1	—	—	—	18	19
Atelectasis ...	16	—	—	—	16	—	—	—	—	—	16	—	—	—	—	16	16
Convulsion ...	10	5	2	4	21	2	2	8	8	3	44	17	5	2	5	44	73
Fever ...	1	5	4	3	13	5	8	10	8	3	47	15	9	3	3	47	77
Diarrhoea ...	1	—	1	—	2	1	—	1	9	3	16	14	2	5	3	16	40
Bronchitis ...	—	1	—	2	3	—	1	6	7	6	23	4	—	—	—	23	27
Pneumonia ...	—	—	—	—	—	1	1	2	1	—	5	—	—	2	1	5	8
Trismus ...	15	—	2	—	17	—	—	—	—	—	17	—	—	—	1	17	18
Erysipelas ...	—	—	—	1	1	—	—	—	—	—	1	—	—	—	—	1	1
Zymotic Diseases ...	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	3
Dysentery ...	—	—	—	—	—	—	—	1	—	—	1	4	3	1	—	1	9
Other Cases ...	2	—	1	—	3	—	—	2	1	—	6	1	3	1	3	6	14
ALL CASES ...	101	14	10	10	135	9	12	31	35	15	237	56	26	14	16	237	349

TABLE IV.

Month.	Infantile Mortality 0-1 year.	1-5 years.	5-15 years.	15-25 years.	25-60 years.	60 years upwards.	All Ages.
January ...	19	3	2	5	30	15	74
February ...	18	3	3	11	31	21	87
March ...	21	7	5	8	22	10	73
April ...	14	3	5	8	35	12	77
May ...	13	7	4	2	31	18	75
June ...	20	15	5	3	43	22	108
July ...	26	13	3	7	34	16	99
August ...	22	14	6	6	26	19	93
September ...	22	11	5	5	28	20	91
October ...	17	5	2	9	22	20	75
November ...	23	16	2	3	23	9	76
December ...	22	15	1	13	28	6	85

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