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ANNUAL REPORT, 1915, MEDICAL RESEARCH INSTITUTE.

1. *Introductory.*—Original investigations are described first. Special attention has been directed to ankylostomiasis, babesiasis, blood-sucking flies, dysentery, skin diseases, and trypanosomiasis.

2. An increase in the amount of clinical material sent to the laboratory for examination and opinion has to be recorded.

3. A bacteriological analysis of the Iju water-supply has been conducted at regular intervals.

4. *Ankylostomiasis.*—Since 1910 Medical Officers have supplied reports from their district as to the prevalence of ankylostomiasis. These reports record the results of examining fæces for ankylostome ova. The subjects of examination are, in the majority of cases, the inmates of the district gaol.

5. Previous to 1910 no such systematic investigation was made. This must be borne in mind when considering the figures in the annual reports, which are as under:—

ANKYLOSTOMIASIS.

1907	...	22 cases.	1911	...	404 cases.
1908	...	19 „	1912	...	405 „
1909	...	30 „	1913	...	212 „
1910	...	123 „	1914	...	383 „

6. The figures from 1907 to 1909 refer to actual cases of ankylostomiasis in the sense of a severe anaemia. In succeeding years the figures are swelled by the inclusion of cases in which the ova of ankylostomes had been found in the fæces, and very many of these cases showed no obvious signs of the ill effects of harbouring the worm.

7. As the result of a circular letter sent round to all stations special efforts were made in the direction of diagnosis, and also along a particular line of treatment which had been very favourably reported on by Dr. J. E. A. Ferguson, of British Guiana.

8. Figures have been extracted from the reports sent from various stations in the Southern Provinces, Nigeria, and are quoted below.

9. Fæces from 200 natives were examined at Ibadan. Ankylostome ova were noted in 120, equal to 60 per cent.

10. The total examined at Benin City was 139, and 60 of these, 43 per cent., were proved to harbour ankylostomes.

11. At Warri the results were positive in 19 out of 104 cases, that is 18 per cent.

12. One hundred natives were examined at Bonny, ova being found in 20.

13. A similar number was reported on from Opobo. Here the adult worm was recovered in two cases, and the ova were noted in 20.

14. Seventy-two individuals were examined at Udi, with positive findings in 59, 81 per cent.

15. At Calabar the number was 66, ova occurring in 64, a percentage of 97.

16. There were 63 examinations at Okwoga, 41 of them with positive results, that is 65 per cent.

17. Fifty-nine prisoners were reported on from Badagry, ova being noted in 41, or 69 per cent.

18. The fæces of 50 inmates of the gaol in Lagos were searched, with a successful result in 24.

19. At Agbor the number of examined cases was 47 adult and 10 children, 44 of the former and seven of the latter being proved to harbour the worm, a percentage of 93 and 70 respectively.

20. Forty-three examinations were made at Okigwi, ova being observed in 42, or 97 per cent.

21. The subjects chosen at Degema numbered 35, of whom 11, or 31 per cent., presented ova in the fæces.

22. The actual figures from the other stations are not available, but the percentage of prisoners at Ikot Ekpene infected with ankylostomes was given as 97, and 12 cases showing ova in the stools were reported from Brass.

23. It will be seen from the tabular statement below that 1,088 individuals were examined, the percentage of infected in the different stations ranging from 18 to 97, and the percentage of the total being 52.

	Total cases examined.	Percentage infected.
Calabar	66	97
Okigwi	43	97
Agbor	57	89
Udi	72	81
Badagry	59	69
Okwoga	63	65
Ibadan	200	60
Lagos	50	48
Benin City	139	43
Degema	35	31
Opobo	100	22
Bonny	100	20
Warri	104	18
TOTAL	1,088	52

24. Few, if any, medical officers have sufficient time to spare from their other duties to make the large number of examinations necessary before it can be reasonably assumed that ankylostome ova are absent from the fæces.

25. The results now to be given of the examination of the inmates and staff of the Yaba Lunatic Asylum (all native) and of the native staff of the Medical Research Institute indicate that from Badagry downwards in the above table the percentage of infected persons was, in all probability, higher than that recorded.

26. The fæces of 136 individuals were examined. This number comprised 50 lunatics, 40 labourers, 28 members of the nursing, clerical and general staff and 18 children.

27. A few grammes of the fæces, immediately after voiding, were enclosed in a clean Petri dish and sent to the laboratory. Sufficient of this material, well mixed and moistened with water, to be thinly spread under a $\frac{7}{8}$ in. square cover glass, was examined under a low power of the microscope. Negative results were not accepted until five such smears from each of three separate stools chosen at weekly intervals had been searched.

28. Ankylostome ova were found in 133, that is a percentage of nearly 98.

The ova were detected in the first stool at the first examination in 80, at the second examination in 23, at the third in 13, at the fourth in six, and at the fifth in five.

29. Two or more stools had to be examined in only nine cases; the results were positive at the first examination of the second stool in four, at the second examination in one, and at the fifth examination in one, the remaining three cases being negative after repeated search.

30. It was possible, then, to demonstrate the ova in the first specimen of fæces in 127 out of the 136 cases, and in 80 of these the ova were present in the first smear examined.

31. The three negative cases included one female attendant, one male and one female lunatic.

32. Eighty-eight subjects were chosen for treatment. The first group, made up of 19 adults, received in July 25 grains thymol thrice in the day time at intervals of four hours, on two successive days. No ill effects were observed to follow this heroic dosage. Ankylostome ova had been demonstrated in the fæces of all except one.

33. Five months after treatment, the fæces were re-examined and four cases were considered free from ankylostomes, repeated search for the ova being unsuccessful.

34. Leaving out of account these four cases, and also the one in which no ova had been found before treatment, the following results were obtained from the remaining 14.

35. Ova had been found in the first smear from the first stool in four cases.

When re-examined in December they were still present in the first stool, in the first smear in two cases, and in the second smear in the other two.

36. Cases in which ova were found in the second smear from the first stool in July numbered five. In December, the results were positive in the first smear from the first stool in four instances, and in the third smear in the remaining one.

37. There was one case in which ova had been found in the third smear from the first stool in July. When re-examined in December the ova were noted in the second smear of the first stool.

38. One case which showed ova in the fourth smear from the first stool in July showed them in the second smear from the first stool in December.

39. There were two cases in which ova had been demonstrated only in the fifth smear from the first stool in July, and in December they were found in the first smear in one, and at the fourth in the other.

40. The last case was positive in the second smear from the second stool in July, and positive again in the first stool in the first smear in December.

The Table may make these statements more clear.

NINETEEN CASES TREATED WITH 25 GRAINS THYMOL THRICE DAILY ON TWO SUCCESSIVE DAYS IN JULY, 1915.

No ova in July.	Ova present in July.		December, in first stool.				No ova in December.
			1st smear.	2nd smear.	3rd smear.	4th smear.	
—	1st stool ...	1st smear 5	2	2	—	—	1
—	„ „ ...	2nd „ 7	4	—	1	—	2
—	„ „ ...	3rd „ 2	—	1	—	—	1
—	„ „ ...	4th „ 1	—	1	—	—	—
—	„ „ ...	5th „ 2	1	—	—	1	—
—	2nd „ ...	2nd „ 1	1	—	—	—	—
1							1

41. Eleven cases were treated in July with 25 grains thymol thrice in the day-time on the first day and 30 grains thymol thrice in the day-time on the next day. Again no ill effects were observed. Apparently complete freeing from ankylostomes occurred in only one case.

42. The findings in July were positive in the first smear of the first stool in five cases. Re-examined in December, ova were found in the first smear from the first stool in four instances and from the fourth smear in one.

43. Four cases showed ova in the second smear from the first stool in July. In December, the ova were noted in the first smear of the first stool in three and in the fifth smear in one.

44. In the remaining case the third smear of the first stool was positive in July, and the first smear of the first stool in December. These figures are also shown in a table.

ELEVEN CASES TREATED WITH 25 GRAINS THYMOL THRICE DAILY ON ONE DAY AND 30 GRAINS THYMOL THRICE DAILY ON THE NEXT DAY, IN JULY, 1915.

Ova present in July.		Ova present in December in 1st stool.			No Ova in December.
		1st smear.	4th smear.	5th smear	
1st stool ...	1st smear 6 ...	4	1	—	1
„ „ ...	2nd „ 4 ...	3	—	1	—
„ „ ...	3rd „ 1 ...	1	—	—	—

45. Fifty-three subjects were given 10 grains thymol morning and evening for 35 consecutive days (missing one day).

Two of these were apparently uninfected by ankylostomes previous to treatment.

46. The thymol administration was begun on 21st July and stopped on 25th August; the fæces of all were re-examined in September, that is from two to three weeks after the last dose of the anthelminitic, and again in December.

47. Ova were present in the first smear from the first stool in 27, before treatment in July. When again examined in September, ova could not be found in 10 of these cases. Of the remainder, ova were still present in the first smear of the first stool in 12, in the second smear in one, in the third smear in two, in the fourth smear in one and in the fifth smear in one.

48. At the second re-examination in December, three of the 10 cases which had shown no ova in September gave positive findings in the first smear of the first stool and one in the fifth smear of the first stool, whilst one case which showed ova in September was negative in December, so that the number of apparent cures had fallen to seven. Of the remainder, the first smear of the first stool was positive in eighteen, in the fourth smear in one in the fifth smear in one.

49. Four cases showed ova in the second smear of the first stool in July. Three of these were positive in the first smear of the first stool in September and one in the fifth smear. Again examined in December, ova were absent in two of the cases, and present in the second smear of the first stool in one and in the fifth smear in one.

50. Six cases gave positive findings in the third smear from the first stool before treatment in July. After treatment in September, there were two apparent cures. Of the remaining four cases, two were positive in the first smear from the first stool and two in the second smear. When re-examined in December, the two cases which were free from ova in September were still free, two cases were again positive in the first smear of the first stool and one in the second smear, whilst one patient (a lunatic) had been discharged in the interval.

51. There were five cases in which ova were only demonstrated in the fourth smear of the first stool, in July. By September, two of these cases were apparently cured, and the findings were positive in the first smear of the first in two and in the second smear in one. These findings were identical when a re-examination was made in December.

52. Four cases showed ova in the fifth smear from the first stool in July. When again examined in September there were three cases free from ova, and the remaining case was positive in the second smear from the first stool. But in December one of these apparent cures showed ova in the fifth smear from the first stool, two cases were still negative, and in the fourth case ova were noted in the first smear from the first stool.

53. The first smear from the second stool was positive in four cases in July. By September one of the cases, an aged lunatic, had died, there were two apparent cures and in the remaining case ova were abundant in the first smear from the first stool. The results were the same at the re-examination in December.

54. One case was negative until the fifth smear of the second stood in July. This case was negative in September, but the ova were found in the first smear from the first stool in December.

55. The two cases which were negative before treatment in July remained negative throughout the examination in September and December.

These figures are detailed in the subjoined table.

Fifty-three cases treated with ten grains thymol, morning and evening for 35 consecutive days, 21st July to 25th August, 1915 (missing one day, 2nd August).

No Ova in July.	Ova present in July.		Ova present in September, in 1st stool.					No Ova in September.	Ova present in December, in 1st stool.				No Ova in December.
			1st smear	2nd smear	3rd smear	4th smear	5th smear		1st smear	2nd smear	4th smear	5th smear	
—	1st stool	1st smear 27	12	1	2	1	1	10	18	—	1	1	7
—	„ „	2nd „ 4	3	1	—	—	—	—	—	1	—	1	2
—	„ „	3rd „ 6	2	2	—	—	—	2	2	1	—	—	2
—	„ „	4th „ 5	2	1	—	—	—	2	2	1	—	—	2
—	„ „	5th „ 4	—	1	—	—	—	3	1	—	—	1	2
—	2nd „	1st „ 4	1	—	—	—	—	2	1	—	—	—	2
—	„ „	5th „ 1	—	—	—	—	—	1	1	—	—	—	—
2								2					2

One patient discharged.
One patient died.

56. Five children, their ages ranging from five to ten years, were treated with five grains thymol twice daily for 35 consecutive days, commencing and terminating as in the previous group.

57. In two of these cases ova were present in the first smear from the first stool in July, and they were still similarly present both in September and December.

58. The ova were found in the second smear of the first stool in July in other two of the children. At the September and December examinations the ova were present in the first smear of the first stool in both instances.

59. One child showed ova in the third sample of the first stool in July, and they were easily found in the first smear of the first stool both in September and December.

The table shows the figures.

FIVE CHILDREN (AGED FIVE TO TEN YEARS) TREATED WITH FIVE GRAINS THYMOL, MORNING AND EVENING FOR 35 CONSECUTIVE DAYS, 21ST JULY TO 25TH AUGUST, 1915 (MISSING ONE DAY, 21ST AUGUST).

Ova present in				
July.			September, in 1st stool.	December, in 1st stool.
			1st smear.	1st smear.
1st stool... ...	1st smear ...	2	2	2
„ „	2nd „ ...	2	2	2
„ „	3rd „ ...	1	1	1

60. Eleven cases received no treatment, and thus acted as controls. At the first examination, in July, ova were noted in the first smear from the first stool in seven, in the second smear in three and in the third smear in one. Re-examined in December, ova were demonstrated in the first smear from the first stool in all

61. No special precautions were taken to prevent reinfection after treatment. The inmates of the Lunatic Asylum, 48 of whom are included in the group of 53 treated with twice daily doses of thymol, are provided with washing places and latrines of such design as to render the chances of ankylostome infection through the skin remote. But a certain amount of earth eating and filth eating is indulged in, and by this means there may have been some degree of reinfection by that channel. The remaining 40 cases were warned of the dangers of bare feet, bathing in pools, and such like, but no supervision could be exercised.

62. Thirty-seven subjects were, for various reasons, only examined once and were untreated. The first smear of the first stool showed the ankylostome ova in 33, the second smear in two and the third smear in two.

63. The hæmoglobin percentage was estimated by Tallquist's method, four to five months after the first examination of the fæces in 122 individuals.

64. Eleven of the cases were in the group which received large equal doses of thymol thrice daily on two consecutive days. The hæmoglobin was 100 per cent. in six, 95 per cent. in two and 90 per cent. in three. All of these individuals were voiding ankylostome ova throughout the five months, except one who was uninfected and in whom the percentage was 100.

65. Nineteen cases were in the group which received large doses of thymol thrice daily on two consecutive days, the larger dose on the second day. The hæmoglobin was 100 per cent. in eight, 95 per cent. in five, 90 per cent. in two, 85 per cent. in two and 80 per cent. in two. All except five had harboured ankylostomes for five months. Four of the remainder were apparently cured by treatment, three of them possessing 100 per cent. hæmoglobin and one 90 per cent., and the other case (80 per cent. hæmoglobin) had not at any time showed ankylostome ova.

66. Fifty-one individuals who had received twice daily doses for 35 days (missing one day) had their hæmoglobin estimated four months after the cessation of treatment. The percentage was 100 in 16, 95 in 16, 90 in 16, and 85 in three. Two of the cases had shown no ankylostome ova either before or after treatment, and their hæmoglobin was respectively 100 and 90 per cent. Fourteen individuals had ceased to pass ankylostome ova by the time of examination in December. Four of these showed 100 per cent., four 95 per cent., five 90 per cent. and one 85 per cent. hæmoglobin.

67. The five children treated for 35 consecutive days (missing one day) with small doses of thymol all showed a high percentage (two of 100, two of 95 and one of 90) of hæmoglobin.

68. Those cases which received no treatment, 36 in number, showed the hæmoglobin as follows :—

100 per cent.	18
95 „ „	9
90 „ „	5
85 „ „	4

Five individuals of this group were children under 10 years of age, one with 100 per cent., one with 95 per cent. and three with 85 per cent. hæmoglobin.

69. To summarise the results, it would appear that either thymol is not a reliably useful anthelmintic for ankylostomes, or that its dosage was not sufficiently large or its exhibition not prolonged enough to effect its reputed action. 22 cases out of 85 were apparently cured, and the highest percentage of these occurred in the group which received twice daily doses of the drug over a long period.

70. At least five smears from a sample of fæces should be examined, and the examination repeated after a week and again after another week, before a negative finding as regards ankylostome ova is accepted.

71. As regards anæmia in those individuals who harboured the worm, the hæmoglobin percentage would appear to be the most easily obtained and the most reliable index of such a state.

72. The percentages recorded above are all high. Pallor of the mucous membranes, œdema of the feet, breathlessness and palpitation on exertion, were not observed in any of the cases.

73. It would seem reasonable to conclude that those 136 individuals who have been examined for the purposes of this report were not actual sufferers from ankylostomiasis, but were rather carriers of the infection.

74. No data have been collected to indicate that such carriers possess an immunity, or that additional infections by the same worm, or factors leading to a lowering of vitality, might produce a real ankylostomiasis anæmia.

75. Cases of the disease, sometimes very acute and even fatal, do occur in Nigeria, but the consensus of opinion points to its being uncommon.

76. By the courtesy of the Principal Medical Officer, some extracts from the reports by medical officers are here given.

77. Dr. J. H. McKay, reporting from the Okwoga district, stated that out of 41 prisoners with ankylostome ova in the fæces, only four showed the signs of ankylostomiasis.

78. Dr. J. S. Smith met with only one definite and typical case of the disease at Forcados.

79. Dr. Hungerford also diagnosed one case at the outdoor Dispensary in Warri.

80. Dr. Tipper treated one typical case in a native policeman at Onitsha. A large proportion of the prisoners were anæmic and weak, and their general health improved noticeably under anthelmintic treatment.

81. At Agbor Dr. Brierley diagnosed one definite case at the Dispensary. He states also that out of 44 individuals in whom he had found ankylostome ova there were signs of anæmia—dilated heart and hæmic bruits—in only one man.

82. Dr. Thompson considered that the disease is not prevalent at Brass, and no clinical signs of the disease were observed.

83. Dr. Beale-Browne concluded that the disease is not by any means serious at Degema, and he found that none of the cases showing ova had the general health affected.

84. Dr. Maclaine found that although infection is general at Ikot-Ekpene, severe cases of anæmia were practically unknown. He saw no cases of the disease during 1915, except in some prisoners returned from Port Harcourt, in whom the strain of severe labour (railway work) had been the predisposing factor.

85. Dr. Macfarlane, during his investigations at Opobo, formed the opinion that ankylostome ova were generally found in the anæmic and flabby-looking. He considered it almost safe to diagnose the presence of the parasite without a microscopical examination, simply by the appearance of the individual. He also stated that the appearance of the people in the Opobo district suggested that many of them suffer from the ravages of the disease.

86. Dr. E. L. A. Sieger, stationed at Ameke, on the North Eastern Railway, under construction, treated only two cases of ankylostomiasis during the year. He considered that the disease was not prevalent in his district.

87. Dr. Jackson Moore believed that fully 60 per cent. of the cases at Ibadan which showed ova in the stools appear in good health, and they did not complain. The remainder complained of only trivial and various disorders, mainly alimentary.

88. Dr. T. B. Adam's investigations at Warri (given at length in the 1914 Annual Report of the Medical Department, Nigeria) are of very great interest.

Five hundred natives were examined, 380 adults and 120 children.

The results are epitomised below.

Out of 353 adult males (16 years and upwards) 311 showed ankylostome ova. 101 of these were anæmic, 51 anæmic and thin, and 10 anæmic and emaciated, that is a little over 50 per cent. of the adult males harbouring ankylostomes presented signs of anæmia. 27 adult females were examined, 24 of them with ova in the stools. 11 were anæmic, 5 anæmic and thin, and 2 anæmic and emaciated (over 60 per cent. showing ill effects).

One hundred and two male children (15 years and less) were examined, and ova noted in the fæces of 92; 17 were anæmic and 45 anæmic and thin, a percentage of over 60. 16 out of 18 female children harboured ankylostomes; 3 were anæmic and 7 were anæmic and thin, the percentage being again over 60, showing evidence of the effects of the parasite.

89. The opinions quoted above are those of medical men who have had a large experience over a number of years in Nigeria. Summarising generally, it may be said that severe cases of ankylostomiasis are uncommon, but that in certain districts a certain amount of anæmia occurs, probably due to the presence of the worm.

90. *Babesiasis.*—By the request of the Principal Medical Officer, a number of blood smears from domestic animals were sent to the Institute to be examined for the presence of babesiæ.

91. A large number were sent by Dr. Dalziel, Municipal Sanitary Officer, Lagos. Smears from 40 cattle, 20 pigs, 20 sheep and 20 goats were obtained at the slaughter-house. Only four of these animals were found to harbour babesiæ, and the infection was very small in all. One bullock and three rams were affected, and the time of the year was November and December.

92. Twenty-four smears were sent from Ibadan by Dr. Mackey in March. The animals were sheep (8), goats (7), pigs (5) and dogs (4). Five of the sheep and two of the dogs harboured babesiæ.

93. In November and December Dr. Jackson Moore sent a further 177 smears from Ibadan, 125 cattle, 25 goats, 14 sheep, 10 dogs and 3 pigs. Babesiæ, in small numbers, were found in nine of the cattle and in one goat.

94. Dr. Ashton forwarded 10 blood smears in December, eight from goats, one from a cat and one from a dog. Babesiæ were not found in any.

95. At different times throughout the year blood smears were examined from six goats, five dogs, four horses, three bullocks and two sheep from Lagos, Ebute Metta and Yaba. Babesiæ were found in only one animal, a dog.

96. Blood smears from a dog were sent by Dr. Cole from Badagry. No babesiæ were found.

97. In all, the blood of 332 animals was examined. Babesiæ were noted in 10 out of 168 cattle, in one out of 66 goats, in eight out of 44 sheep and in three out of 21 dogs; no babesiæ were observed in 28 pigs, four horses and one cat.

The percentages are :—

	Number examined.	Infected with Babesiæ.
Cattle	168	5·9 per cent.
Goats	66	1·5 ,,
Sheep	44	18·1 ,,
Dogs	21	14·2 ,,

Blood-sucking Flies.

98. The insects enumerated were all obtained in the immediate neighbourhood of Yaba.

99. Three specimens of *Glossina palpalis*, females, and two of *Stomoxys nigra* were caught in the laboratory in April.

100. During May *Glossina palpalis* 18 ♀, *Stomoxys nigra* 8 ♀, *Tabanus secedens* 3 ♀, *Stomoxys omega* 2 ♀, *Tabanus socialis* 2 ♀, *Hippocentrum versicolor* 2 ♀, *Tabanus thoracinus* 1 ♀, and *Tabanus fasciatus* 1 ♀, were obtained.

101. The following mosquitoes were caught during the same month, mostly by the labourers in their own huts:—*Culiciomyia nebulosa* ♂ 123 ♀ 123, *Ochlerotatus nigricephalus* 61 ♀, *Ochlerotatus irritans* 26 ♀, *Anopheles costalis* 3 ♂ 26 ♀, *Mansonioides africanus* 21 ♀, *Culex duttoni* 3 ♂ 3 ♀, *Culex thalassius* 3 ♀, *Stegomyia fasciata* 2 ♀, *Stegomyia luteocephala* 2 ♀, *Banksinella luteolateralis* 2 ♀, *Culex consimilis* 1 ♂ and *Culex invidiosus* 1 ♀.

102. During June *Glossina palpalis* 10 ♀ were taken, also *Stomoxys nigra* 28 ♀, *Stomoxys omega* 2 ♀, *Tabanus secedens* 1 ♀, *Hippocentrum versicolor* 1 ♀ and *Glossina tachinoides* 1 ♀.

103. The mosquitoes caught in the same month were *Culiciomyia nebulosa* 2 ♂ 2 ♀, *Anopheles costalis* 4 ♀, *Ochlerotatus nigricephalus* 1 ♀, *Mansonioides africanus* 1 ♀ and *Culex tigripes* 1 ♀.

104. In July *Glossina palpalis* 11 ♀ were captured, also *Mansonioides africanus* 4 ♀, *Anopheles costalis* 1 ♀ and *Anopheles mauritianus* 1 ♀.

105. Only *Glossina palpalis* 1 ♀ was obtained in August, but three were taken in September, as well as one female specimen each of *Tabanus socialis* and *Tabanus tæniola*.

106. During October, *Glossina palpalis* 3 ♀, *Tabanus tæniola* 4 ♀ and one *Tabanus socialis* ♀ were captured.

107. In November there were *Glossina palpalis* 1 ♀, *Tabanus tæniola* 3 ♀, *Tabanus par* 1 ♀, *Tabanus kingsleyi* 1 ♀ and *Tabanus secedens* 1 ♀, and in December one female *Glossina palpalis* was caught.

108. The total blood-sucking insects caught and identified was 535, and of this number 320 were dissected and examined.

109. Smears were made of (*a*) proboscis, (*b*) cephalic muscles, (*c*) thoracic muscles and (*d*) intestinal tract. In most cases these smears were examined in the fresh as well as in the stained condition.

110. During the earlier period of the investigation attempts were made to feed the insects, particularly the glossina, on clean guinea pigs, but this procedure was soon given up as it occupied too much time, and also because many insects which would not feed on the day on which they were caught were found dead next day and therefore had to be discarded altogether. This occurred most commonly in the case of the glossinæ, and the inference was made that these flies were not locally hatched, but had come with the trains (which pass close to the Laboratory) and were spent and bruised by their journey.

111. Smears were examined from 47 *Glossina palpalis*. Trypanosomes were found in the proboscis of two and in the stomach of other two. Spirochætes occurred in one. Mammalian red blood cells were noted in the stomach of five, avian red cells in one, and filarial embryos were observed in one of the five that had ingested mammalian blood. The remaining 37 insects showed nothing noteworthy. The trypanosome-infected flies were caught one in April, two in June and one in November.

One specimen of *Glossina tachinoides* was examined with negative results.

112. Smears from 18 *Stomoxys nigra* and from four *Stomoxys omega* were examined. The only interesting result was the findings of avian red blood corpuscles in the stomach of one *Stomoxys nigra*. These insects, however, were caught mostly newly hatched from the garden manure.

113. Specimens of seven species of Tabanus, *T. tæniola* (8), *T. secedens* (5), *T. socialis* (4) and one each of *T. par*, *T. fasciatus* *T. kingsleyi* and *T. thoracinus*, a total of 21 were dissected. Herpetomonas were observed in the intestinal tract of one *T. secedens*.

114. Two specimens of *Hippocentrum versicolor* showed nothing of interest.

115. Two hundred and twenty-seven mosquitoes were dissected. Of 112 *Culiciomyia nebulosa* spirochætes were found in the stomach of three, herpetamonas in the stomach of other three, and filariæ in the thoracic muscles of one. Avian blood corpuscles were noted in the stomach of 27, mammalian blood in seven, and mixed avian and mammalian in two.

116. Thirty-one specimens of *Ochlerotatus nigricephalus* were examined. Herpetomonas were noted in the stomach of one. Mammalian blood was contained in the stomach of 17, and in two of these there were fresh embryos of *Acanthocheilonema perstans* (the labourer who brought these insects harboured the filaria).

117. Twenty-seven *Anopheles costalis* were dissected. Only one of these showed malarial infection, oocysts being present in the stomach wall. One harboured filaria in the thoracic muscles. Mammalian blood was noted in the stomach contents of 11 (one of these, brought by the same labourer as in paragraph 116, also showed embryos of *Acanthocheilonema perstans*) and one showed both mammalian and avian red blood cells.

Mammalian blood corpuscles were noted in the stomach contents of one *Anopheles mauritianus*.

118. Twenty-three specimens of *Mansonioides africanus* were dissected. Spirochætes occurred in the stomach of one, and six contained mammalian erythrocytes.

Amœbes occurred in the intestinal tract of two.

119. Smears from 22 *Ochlerotatus irritans* showed spirochætes in the stomach of one. Ten of the insects had fed on mammalian blood, five of these showing embryos of *Acanthocheilonema perstans*, under the circumstances already alluded to in paragraphs 116 and 117.

120. Two specimens of *Stegomyia fasciata* and two *Stegomyia luteocephala* were examined. Mammalian blood was found in one *Stegomyia fasciata* and one *Stegomyia luteocephala*, and avian blood in the second specimen of the latter.

121. The remaining mosquitoes comprised three *Culex thalassius*, and one specimen each of *C. duttoni*, *C. invidiosus*, *C. tigripes (var. fusca)*, and *Banksinella luteolateralis*. Nothing of interest was noted in the smears from these seven insects.

122. Trypanosomes were found in four specimens of *Glossina palpalis* (47 examined).

123. Herpetomonas were noted in the intestinal tract of three *Culiciomyia nebulosa* (112 examined), one *Ochlerotatus nigricephalus* (31 examined) and one *Tabanus secedens* (five examined).

124. Spirochætes were observed in three *Culiciomyia nebulosa* (112 examined), one *Mansonioides africanus* (23 examined), one *Ochlerotatus irritans* (22 examined), and in one *Glossina palpalis* (47 examined).

125. Filaria were seen in the thoracic muscles of one *Culiciomyia nebulosa* (112 examined) and one *Anopheles costalis* (27 examined).

126. Malarial oocysts occurred in the stomach of one *Anopheles costalis* (27 examined).

127. The trypanosome-infected glossinæ were caught in April, June and November. The spirochæte-infected glossina was caught in June, the culiciomyiæ, the mansonioides and the ochlerotatus in May. The filaria-infected culiciomyia and the anopheles were both caught in May.

The malaria-infected anopheles was obtained in June.

128. Mammalian blood had formed the meal in five *Glossina palpalis*, twelve *Anopheles costalis*, one *Anopheles mauritianus*, six *Mansonioides africanus*, seven *Culiciomyia nebulosa*, 17 *Ochlerotatus nigricephalus*, 10 *Ochlerotatus irritans*, one *Stegomyia fasciata* and one *Stegomyia luteocephala*.

129. Avian blood had been ingested by one *Glossina palpalis*, one *Stomoxys nigra*, and 27 *Culiciomyia nebulosa*.

130. Both mammalian and avian erythrocytes were found in the stomach of two *Culiciomyia nebulosa*, one *Anopheles costalis* and one *Stegomyia luteocephala*.

131. It would appear from these results that *Culiciomyia nebulosa* prefers avian to mammalian blood.

132. Several newly hatched specimens of *Stegomyia fasciata*, *Stegomyia luteocephala*, *Ochleraotatus nigricephalus*, *O. irritans*, and *Culiciomyia nebulosa* were fed on the labourer who harboured *Acanthocheilonema perstans*.

133. These insects were dissected at daily intervals up to fifteen days after the infecting feed, but no development of the filarial embryos was observed.

134. *Dysentery*.—Intestinal protozoa have been found in the fæces of 19 individuals. Not all suffered from diarrhœa.

135. The *Entamœba tetragena* was noted in 12 cases. In four the condition was a chronic one, and the amœbæ were practically all encysted in two of these (Europeans); in the other two instances the patients were natives, the amœbæ were few but free and motile and in all four cases there were numerous degenerated epithelial and pus cells, but no red blood corpuscles. The fæces were scybalous and greenish-brown coloured in the two Europeans, and somewhat liquid and yellow-coloured in the two natives. In all four the mucus was scanty.

136. One European who had suffered from an acute attack (the first) of dysentery received a large dose of emetine before the fæces were examined. Thirty-six hours after the first dose of the drug, only a few encysted amœbæ were observed in the stools, a very few pus cells and no erythrocytes. Forty-eight hours afterwards the stools appeared normal.

137. The remaining seven cases, including one European and six natives, were all acute, abundant mucus, pus cells, erythrocytes and active amœbæ being present in the motions.

138. A balantidium was observed in six cases, all natives. In only one instance were pus cells noted, and no red blood cells were observed in any. The motions were loose, evil-smelling and yellowish-brown in colour. Mucus was not found in any, and none of the cases made any complaint or sought treatment.

139. *Blastocystis hominis* was met with in two cases, both Europeans; once in association with a case of chronic dysentery already mentioned; the other in a case where the motions were frequent, bulky, creamy and pale in appearance and very malodorous, but with no mucus, pus cells or erythrocytes.

140. A small acarine was noted in the stools of three individuals, one European and two natives. So far as could be ascertained this microscopic insect gave rise to no signs or symptoms.

141. *Filariasis.*—The blood from 306 individuals was examined for the presence of filarial embryos. Most of the material was in the form of thin smears, but in a number of cases a drop was examined in the fresh state, and thick dehæmoglobinised films were also made.

142. The embryos of *Acanthocheilonema perstans* were noted in a number of individuals, all natives. *Loa* embryos occurred also in two of these cases, and *bancrofti* embryos in one.

143. Embryos of *Loa loa* were observed in the blood of seven persons, associated with the embryos of *Acanthocheilonema perstans* in two.

144. The embryos of *Filaria bancrofti* were only observed in one case already mentioned.

145. A male and female *Loa loa* were obtained by Dr. Beale-Browne from the sac of a scrotal hernia at Degema.

146. Filariæ in insect hosts have already been alluded to (para. 125).

147. *Leprosy.*—Two inmates of the neighbouring Leper Asylum were chosen for treatment with salvarsan.

The first case was one of advanced nodular leprosy, and a prolonged course of Nastin treatment prescribed some two or three years previously had effected no observable improvement in the condition.

148. Three doses of 606 were given intramuscularly. The first dose was 0·5 gram. The second dose, 0·5 gram., was administered a fortnight later, and the third dose, 0·6 gram., was given a month after the first.

149. The blood, urine and fæces were examined immediately prior to treatment on 22nd January.

The total blood counts were: Reds, 4,000,000 per cmm.; whites, 6,000 per cmm. The differential leucocyte count was: Polymorphonuclear neutrophils, 58 per cent.; lymphocytes, 10 per cent.; large mononuclears, 12 per cent.; eosinophils, 19 per cent.; and transitionals, 1 per cent. The urine presented no abnormalities.

The fæces contained ova of *Tænia saginata* and of *Trichuris trichiura*.

The temperature was 98·4 F.

150. On the following day, 23rd January, the temperature had risen to 99°·2 F., and a big increase in the white cells was noted, 19,062 per cmm. As regards the differential count, the lymphocyte percentage had arisen to 22·5, the large mononuclears had fallen to 7 per cent., the polymorphonuclear neutrophils were practically unaltered, and the eosinophils had fallen to 14 per cent.

151. On the second day after injection (24th January) the temperature was 99°·4 F., the white cells were still further increased to 20,312 per cmm., and the reds had mounted to 4,800,000 per cmm. As regards the differential count the percentages were, roughly, as before, except that the lymphocytes were 14 per cent. and the large mononuclears 11 per cent.

152. Two days later, *i.e.*, 26th January, an increase in the *Polymorphonuclear leucocytes* was shown (66 per cent.), and the eosinophils had fallen to 10 per cent.

153. On 28th January, the temperature having returned to the normal average (98°·4 F.), the white cells had decreased as far as 11,560 per cmm., and the reds numbered just over five million per cmm. The differential count was practically unchanged.

154. Further examinations on 30th January, 1st February, 3rd February, 5th February and 8th February revealed a white cell count of from 8,000 to 11,000 per cmm., and a red cell count of from 5,200,000 to 5,900,000 per cmm., a steady increase of the polymorphonuclear neutrophil percentage to 70 per cent., and an eosinophil percentage varying between eight and twelve. The large mononuclear percentage steadily diminished to five.

155. After the second intramuscular infection of 606, on 8th February, the temperature again rose slightly, 99° F. on 9th February, and 98°·8 F. on 10th February, and was again normal on 11th February.

156. From 8th to 24th February blood examinations were made at intervals of from three to four days. The total white cell count varied little, oscillating between 8,000 and 10,600 per cmm., and the red cell count remained just over five million per cmm. The polymorphonuclear neutrophil percentage remained higher than at first obtained, 60-70 per cent., and the eosinophils steadily fell to 4 per cent.

157. After the third dose of salvarsan, on 24th February, the febrile disturbance was practically nil, and the total and differential blood counts altered only slightly, the final estimations made on 4th March giving these results:—

Total white cells, 10,250 per cmm.; total red cells, 5,098,000 per cmm.; polymorphonuclear neutrophils, 64 per cent.; lymphocytes, 22 per cent.; large mononuclears, 8 per cent.; eosinophils, 4 per cent.; and transitional cells, 2 per cent.

158. The patient expressed the opinion that the treatment had been beneficial, and clinically the nodules on the ear and nose were smaller than previously.

159. A streptothrix was isolated from a case of nodular leprosy. The culture medium was fish agar (peptone, fish bouillon and agar) sterilised by filtration. An attempt to cultivate the streptothrix on this medium sterilised by heat failed entirely.

160. The material obtained from the successful culture was inoculated into two monkeys (*Papio sphinx*). The mode of inoculation was by subcutaneous infection in one and by scarification of the skin in the other.

161. The first monkey showed an immediate febrile reaction lasting three days, and a month later this animal had died of pneumonia with no signs, clinically or at the autopsy, of leprosy. The other monkey showed no reaction and is alive and well, showing no signs of the disease (date of inoculation, 18/1/15).

162. The leper from whom the culture was originally taken was treated with intramuscular injections of salvarsan, three doses being given, the first on 18/1/15 of 0·55 gram., the second a fortnight later, 0·6 gram., and again three weeks later a third dose of 0·6 gram.

163. There was great pain all over the body after the first and second injections, arising within half-an-hour and lasting for two days, but the temperature remained normal throughout, and no reaction occurred after the third dose. The total white cells rose from 6,000 per cmm. before treatment to 12,000 after the third injection, while the red cells increased from 4,000,000 per cmm. to 5,084,000 per cmm. Little variation was noted in the differential leucocyte count except a gradual fall of the eosinophil percentage from 19 per cent. to normal.

164. Blood smears from 306 individuals were examined in a search for malarial parasites. Subtertian rings were found in 16 cases, in one instance associated with the parasite of benign tertian malarial fever. Four of the individuals were suffering from blackwater fever. All save five of these 16 were natives.

165. The quartan malarial parasite was observed in 13 cases, all native except one.

166. The parasite of benign tertian malaria was met with only in four cases, all natives, and in one of these the subtertian parasite also occurred.

167. Cultivation of the subtertian parasite by Bass' method was done in one case.

168. The blood was obtained and treated in the usual way from a young adult male native. He complained of bodily pains and " fever " of one day's duration, and he suffered from frequent vomiting of bilious matter. The temperature was 99° ·8 F. on the day on which the experiment was begun.

169. At this time, 12 noon on 21/7/15, the blood-smear showed scanty subtertian rings, a few pigmented mononuclear leucocytes and evidence of auto-erythrophagocytosis.

170. After four hours' incubation at 39° C. the parasites were in the shape of small signet rings, stirrups, pears and spheres in about equal proportion.

171. After eight hours' incubation there were still a few small signet rings, but the big majority of the parasites were in the form of compact spheres.

172. After 20 hours only spherical forms were seen, many of them actively amœboid. At the end of 24 hours, 26, 28 and 30 hours, the only change noted was a steady increase in size, although the rate of growth was not equally rapid in all, and in no instance was more than about a quarter of the red cell occupied by the parasite.

173. At the end of 32 hours it was obvious that there were two forms of the protozoon, one larger and now with fine discrete grains of black pigment, occupying very nearly half the host cell, and one smaller, occupying only about a quarter of the erythrocyte and not showing any pigment.

174. After 34 hours' incubation there was still the difference in bulk between the two forms of the parasite, but all then contained pigment.

175. After 44 hours increase in size both of cytiplasm and chromatin was noted, and the same condition ruled at the end of 54 hours.

176. When the 56th hour was reached, however, the distinction between the two forms was very evident, only a few parasites being in the pre-rosette stage, and the great majority obviously showing the characters of the sexual generation.

177. Four hours later (60 hours in all) the blood picture was particularly striking. Auto-agglutination was well marked in the fresh smear. In the stained smear most of the parasites were gametocytes. Some rosettes were observed, ingested by the large mononuclear cells as well as by the neutrophil polymorphs, and a certain number of rosettes also showed signs of degeneration. Apparently, however, some rosettes had sporulated in the interval between the 56th and the 60th hour, as some tiny rings were seen and red cells doubly or trebly infected by these were noted. In addition, there was a fair proportion of somewhat compact and spherical parasites retaining the appearances of those forms noted as in the majority in the smears taken at the 56th hour.

178. After 62 hours, agglutination of the gametocytes was a marked feature of the fresh smears. There were very few definitely recognisable schizonts, and these appeared to be degenerated. A few of the more compact spheres were still observable; these did not suggest that they had developed from the small ring forms noted at the 60th hour, but rather gave the impression that most of them were the spherical compact forms which had not progressed. A few, however, showed abundant chromatin.

179. At the end of 66 hours, gametes predominated, agglutination of these was well marked, and the compact spherical forms were few. Only a very few forms were seen, evidently of the second generation noted at the 60th hour.

180. After 68 hours, gametes still bulked largely in the stained films, but they all showed signs of degeneration. The forms already alluded to as probably proceeding from the second generation of schizonts were very few, but showed increase in bulk.

181. At the end of 78 hours all forms of the parasite had very appreciably lessened in number, but such as remained consisted of a few gametes and a few forms in the pre-rosette stage.

182. After 80 hours a few rosettes were observed, most of them infected by the leucocytes, but a few were free and some of these had shed their spores.

183. Four hours later, 84 hours in all, practically all the parasites showed signs of degeneration, a few ingested rosettes were still observable and some tiny spheres were seen inside the red cells, but the gametes had practically disappeared.

Apparently no further development took place after this, degeneration becoming more and more marked in the smears examined at the 88th, 90th, 102nd, 106th, 112th, 116th and 120th hours.

184. It was concluded that :—

(1) Most of the parasites originally present in the patient's blood were destined to become gametes.

(2) These gametes were decidedly of slower growth than those forms of the parasite which became schizonts, and many of them were so slow in growth as to suggest that, if they were not actually beginning to degenerate, they were holding back, as it were, in the hope of progressing again under more favourable conditions.

(3) The first generation of schizonts proceeded, but in lessening numbers at every stage, to sporulation, and these spores, again in still fewer numbers, developed to the rosette stage, but only a very few sporulated and this third generation speedily died out, the leucocytes accounting for many by phagocytosis.

(4) Pigment was first observed at the end of 32 hours' incubation. At the end of 60 hours auto-agglutination of the infected cells was well marked.

185. Blood smears were taken from the patient himself at midday on 22/7/15, when the temperature was normal, the vomiting ceased and the pains practically gone. No parasites were seen, but there were a few pigmented large mononuclear cells. The larger type of large mononuclear, those of endothelial origin, contained in some instances red cells, whilst others were vacuolated.

186. Smears examined again on 23/7/15 at noon were similar in appearance, except that no ingested red cells were noted.

187. This patient received no quinine. He was given phenacetin, grains 5, and a saline purge on 21/7/15. He was well on 23/5/15, and remained so.

188. Another experiment was carried out with a view to ascertaining if the parasites transferred from the culture already described would grow in the blood of another native. Ten cc. of blood were obtained from the second native in the usual way, dextrose added and the fibrin extracted.

189. One cc. of the malarial culture was added to 5 cc. of the malaria-free blood.

A tube of this latter was kept as a control, incubated as with the other at 39° C. and examined at the same intervals.

190. The results were that growth proceeded at the same rate as in the original culture, but at each examination there were fewer surviving parasites, the phagocytes being very active and ingesting red cells and plasmodia with great avidity. The first generation of schizonts reached the sporulation stage in very few numbers, and such spores as successfully invaded fresh red cells speedily died out. The sexual forms persisted a few hours longer than the asexual, but within 66 hours the few parasites that remained were all degenerated. The control tube showed no parasites at any time.

191. It was concluded that the results of this second experiment indicated that the blood of the second native contained even more antibodies than the first, inasmuch as a larger proportion of the parasites degenerated at an earlier stage, the phagocytic action of the leucocytes was more marked and development was finally arrested at an earlier period.

192. As regards monkey malaria some work was described in the 1914 report; the morphological characters of the parasite were given and some attempts at cultivation by Bass' method were also detailed.

193. The affected monkey is still alive. No more attempts at cultivation were made, but the blood was examined at regular intervals. The parasites steadily decreased in numbers. No schizonts were seen at any time. Plasmodia were noted for the last time in November. Throughout December the blood examination was negative.

194. Other seven monkeys sharing the affected animal's cage for twelve months did not develop malaria.

195. *Skin Diseases.*—A case resembling Pyosis mansoni was noticed in a labourer employed at the Medical Research Institute, Yaba. The condition was evidently in the earliest stage, as it had up till then escaped the notice of the patient.

196. The affection consisted of minute vesicles not bigger than a pin's head, very slightly raised above the surface and of a lighter colour than the surrounding skin. These were limited for the most part to the base of the neck, the scapular and clavicular regions, extending down on either side of the body in lesser numbers. The fore-arms and legs were entirely free, as were also the face and abdomen. The minute contents of the largest of the vesicles, when pricked, seemed to be of a semi-transparent watery consistency.

197. There was no fever associated with the eruption, and little or no irritation complained of. There was no inflammatory reaction, the skin at the base of each vesicle being perfectly normal. Cultures on ordinary agar slopes were made, and a large grampositive diplococcus having the following characteristics was isolated :—

After 24 hours at 37°C. on Agar slope—

A very profuse luxuriant growth of a shiny dirty gray colour both by direct and transmitted light. The colonies were more or less round in outline and flat with regular edges.

After 24 hours at 37°C. on Agar plate—

Rounded regular colonies, centres slightly raised, sloping gradually to the edges (convex surface).

After 24 hours at 37°C. on Potato--

Profuse luxuriant moist flat growth, irregular in outline of a pale dirty yellow colour.

After 24 hours at 37°C. on Yam—

A somewhat less profuse growth, raised in semi-moist confluent crusts of a dirty yellow colour.

After 24 hours at 37°C. in Glucose Maltose and Saccharose.

Acid formation, but no gas. No change in other sugars. No growth in bile salt media

198. The individual cocci measured 2·5 in diameter. A marked tendency to remain in pairs was noticed, and to a lesser extent staphylococcal formation. After repeated cultivation on agar the latter characteristic became more evident, the organism itself also becoming smaller in size.

199. When emulsified and mixed with equal parts of human blood the red cells of the latter were dehæmoglobinised to a marked degree.

200. A vaccine was prepared and used on the patient. After three injections the condition had completely disappeared.

201. What would appear to be a very advanced stage of the above condition was seen in conjunction with Dr. Gibson of Lagos.

The patient was a young European belonging to a Timber Concession. When seen the only part of his body affected was his left leg below the knee, though according to his own statement the inguinal region was the first part affected. This, however, cleared up before he was seen by Dr. Gibson.

202. The eruption was limited more or less to the middle third of the leg. At the periphery, vesicles similar to the above were seen, but larger in size, rounded and more elevated above the surface. Their contents consisted of a turbid white fluid. Towards the centre the individual vesicles had in places coalesced and probably assisted by irritation from the patient's clothes, pustules of various sizes and form had resulted. The contents of the latter gave all the characters associated with pus. The surrounding skin was discoloured by angry reddish inflammation.

203. Cultures were taken from the smaller vesicles and a diplococcus similar to the above was isolated.

A vaccine was prepared with beneficial results.

204. Efforts were made on three occasions to inoculate a monkey with this diplococcus without result.

205. *Trypanosomiasis.*—Dr. H. Andrew Foy sent to the Institute a large collection of blood smears, and four smears from gland juice, which he had obtained from natives during an inspection of a district on the Benue River. *Trypanosoma gambiense* was found in 15 of the blood smears and in two of the films made from the gland juice, 17 cases in all.

206. The same species of trypanosome was also found in the blood of a native soldier, an inmate of Lagos Hospital.

207. Many of the blood smears from domestic animals showed trypanosomes, cows, sheep, goats, horses, pigs and dogs were all found infected.

208. Cattle and horses appear to be especially prone to the disease, probably because they are more frequently to be found outside the immediate environs of a town or village than the other animals, and so are more exposed to the bites of tsetse.

209. Blood smears from 168 cattle were examined. They were all sent to the Institute in the dried state. Trypanosomes were found in 49, that is 29·1 per cent. So far as could be judged most of the parasites were *T. vivax*, and a few resembled *T. pecaudi* (*T. brucei*).

210. A single goat out of 66 examined showed trypanosomes, the parasite resembling *T. vivax*.

211. Fourty-four sheep were examined and trypanosomes were found in one, the species being apparently *T. vivax*.

212. Three pigs out of 28 were found to harbour trypanosomes, resembling *T. pecorum* (*T. congolense*).

213. Blood smears from 21 dogs showed trypanosomes of the *T. pecaudi* (*T. brucei*) type in two cases.

214. Four horses were examined and trypanosomes of the *T. vivax* type occurred in two.

215. One cat was examined, with negative result.

216. The infection was mostly a heavy one in the cattle, horses and dogs, and a scanty one in pigs, sheep and goats.

The actual figures are :—

	Number examined.	Infected with Trypanosomes.
Cattle	168	29·1 per cent.
Goats	66	1·5 „
Sheep	44	2·2 „
Pigs	28	10·7 „
Horses	4	50 „
Cat	1	—

217. *Vaccine lymph.*—The following experiments were carried out at the request of the Director of the Medical and Sanitary Service with the object of ascertaining whether there would be any danger in employing cattle, suffering from an infection of trypanosomiasis or babesiasis, in the manufacture of small-pox lymph ; in other words, whether or not these parasites in some latent form or other could be transmitted to people vaccinated with lymph prepared from cattle harbouring these same parasites.

218. After several visits had been paid to the cattle market at Ebute Metta, two young cows were finally chosen—one infected with trypanosomes and the other with babesiæ.

Three attempts were made to vaccinate these but without success, Dr. Mackey kindly helping on the first two occasions. Finally both animals died. Again two similar cows were procured and a fresh supply of lymph was tried —this met with success and after some difficulty lymph was taken from both. Owing to the weak condition of these animals they had to be allowed a good deal of liberty, and the difficulty arose how to prevent them from rubbing or scratching themselves and so rendering the experiment useless as far as they themselves were concerned.

219. Two monkeys, whose blood had previously been examined, were vaccinated successfully with this lymph. After the first day their temperatures were taken morning and evening every second day for three weeks and at irregular intervals following. Two months afterwards their blood was examined for the last time. No parasites of any sort were found, and their temperatures were normal throughout.

220. A portion of the lymph was examined microscopically, and also added to the water of condensation of three agar tubes. The result in both cases was negative.

221. Various blood smears from 23 snakes, mostly harmless green or brown colubrines, were examined in a search for the pigment-bearing parasites which have been described from a few of the cold-blooded animals. Hæmogregarines were found in six. Hæmoproteus or plasmodia were not found in any, although in two of the animals a few of the leucocytes contain pigment granules.

222. Other cold-blooded animals examined were 3 fish, 2 frogs, 1 toad, 1 crocodile, 1 turtle and 4 small tortoises. Parasites were only found in one animal, the turtle, and these were hæmogregarines.

223. A variety of other animals was examined. Out of nine different birds, one, a small heron, harboured trypanosomes. Ten mice showed no blood parasites. Out of seven rats, *T. lewisi* was noted in 4 and *Grahamella* in one.

Seven monkeys, 4 bats, 2 pottos and one porcupine were examined with negative results.

224 During the investigation into the prevalence of ankylostomiasis ova other than ankylostome were noted as they occurred in the fæces. Of the 136 individuals examined, trichuris ova were found in 125, ascaris ova in 100, tænia ova in eight, schistosome ova in three and oxyuris ova in two. Trichuris ova were also found in two Europeans.

225. Water analysis samples in very large number have been examined at frequent and regular intervals from the Iju water supply.

226. Actual figures would occupy too much space. Suffice it to say that the results of bacteriological analysis proved that the measures of purification in use at the waterworks are amply efficient.

227. No pathogenic organisms have been recovered at any time, and *B. coli* have been absent from 20 c.c. of the water.

228. Mr. Peet, the Water Authority, supplied two incubators, a considerable quantity of culture media and also apparatus of various kinds.

229. During the examination of samples from the Iju waterworks a very motile gram-negative bacillus from 2–4 in length was isolated from the raw water, giving the following additional characteristics :—

After 24 hours at 37°C. on agar by transmitted light—

A not very abundant growth of a semi-transparent, ground glass appearance, becoming opaque in the thickest part of the smear. Outline irregular.

After 24 hours at 37°C. on agar by reflected light—

Flat surface of a shiny dirty gray ground glass appearance at the periphery, becoming smooth towards the centre. Edges irregular.

After 24 hours at 37°C. on bile salt agar by transmitted light—

A flat ground glass transparent thin growth, irregular edges.

After 24 hours at 37°C. on bile salt agar by reflected light—

A thin flat dry ground-glass growth of a dirty gray colour.

After 24 hours at 37°C. on Conradi-Drigalski media—

An irregular growth with reddish purple centre and somewhat raised pale blue edges.

After 24 hours at 37°C. on Fawcus picric acid and brilliant green—

Bluish green circular colonies with regular margins. A flat growth on pea green media.

After 24 hours, potato, a brownish gray growth with irregular outline.

Acid is formed in glucose—no gas. Other sugars show no change.

Does not agglutinate—Typhoid, paratyphoid A, paratyphoid B, or Bac. Coli.

A monkey and a guinea pig were fed with cultures of this bacillus, but the results were negative.

230. Dr. H. Andrew Foy sent cultures of four organisms isolated from the water in a well at Kano. One of these proved to be *B. paratyphosus A*, another was *B. pyocyaneus* and the remaining two were *B. coli communis*.

B.

Clinical Material.

231. *Bacteriological.*—Four cultures from clear ascitic fluid sent from Ibadan all failed to show signs of growth.

232. Four cultures from fæces and urine sent from Kano proved to be *B. typhosus* (two), *B. cloacæ* and *B. paratyphosus A*.

233. Three cultures from urethral discharge, sent from Aro, failed to show the gonococcus.

234. Two samples of urine from Lagos yielded *B. coli* on cultivation.

235. One sample of pus from a case of peritonitis in a child at Lagos showed staphylococci, streptococci and pneumococci in culture.

236. *Blood smears.*—Films from 330 individuals were examined. Sixteen were from cases of blackwater fever, and the subtertian malarial parasite was found in four.

237. *Trypanosoma gambiense* occurred in 16, subtertian malarial parasites in 16 quartan in 13, and benign tertian in four.

238. Embryos of *A. perstans* were noted in nine, of *Loa loa* in seven and of *F. bancrofti* in one.

239. In one case the blood was indicative of well-marked myeloid leukæmia, the patient being an adult male native aged about 30 years.

240. Differential leucocyte counts were made in 41 instances, and these on several occasions suggested the correct diagnosis, in the absence of blood parasites or pigment.

241. *Fæces.*—Thirty-nine specimens of fæces were received for examinations. Six of these showed active *Entamœba tetragena*, two showed only the cysts, and balantidium was found on four occasions. Blastocystis was noted in two cases, and a microscopic acarine in one. Two cases showed typical mucus casts.

242. *Fluids.*—Eight specimens were received, five of ascitic, two of pericardial and one of pleural fluid. All were simple transudates, except in one case, where streptococci were abundant in the pericardial exudate.

243. *Insects.*—Specimens of *Anopheles costalis*, *Mansonioides africanus*, *Culex grahami*, *Culiciomyia nebulosa*, *Toxorhynchites marshalli*, and some tipulids, chironomids and caddis flies were sent from Onitsha.

244. *Culex pruina* was obtained from Port Harcourt, a reduviid from Opobo, pollenia from Ibadan, dermanyssus from Lagos, lice from Yola, cordylobia larvæ from Ebute-Metta and larval ticks from Ikoyi.

245. A specimen of *Gryllotalpa borealis*, said to have bitten a patient on the hand and to have caused a lymphangitis, was sent from Lagos.

246. The Municipal Sanitary Officer of Lagos continued to send bottles of larvæ obtained by the sanitary inspectors and also adult mosquitoes caught by himself.

247. The mosquitoes were :—

June.—*Stegomyia fasciata, Culiciomyia nebulosa, Uranotænia annulata* and *Culex grahami.*

July.—*Culex thalassius, C. invidiosus* and *C. grahami.*

August.—*Culex decens, C. invidiosus, C. rima* and *Mansonioides africanus.*

November.—*C. grahami, Ochlerotatus irritans, O. nigricephalus* and *Culiciomyia nebulosa.*

248. Mosquito-larvæ were received for identification almost every day throughout the year.

249. During January 113 bottles were received. The larvæ of *Stegomyia fasciata* were present in 82, *Culiciomyia nebulosa* in 12, *Ochlerotatus irritans* in seven, *Anopheles costalis* in six, *Culex decens* in five and *C. tigripes* in one. The stegomyia were found mainly in pots, culiciomyia in Agbo pots and *Anopheles costalis* in pools and wells. Ochlerotatus and stegomyia were found in the same water in three cases, anopheles and stegomyia in two cases, culiciomyia and stegomyia in two cases, *Culex decens* and stegomyia in one case, culiciomyia and ochlerotatus in one case, and anopheles and *Culex decens* also in one case.

250. In February 107 bottles were examined. *Stegomyia fasciata* were found in 81, *Culiciomyia nebulosa* in 21, *Ochlerotatus irritans* in two, *Culex duttoni* in two and *Anopheles costalis* in one. The only receptacles noted were pots. Stegomyia and culiciomyia were found in the same receptacle in ten cases, stegomyia and ochlerotatus in one, stegomyia and *Culex duttoni* in one, stegomyia, culiciomyia and chirodomids in one, and culiciomyia and psychodids also in one.

251. Eighty bottles were received in March. *Stegomyia fasciata* was present in 64, *Culiciomyia nebulosa* in 12, *Anopheles costalis* in two and *Ochlerotatus irritans* also in two.

Stegomyia fasciata and *Culex nebulosa* were together in six, *Stegomyia faiciata* and *Ochlerotatus irritans* in one, *Stegomyia fasciata* and *Anopheles costalis* in one, culiciomyia and psychodids in one, anopheles and ochlerotatus in one, *Stegomyia fasciata* and psychodids in one, and *Stegomyia fasciata* and chironomids in one. The receptacles mentioned were pots, drains, canoes and wells.

252. Sixty-two collections of mosquito-larvæ were forwarded in April. *Stegomyia fasciata* hatched out in 45, *Culiciomyia nebulosa* in eleven. *Ochlerotatus irritans* in three, *Anopheles costalis* in two and *Culex decens* in one. Stegomyia and culiciomyia were together in six collections, and stegomyia and anopheles in one. The receptacles noted were pots, buckets, baths, pools and crab-holes.

253. During May 74 bottles were received. *Stegomyia fasciata* were identified in 59, *Culiciomyia nebulosa* in ten, *Anopheles costalis* in three and *Ochlerotatus nigricephalus* in two. Stegomyia and culiciomyia were found together in two, and stegomyia and anopheles in one. The larvæ were recovered from the following :—Pots, buckets, canoes, coolers, giant lily, pools, barrels, wells, crab-holes, catchpits and drums.

254. There were 135 collections for examination in June. Eighty-one of these contained *Stegomyia fasciata,* 26 *Culiciomyia nebulosa,* 11 *Anopheles*

costalis, a similar number *Ochlerotatus irritans*, four *Stegomyia luteocephala*, one *Stegomyia africana* and one *Culex decens*. *Stegomyia fasciata* and *Culiciomyia nebulosa* were associated in ten, anopheles and ochlerotatus in two, *Stegomyia fasciata* and psychodids in two, *Stegomyia fasciata* and chironomids in one, *Stegomyia fasciata*, *Culiciomyia nebulosa* and chironomids in one, and anopheles, *C. decens*, cyclops and tadpoles in one. The receptacles were bottles, gutters, tanks, pipes, wells, crab-holes, pools, drums, pots, cups, tins, catchpits, barrels, canoes and trees.

255. One hundred and one collections were examined in July. *Stegomyia fasciata* occurred in 60, *Culiciomyia nebulosa* in 23, *Anopheles costalis* in ten, *C. decens* in three, *Stegomyia luteocephala* in three and *C. grahami* in two. *Stegomyia fasciata* and culiciomyia were co-existing in five, *Stegomyia fasciata* and chironomids in two, *Stegomyia fasciata* and anopheles in one, *Stegomyia fasciata* and *Stegomyia luteocephala* in one, and culiciomyia and anopheles in one. The receptacles were drums, pools, tins, barrels, pots, wells, horns, mango trees, demijohns, buckets and gutters.

256. During August 99 bottles were received. *Stegomyia fasciata* were identified in 36, *Culiciomyia nebulosa* in 13, *Anopheles costalis* in 14, *Ochlerotatus irritans* in 14, *C. decens* in 14, *Ochlerotatus nigricephalus* in one, *Stegomyia luteocephala* in two, *C. grahami* in one, *C. fatigans* in two, *C. insignis* in one and *Uranotænia annulata* in one. *Stegomyia fasciata* were in the same receptacle as culiciomyia in one case, as cyclops in two, as *C. fatigans* and psychodids in one, and as psychodids in one. Anopheles were associated with culiciomyia in one, with cyclops in one, and with *C. decens* in two. *Ochlerotatus nigricephalus* and cyclops were together in one, *O. irritans* and *C. decens* in one, *C. decens* and *C. grahami* in one and *C. insignis* and cyclops in one. The receptacles in which the larvæ were found were pots, barrels, crab-holes, canoes, pools, gutters, catchpits, wells, tanks, pipes, mango and banyan trees.

257. There were 126 collections for identification in September. *Stegomyia fasciata* were present in 63, culiciomyia in 17, *Anopheles costalis* in nine, *Stegomyia luteocephala* in 11, *C. decens* in eight, *O. irritans* in five, *C. insignis* in three, *C. invidiosus* in three, *C. fatigans* in three, *C. grahami* in two, *C. tigripes* in two, *U. annulata* in one, *Stegomyia africana* in one and *Ochlerotatus nigricephalus* in one. *Stegomyia fasciata* were together with culiciomyia in four, with *C. fatigans* in one, with *Stegomyia luteocephala* and psychodids in one and with *C. grahami* and chironomids in one, culiciomyia were associated with uranotænia and *C. decens* in one, and with dytiscus larvæ in another. Anopheles were found together with cyclops and chironomids in one, with cyclops in one, and with *C. decens*, cyclops and tadpoles in one. *C. decens* were with cyclops in two and with chironomids in one. *C. grahami* were with cyclops in one, *O. irritans* were also with cyclops in one. *C. tigripes* were with *C. fatigans* in one, *Stegomyia luteocephala* were with *C. invidiosus* in one, *S. africana* were with *C. tigripes* in one and *C. invidiosus* were with cyclops in one. These larvæ were found in tamarind, flamboyant, banyan and breadfruit trees and in a species of ficus, also in crab-holes, wells, pots, canoes, cups, calabashes, barrels, catchpits, pools, buckets, tins, broken bottles and tanks.

258. There were 109 collections in October. Sixty-one of these contained *Stegomyia fasciata*, 16 anopheles, nine culiciomyia, nine *Ochlerotatus irritans*, eight *Stegomyia luteocephala*, five *C. decens*, and one *Uranotænia annulata*. *Stegomyia fasciata* were together with *C. decens* in one, and with culiciomyia in one, with anopheles in one, and with psychodid in one. Anopheles were

with tadpoles in one, with *C. decens* in one, and with both *C. decens* and tadpoles in one culiciomyia was with dyticus larvæ in one. *O. irritans* were with *C. decens* in one and with *Stegomyia luteocephala* in one.

The breeding places were pots, crab-holes, bottles, calabashes, pools, surf-boats, wells, gutters, pails, barrels, tins, tanks, drums, saucepans and flamboyant and banyan trees.

259. Only 42 bottles were sent during November. Twenty-nine of these contained *Stegomyia fasciata*, five culiciomyia, five *Anopheles costalis*, two *O. irritans* and one *C. decens*. *Stegomyia fasciata* were found with psychodids in one bottle, and *C. decens* were associated with chironomids in another. The receptacles were tins, pots, canoes, pools, wells, demijohns, barrels and catchpits.

260. Thirty-two collections were received in December, *Stegomyia fasciata* were contained in 15, *Culiciomyia nebulosa* in eight, *Anopheles costalis* in four and *Ochlerotatus irritans*, *C. decens*, *S. luteocephala*, *C. insignis* and *Uranotænia annulata* each in one, *Stegomyia fasciata* occurred with culiciomyia in one and with anopheles in one. Anopheles were found with culiciomyia in one, and with psychodids and cyclops also in one. Culiciomyia were found living with chironomids in one. Uranotænia and *C. insignis* were also together in one bottle. The receptacles were demijohns, tins, pools, catchpits, crab-holes, wells, barrels, buckets and banyan trees.

Tables are given showing the figures under the different months.

261. The first table shows the great preponderance of stegomyia larvæ. The second shows that the larvæ can thrive in association with many others of different genera, and in very varied conditions, in deep wells with anopheles and *C. decens* and other culicines, in pools, in crab-holes, in every imaginable kind of receptacle, in holes in trees, and even in pots of native medicine, along with culiciomyia.

TABLE SHOWING IDENTIFICATION OF LARVÆ COLLECTED BY SANITARY INSPECTORS IN LAGOS DURING 1915.

Mosquito.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Stegomyia fasciata	82	81	64	45	59	81	60	36	63	61	29	15	676
Culiciomyia nebulosa ...	12	21	12	11	10	26	23	13	17	9	5	8	167
Anopheles costalis	6	1	2	2	3	11	10	14	9	16	5	4	83
Ochlerotatus irritans ...	7	2	2	3	...	11	...	14	5	9	2	1	56
Culex decens	5	...	...	1	...	1	3	14	8	5	1	1	39
Culex tigripes	1	...	...	...	...	...	...	...	2	...	...	...	3
Culex duttoni	...	2	...	...	...	...	...	...		...	...	...	2
Ochlerotatus nigricephalus ...	...	...	...	...	2	...	...	1	1	...	...	...	4
Stegomyia luteocephala ...	...	...	...	...	...	4	3	2	11	8	...	1	29
Stegomyia afri ana	...	...	...	...	...	1	...	...	1	...	...	...	2
Culex grahami	...	...	...	...	...	...	2	1	2	...	...	...	5
Culex fatigans	...	...	...	...	...	...	...	2	3	...	...	...	5
Culex insignis	...	...	...	...	...	...	...	1	...	...	...	1	2
Uranotænia annulata ...	...	...	...	...	...	...	...	1	1	1	...	1	4
Culex invidiosus	.	...	...	...	...	...	...	...	3	...	...	...	3
Total	113	107	80	62	74	135	101	99	126	109	42	32	1,080
Stegomyia fasciata per cent.	72·5	75·7	80	72·5	79·7	60	59·4	36·3	50	55·04	69·04	46·8	62·5
Anopheles costalis per cent. ...	5·3	0·9	2·5	3·2	4·05	8·1	9 9	14·1	7 1	14 6	11·9	12·5	7·6

TABLE SHOWING OTHER LARVÆ LIVING TOGETHER WITH STEGOMYIA FASCIATA AND WITH ANOPHELES COSTALIS.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Stegomyia fasciata and Culiciomyia nebulosa	2	10	6	6	2	10	5	1	4	1	...	1	48
Stegomyia fasciata and Anopheles costalis	2	...	1	1	1	...	1	...	...	1	...	1	8
Stegomyia fasciata and Ochlerotatus irritans	3	1	1	...	...	...	...	...	...	...	...	...	5
Stegomyia fasciata and Culex decens	1	...	...	...	...	...	...	...	...	1	...	...	2
Stegomyia fasciata and Culex duttoni	...	1	...	...	...	...	...	...	...	...	...	...	1
Stegomyia fasciata and Culex fatigans	...	...	...	...	...	...	...	...	1	...	...	...	1
Stegomyia fasciata and Stegomyia luteocephala	...	...	...	...	...	...	1	...	...	...	...	...	1
Stegomyia fasciata and Stegomyia luteocephala and Psychodids ...	...	...	...	...	...	...	...	...	1	...	...	...	1
Stegomyia fasciata and Culex fatigans and Psychodids ...	...	...	...	...	...	...	...	1	...	...	...	...	1
Stegomyia fasciata and Culiciomyia nebulosa and Chironomids	...	1	...	...	...	1	...	...	...	...	...	...	2
Stegomyia fasciata and Culex grahami and Chironomids ...	...	...	...	..	...	...	...	...	1	...	...	...	1
Stegomyia fasciata and Chironomids	...	...	1	...	...	1	2	...	...	...	...	...	4
Stegomyia fasciata and Psychodids	...	...	1	...	...	2	...	1	...	1	1	...	6
Steyomyia fasciata and Cyclops .	...	...	...	...	...	...	...	2	...	...	...	...	2
Anopheles costalis and Culiciomyia nebulosa	...	...	...	...	...	...	1	1	..	..	...	1	3
Anopheles costalis and Ochlerotatus irritans	...	...	1	1	...	2	...	...	...	..	...	...	4
Anopheles costalis and Ochlerotatus decens	1	...	...	...	...	...	...	2	...	1	...	...	4
Anopheles costalis and Ochlerotatus decens and Tadpoles ...	...	...	...	...	...	...	...	...	...	1	...	...	1
Anopheles costalis and Ochlerotatus and Cyclops	...	...	...	...	...	1	...	...	1	...	...	...	2
Anopheles costalis and Cyclops ..	...	...	...	...	...	...	...	1	1	...	...	..	2
Anopheles costalis and Cyclops and Chironomids	...	...	...	...	..	...	...	...	1	...	...	...	1
Anopheles costalis and Cyclops and Psychodids	...	...	...	...	...	...	...	...	...	...	..	1	1
Anopheles costalis and Tadpoles ...	...	...	...	...	...	...	...	...	...	1	...	...	1

262. *Penile sores.*—Six specimens were examined and the *Treponema pallidum* was found in three.

263. *Skin sores.*—Smears from seven sores of doubtful nature were also examined, but all proved negative as regards spirochætes.

264. *Sputum.*—Ten samples of sputum were stained and examined for tubercle bacilli, and the result was positive in three. One smear from the throat was examined for the bacilli of diphtheria, with a negative result.

265. *Tissues.*—A large number of sections were examined.

There were 32 specimens of liver, of which 11 were fatty, seven cirrhotic, four showed abscess formation of amœbic origin, two were tubercular, one syphilitic (gummatous), one with secondary sarcoma and one with secondary carcinoma.

266. Specimens of kidney numbering 24 were examined, and 20 of these showed various stages of nephritis.

267. There were 23 sections of spleen, one of which contained secondary sarcomatous deposits.

268. Specimens of glands to the number of 18 were cut and examined, and three of them showed secondary malignant infection.

269. Fifteen sections of heart muscle were made, and seven sections of stomach were examined.

270. Pieces of lung were forwarded from seven cases; one of these was tubercular and another contained secondary sarcomatous growth.

271. The other tissues consisted of brain (four specimens, one tubercular); intestine, seven specimens (two dysenteric, one tubercular); gall-bladder, four specimens; appendix, three specimens (all showing acute inflammatory signs); pancreas, two specimens; skin, two specimens (one leprotic, the other a neurofibroma); suprarenals, two specimens; tonsils, two; muscle, two; and one each of thymus gland, ulnar nerve, omentum (secondary cancerous invasion), spinal cord, fallopian tubes (pyosalpinx), bone-marrow and uterus (fibroid).

272. In addition to these there were 22 specimens of tumour growth. There were five fibro-sarcomas, three periosteal sarcomas, one giant-celled sarcoma and one small round-celled sarcoma. There were two epitheliomas, one from the penis and the other from the anus. One carcinoma of the liver was received, also one cyst-adenoma of the jaw. The other tumours were non-malignant and included six fibromas, one lipoma and one neurofibroma.

273. Many specimens were added to the Museum, which is now assuming useful proportions. These specimens comprised snakes, plants, tumour growth, aneurisms and other pathological conditions.

274. Eleven smears from urethral discharge were examined for gonococci, with a positive result of four.

275. Twenty specimens of urine were examined.

Quantitative sugar estimations were done in eight, three samples were from cases of blackwater fever, three were from acute nephritis, schistosome ova occurred in two, prostatic threads were noted in one, and three presented no abnormalities.

276. Fifteen vaccines were prepared. Twelve of these were staphylococcal, two were from diplococcus and one from gonorrhœa. The diplococci referred to were isolated from the cases of *Pyosis mansoni*, and it was noticed, while working with the organism, that when mixed with human blood the red cells were markedly dehæmoglobinised.

277. Thirteen Wassermann reactions were performed. The result was positive in nine.

278. Bacteriological analyses were made on samples from various private and public wells in Lagos, Ebute-Metta, Calabar, Port Harcourt, Owerri and Mamfe, and also on samples from the soda-water factories at Ebute-Metta and at the W.A.F.F. headquarters, Lagos.

The results from the soda-water factories were uniformly good and those from the wells uniformly bad.

279. Seven Widal reactions were done.

The result was positive to *Bacillus typhosus* in two, to *Bacillus paratyphosus A.* in one and to *Bacillus paratyphosus B.* in one.

280. Four specimens of *Tænia saginata* were received, two of *Loa loa* and one of *Dracunculus medinensis.*

281. *The staff.*—Dr. Connal was on duty from 2nd April until the end of the year. Dr. Coghill was on duty from the beginning of the year until the end of August, when he proceeded to Aro to relieve the medical officer there. He proceeded on leave on 25th October. Sergeant Pollitt, R.A.M.C., acted as laboratory attendant from the beginning of the year until 1st June.

No changes occurred in the native staff.

282. *Buildings, etc.*—No new buildings were erected.

The Iju water supply was laid on, early in the year, and has proved a blessing impossible to exaggerate.

283. *Meteorological.*—Barometric readings and records of the solar maximum, grass minimum, dry and wet bulb, and shade maximum and minimum temperatures were kept daily, and measurements of rainfall taken.

284. *Acknowledgments.*—Material was received from practically all the stations in Nigeria, and the following kindly supplied specimens :—Dr. T. B. Adam, Capt. E. L. Anderson, Dr. Ashton, Dr. Beale-Browne, Dr. Guy Beatty, Major Best, Dr. Brierley, Dr. Chartres, Dr. Craig, Dr. Dalziel, Dr. Ellis, Dr. Faderin, Dr. E. M. Franklin, Dr. Foy, Dr. Gibson, Dr. G. M. Gray, Dr. Hanington, Mr. Hubbard, Dr. Hungerford, Dr. Innes, Dr. Kauntze, Dr. Kennedy, Dr. Lobb, Dr. McKay, Dr. Mackey, Dr. Maclaine, Dr. Macpherson, Dr. Manning, Dr. Manson, Dr. Maples, Dr. Martyn-Clark, Dr. J. J. Moore, Dr. Neale, Dr. Norman, Dr. Parkinson, Dr. Pasley, Dr Paterson, Dr. Peacock, Dr. Pickels, Dr. Pirie, Dr. Pollard, Dr. Quirk, Dr. Sapara, Dr. E. L. Sieger, Dr. J. S. Smith, Dr. Taylor, Dr. Tipper, Dr. F. B. Thompson, Dr. A. H. Wilson.

285. Assistance and advice is also gratefully acknowledged to Lt.-Col. Alcock and Dr. R. T. Leiper, of the London School of Tropical Medicine, and to Dr. Balfour and Dr. Wenyon, of the Wellcome Research Bureau.

286. Mrs. Summers Connal was responsible for the identification of the mosquito-larvæ, of the insects generally, and for most of the dissection and examination of the blood-sucking flies.

287. The privilege of medical supervision over the Yaba Lunatic and Leper Asylums was accorded by the Principal Medical Officer and was exercised throughout the whole year, thus releasing a medical officer for duties elsewhere.

(Signed) A. CONNAL.

(Signed) H. SINCLAIR COGHILL.

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