

Annual medical report on the health and sanitary condition of the Nyasaland Protectorate for the year ended 31st March, 1913.

Contributors

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NYASALAND PROTECTORATE.

Annual Medical Report

ON THE

HEALTH AND SANITARY CONDITION

OF THE

NYASALAND PROTECTORATE

FOR THE

YEAR ENDED 31st MARCH, 1913.

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NYABALAND PROTECTORATE

Annual Medical Report

1911

HEALTH AND SANITARY CONDITION



NYABALAND PROTECTORATE

YEAR ENDED THE 31st MARCH 1911

OFFICE OF THE PRINCIPAL MEDICAL OFFICER,
ZOMBA,
NYASALAND PROTECTORATE,

June 7th, 1913.

SIR,

I have the honour to submit for the information of His Excellency the Governor, and for transmission to the Right Honourable the Secretary of State, the Medical Report on the Health and Sanitary Condition of the Nyasaland Protectorate for the year 1912-13, together with the Returns, &c., appended thereto.

I have the honour to be,


Sir,

Your obedient servant,

H. HEARSEY,

Principal Medical Officer.

THE ACTING GOVERNMENT SECRETARY.



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NYASALAND PROTECTORATE.

ANNUAL MEDICAL REPORT

FOR THE YEAR ENDED 31st MARCH, 1913.

I.—ADMINISTRATIVE.

STAFF.

The Medical Staff comprises:—The principal Medical Officer: H. Hearsey. Eleven Medical Officers: A. H. Barclay, J. E. S. Old, J. B. Davey, H. S. Stannus, J. O. Shircore, A. G. Eldred, G. M. Sanderson, D. Drew, R. Drummond, R. Bury and J. G. Morgan. An exchange has been effected during the year between Dr. J. O. Shircore and Dr. N. Leys of the East Africa Protectorate; Dr. Drew has resigned, enabling Dr. P. C. Conran, a temporary Medical Officer, to come on to the permanent staff.

The Nursing Staff is as follows:—Matron: R. Paterson. Four Nursing Sisters: A. M. Tadman, A. A. Pallot, M. Gittins and B. C. Empson.

P.M.O.'s Office.—A Clerk was appointed at the end of the year, but his services were transferred to another Department immediately on his arrival.

Medical Store.—There is no Medical Storekeeper, the work of the Medical Store being carried out by the P.M.O. with the assistance of an Indian Dispenser.

Subordinate Staff.—This consists of four Sub-Assistant Surgeons, seconded from the subordinate grade of the Indian Medical Service. Two of these are in civil employment, and two are attached to the Troops.

PRINCIPAL APPOINTMENTS AND CHANGES DURING THE YEAR.

Medical Staff.—Dr. A. H. Barclay, on return from leave, assumed medical charge of the Blantyre district.

Dr. J. E. S. Old has remained in medical charge of the Lower Shire, and for some time in visiting charge of the Ruo district.

Dr. J. B. Davey, who was attached to the Scientific Commission of the Royal Society, has proceeded on leave.

Dr. H. S. Stannus has continued in medical charge of the Zomba district.

Dr. J. O. Shircore assumed the duties of Senior Medical Officer in charge of Sleeping Sickness Investigations, and later was transferred to the East Africa Protectorate in exchange with Dr. N. Leys, who is at present on leave.

Dr. A. G. Eldred has been in medical charge of the Blantyre, and subsequently of the Mlanje district.

Dr. G. M. Sanderson, on return from leave, has been placed temporarily in medical charge of the Ruo district.

Dr. D. Drew was engaged on Sleeping Sickness Investigations in the South Nyasa district, and has recently resigned.

Dr. R. Drummond has also been on duty in connection with Sleeping Sickness, and is at present in medical charge of the Mlanje district.

Dr. R. Bury has remained in medical charge of the South Nyasa district.

Dr. J. G. Morgan was engaged on Sleeping Sickness Investigations in the Marimba district, and later was transferred to the medical charge of the West Nyasa district.

Dr. P. C. Conran, temporary Medical Officer, has been placed on the permanent staff owing to the resignation of Dr. Drew, and has been in medical charge of the North Nyasa district, and subsequently of Sleeping Sickness Investigations in the Dowa sub-district.

Dr. N. Leys of the East Africa Protectorate medical staff, who has exchanged with Dr. J. O. Shircore, is at present on leave.

Nursing Staff.—The Matron and Miss Pallot have been in nursing charge of the Zomba Hospital.

Miss Tadman has been attached to the Blantyre Hospital.

Miss M. Gittins has been appointed in place of Miss H. Lawrence who was invalided, and has been attached to the Blantyre Hospital.

Miss. B. C. Empson has been appointed to fill the vacancy caused by the resignation of Miss M. Byerlay and has been posted at Fort Johnston.

P.M.O.'s Office.—There has been no Clerk during the year.

Medical Store.—There is no Medical Storekeeper.

Subordinate Staff.—S.A.S. Gurmukh Singh, in charge of the Civil Dispensary, Zomba, was relieved by S.A.S Varyam Singh.

S.A.S. Suleiman Gulab, lately attached to the Troops at headquarters, Zomba, has completed his tour of service and proceeded to India, and has been relieved by S.A.S. Hira Singh.

S.A.S. Bir Singh has remained in sub-medical charge of the Troops at Fort Mangoche.

S.A.S. Kishan Singh has been recently appointed in place of S.A.S. Suleiman Gulab.

TABLE I.—MEDICAL STAFF.

Principal Medical Officer: H. Hearsey.

Medical Officers.

A. H. Barclay	D. Drew (2)
J. E. S. Old	R. Drummond
J. B. Davey	R. Bury
H. S. Stannus	J. G. Morgan
J. O. Shircore (1)	P. C. Conran (3)
A. G. Eldred	N. Leys (4)
G. M. Sanderson	

-
- (1.) Exchange with Dr. N. Leys of the East Africa Medical Staff.
 (2.) Resigned.
 (3.) Appointed on permanent staff in place of Dr. Drew.
 (4.) Exchanged with Dr. J. O. Shircore.

NURSING STAFF.

Matron: R. Paterson.*Nursing Sisters.*

A. M. Tadman	|	M. Gittins
A. A. Pallot	|	B. C. Empson

SUBORDINATE STAFF.

Sub-Assistant Surgeons.

S.A.S. Varyam Singh	|	S.A.S. Bir Singh
S.A.S. Hira Singh	|	S.A.S. Kishan Singh

TABLE II.—FINANCIAL RETURN, 1912-13.

EXPENDITURE.							£	s.	d.
Personal Emoluments, European Staff	...	...	...	...	...	...	6,603	0	8
" " Subordinate Staff	...	...	...	...	...	...	834	12	8
" " Medical Officer, Chinde	...	...	...	...	...	...	50	0	0
Upkeep of Hospital and Dispensaries	...	...	...	...	...	...	161	18	6
Medical Stores and Books	...	...	...	...	...	...	361	5	5
Travelling	...	...	...	...	...	...	74	8	2
Passages	...	...	...	...	...	...	662	9	11
Calf Lymph	...	...	...	...	...	...	89	0	0
Lunatic Asylum	...	...	...	...	...	...	81	1	0
Small-pox	...	...	...	...	...	...	9	17	8
Sleeping Sickness	603	18	10
Miscellaneous	77	4	11
							£9,608	17	9

REVENUE.

Hospital Receipts	£78	9	6
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TABLE III.—RETURN OF STATISTICS OF POPULATION FOR THE YEAR 1912-13.

				Europeans and Whites.	Africans.	Asiatics.
Number of Inhabitants, 1912-13	...	...	...	758	1,020,537	356
" " Births, 1912-13	...	...	...	27	No record	1
" " Deaths, 1912-13	...	...	...	11	"	7
" " Immigrants, 1912-13	...	...	...	No record	"	—
" " Emigrants, 1912-13	...	...	...	"	"	—
" " Inhabitants, 1911-12	...	...	...	773	1,000,659	463
Increase	...	...	...	—	19,878	—
Decrease	...	...	...	15	—	107

II.—PUBLIC HEALTH.

(A) GENERAL REMARKS.

(1) GENERAL DISEASES.

There were no general, non-communicable diseases of any importance reported during the year.

(2) COMMUNICABLE DISEASES.

MOSQUITO OR INSECT-BORNE.

Malaria.—There has been an appreciable reduction in the number of cases recorded this year, namely, a total of 558, as compared with 808 in the previous year, and 786 in the year preceding. This lowered incidence may in part be attributable to the long period of drought which was experienced during the past year, and in some measure to the fact that four members of the staff were engaged in Sleeping Sickness investigations, and their services were accordingly deflected from ordinary routine work to this special duty; the returns, therefore, are not as complete as they would otherwise have been. As regards seasonal incidence, the larger proportion of cases has occurred during and shortly after the rainy season. Malaria still continues to be the commonest disease among Europeans, but attacks with severe symptoms are becoming noticeably rare, a circumstance which may be accounted for by the greater attention which is now devoted to the prophylactic use of quinine.

Blackwater Fever.—Eleven cases of blackwater fever, comprising ten Europeans and one Asiatic, have come under the treatment of Medical Officers during the past year, as compared with five in the previous year, and three in the year preceding. These cases were distributed as to months as follows:—Two in January, and one each in February, April, May, July, August, September, October, November and December; that is to say, six in the wet and five in the dry season. As regards altitude, eight occurred in the Shire Highlands and three on the lake and river level. Seven of these cases recovered and four terminated fatally, two from anuria and two apparently from heart failure. The larger proportion of cases which occurred in the Shire Highlands is to be explained by the circumstance that it is at the higher elevations that the European population is concentrated. Of the ten Europeans seven were by occupation planters, and it is among this portion of the community that the opportunities of acquiring malarial infection are greatest, owing to their living in proximity to large bodies of natives who are employed on the plantations as workers. In all the eleven cases there was a history of previous attacks of malaria, more or less frequent.

Filariasis.—This infection is rarely reported by Medical Officers, elephantiasis of the legs or scrotum being seldom observed. It is, however, evident that in certain districts its existence may be readily demonstrated if the parasite is specially searched for. Dr. Sanderson, in the Ruo district, examined 177 natives for this infection, blood films being taken during the day from 66, and from the remainder after 8 p.m. Only *m.f. bancrofti* was found. Of the 66 natives examined between 8.30 a.m. and 4.30 p.m. positive results were obtained in five, or 7.5 per cent. Of the 111 examined after 8 p.m. filariæ were found in as many as 31, which gives a percentage of 27.92. In none of the cases which yielded a positive result were there any signs of elephantiasis present.

Tick Fever.—This is widespread in all the districts bordering the Lake, and must account for a great deal of sickness, but it is only rarely that the infection comes under the notice of Medical Officers, natives seldom seeking

advice for this complaint. Children are all attacked, but adults seem to acquire a high degree of immunity. Newcomers almost invariably suffer; relapses are the rule, usually three or four, gradually diminishing in severity. It is thought that the immunity in adults is only relative, and that they sicken if bitten by ticks in some other village.

Trypanosomiasis.—Up to the end of March, 1913, 126 cases of Sleeping Sickness have been recorded in the Protectorate, and during the year under review 63 cases have been diagnosed, as compared with 25 in the previous year, and 30 in the year preceding.

Appended is the return of cases, by months, from the year 1908, when the first two cases were discovered, up to the end of March of the current year:—

Year.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	Total.
1908-9 .	—	—	—	—	—	—	1	—	1	—	—	—	2
1909-10	—	1	1	1	1	2	—	—	—	—	—	—	6
1910-11	—	—	1	—	3	8	1	1	2	2	—	12	30
1911-12	5	6	2	2	1	1	1	1	5	—	1	—	25
1912-13	1	3	9	9	3	5	3	10	2	7	6	5	63
Totals .	6	10	13	12	8	16	6	12	10	9	7	17	126

A systematic search for cases was not begun till August, 1910, and it is therefore only from this period onwards that the figures above shown can be regarded as a correct index of the results obtained by actual investigation.

Of the 63 cases diagnosed during the past year 40 were males and 23 females; so that roughly there were twice as many infections amongst men as compared with women. Of the 25 cases recorded in the previous year 14 were males and 11 females; and in the year preceding, of the 30 cases 21 were males and 9 females. The totals for the three years, therefore, give 75 males and 43 females, tabulated as under:—

Year.	Males.	Females.	Totals.
1910-11	21	9	30
1911-12	14	11	25
1912-13	40	23	63
Totals	75	43	118

A census which was made of natives residing in the proclaimed area gave a total of approximately 15,400 adults. It will thus be seen that in the three years of which we have fairly accurate records, the infections per mille of the population were as follows:—

In 1910-11 ...	...	...	...	...	1.94 per mille.
„ 1911-12 ...	...	...	...	...	1.62 „ „
„ 1912-13 ...	...	...	...	...	4.09 „ „

The population in and near the endemic centre, however, is estimated at about 3,000 adult inhabitants; and if this number only is considered the infections during the three years yield the following results:—1 per cent., 0.83 per cent. and 2.1 per cent. respectively.

The increase in the number of cases during the past year, as compared with the two previous years, is noteworthy, but it would be premature to draw deductions therefrom at this date, especially when it is remembered that as the natives become accustomed to the presence of the Medical Officer, and moreover have no fear of cases being deported to a segregation camp, there is less likelihood of concealment of the sick as time goes on, and therefore the chances of finding a larger proportion of the infected will be correspondingly increased.

The districts adjacent to the proclaimed area, and lying to the north and south of it, have been systematically investigated by Medical Officers, but no cases have up to the present been found, the districts so investigated comprising the Marimba, Dedza, South Nyasa and Upper Shire districts. It is very improbable, however, that with a continuous stretch of fly to the north and south of the Sleeping Sickness area infected cases in these localities do not exist, and this view has recently been emphasized by the circumstance that, independently of these investigations, two infected cases have been found in the Marimba district. It has accordingly been decided to make a re-investigation of these districts during the present year, and as the Medical Officers are being provided with an adequate native staff it is hoped that results will be obtained on which more reliance can be placed.

In addition to mapping out the fly areas in their respective districts, Medical Officers are under instructions to forward blood films of mammals, both domestic and wild, to the Scientific Commission of the Royal Society. All biting flies collected are despatched to the Entomological Research Committee. The Medical Officer who is in charge of Sleeping Sickness investigations in the endemic area of the Dowa sub-district has been engaged in mapping out the natural features of the country, with a view to facilitating clearing operations during the dry season. The clearings which have recently been made around villages in the area have been attended with the best results, Dr. Conran in his recent report stating that the cutting down of bush and scrub and the lopping of branches of overhanging trees had produced a very appreciable diminution in the number of flies from the immediate neighbourhood of these villages.

The clinical features of human trypanosomiasis as met with in Nyasaland were published in last year's report, the paper having been contributed by Dr. G. M. Sanderson, who was then in charge of the Sleeping Sickness area. Under Section VI. of this report will be found a paper by Dr. J. O. Shircore, who was in charge of the area during the greater part of 1912, and to which reference is here drawn.

Appended is a list of the cases which were diagnosed in the year under review, namely, from April, 1912, to March, 1913. There has not been recorded a single instance of recovery or of amelioration of symptoms, the disease being

uniformly progressive, and rapidly fatal as compared with the Uganda type of infection. The cases shown as not having yet died are expected to succumb within the next few weeks.

Serial No.	Name.	Sex.	District.	Village.	Diagnosed.	Remarks.
64	Mdama	Female	Dowa	Chimubvi	19/4/12	D. 20/4/12
65	Maketsoka	"	"	Kambwiri	16/5/12	D. 19/5/12
66	Chimpayi	Male	"	Chimubvi	16/5/12	D. 24/5/12
67	Mwakunzi	"	"	Mwakundi	23/5/12	D. 18/9/12
68	Malenga	"	"	Chidzaye	10/6/12	D. 30/7/12
69	Mawapano	Female	"	Chiunda	11/6/12	D. 31/7/12
70	Delekena	"	"	Mulungu	15/6/12	D. 18/6/12
71	Chituluka	Male	"	Mkokawambo	14/6/12	D. 13/8/12
72	Tabia	Female	"	Asani	16/6/12	D. 25/6/12
73	Malenga	Male	"	Katawa	27/6/12	D. 13/7/12
74	Nlachiona	Female	"	Mtonga	28/6/12	D. 7/8/12
75	Katambo	Male	"	Katambo	29/6/12	D. 2/7/12
76	Cheembenuzia	Female	"	Mtonya	30/6/12	D. 26/7/12
77	Chikankeni	Male	"	Chimonjo	7/7/12	D. 26/7/12
78	Kayambo	"	"	Sindawi	16/7/12	D. 17/7/12
79	Mtondo	"	"	Mwakundi	16/7/12	D. 17/7/12
80	Chilowero	"	"	Mayambo	23/7/12	D. 29/7/12
81	Chipochola	"	"	Njati	23/7/12	D. 22/9/12
82	Nsamgambe	"	"	Kambwiri	25/7/12	D. 25/7/12
83	Thumveke	Female	"	Mtonga	31/7/12	D. 17/8/12
84	Chifundo	"	"	Chimubvi	30/7/12	D. 30/7/12
85	Inje	Male	"	Kawanga	31/7/12	D. 3/9/12
86	Bendu	"	"	Kamfumu	3/8/12	D. 23/9/12
87	Diwa	"	"	Kambwiri	13/8/12	D. 15/8/12
88	Chiliwani	"	"	Chidzaye	22/8/12	D. 29/8/12
89	Mtemankhazi	"	"	Gwengwe	6/9/12	D. 12/9/12
90	Okukosa	"	"	Gwende	14/9/12	D. 18/9/12
91	Ndalaula	Female	"	Lumwira	21/9/12	D. 27/10/12
92	Zefeniya	Male	"	Mwakundi	24/9/12	D. 3/10/12
93	Kafandikale	"	"	Katambo	27/9/12	D. 5/12/12
94	Tapasiamu	Female	"	Msosa	13/10/12	D. 22/12/12
95	Kalemekeza	Boy	"	Chidzaye	17/10/12	D. 17/12/12
96	Kwaukula	Female	"	Mwakundi	31/10/12	D. 6/11/12
97	Matandika	Male	"	Mambo	11/11/12	D. 11/11/12
98	Chibibi	Female	"	Msosa	12/11/12	D. 19/11/12
99	Kadzundu	"	"	Kampidu	14/11/12	D. 6/12/12
100	Adalia	"	"	"	15/11/12	D. 29/12/12
101	Mongerana	"	"	Mgawachifu	15/11/12	D. 5/1/13
102	Mtengu	Male	"	Sumaewa	15/11/12	D. 5/1/13
103	Nenani	Youth	"	Matumba	19/11/12	D. 30/11/12
104	Dunstan	Male	Marimba	Lunda	1/6/12	D. 15/10/12
105	Mzere	Youth	Dowa	Mankwazi	1/12/12	D. 17/4/13
106	Saidi	"	"	Mangwera	2/12/12	D. 20/1/13
107	Chibungwe	Male	"	Chibungwe	26/12/12	
108	Chitogula	Female	"	Mwakundi	30/12/12	D. 16/1/13
109	Sulemani	Male	"	Asani	9/1/13	D. 16/1/13
110	Ndafanji	"	"	Chidzaye	10/1/13	D. 11/1/13
111	Mkatafolo	Female	"	Kumbemba	10/1/13	D. 3/2/13
112	Mchare	Male	"	Sumaewa	13/1/13	D. 14/2/13
113	Kabodza	"	"	Kawanga	13/1/13	D. 14/4/13
114	Ndalire	"	"	Mankwazi	17/1/13	D. 16/3/13
115	Mwalimo	"	"	Chinyama	20/1/13	D. 3/4/13
116	Topezani	"	"	Katenjeza	13/2/13	D. 6/2/13
117	Kampunje	"	"	Chitsala	14/2/13	D. 17/2/13
118	Anderson	Youth	Marimba	Mpondagaga	18/2/13	
119	Kuchiko	Female	Dowa	Mtondo	16/2/13	D. 23/2/13
120	Kikutha	Boy	"	Kombeza	16/2/13	
121	Chalungiza	Male	"	Chikuni	16/2/13	D. 29/3/13
122	Msekankwazi	Female	"	Chibungwe	15/3/13	
123	Manangwisi	"	"	Kombeza	17/3/13	
124	Makho	"	"	"	17/3/13	D. 26/3/13
125	Dluwalinyenza	Male	"	Gwende	18/3/13	D. 22/3/13
126	Kamodzi	Female	"	Mgawachifu	18/3/13	

INFECTIOUS OR EPIDEMIC.

Chicken-pox.—There were 51 cases reported during the year, its seasonal appearance corresponding with that of previous years, namely, at the commencement of the cold weather. Varicella is said rarely to attack adults, but the noteworthy feature here is that both measles and chicken-pox are observed largely in adults.

Small-pox.—It is satisfactory to record that since the year 1909, when systematic vaccination of the population was first commenced, there has been no epidemic. Prior to this, epidemics of small-pox were of annual occurrence in one district or another, and the benefits accruing from the vaccination of the general population on an extensive scale are now being realised. Two outbreaks occurred during the year, in the Marimba and West Nyasa districts respectively; in both these instances, however, it was clearly established that the infection had been introduced by natives who had recently arrived in the neighbourhood from the adjoining infected territory. The usual precautionary measures were taken, and there was no serious spread of the disease. The number of vaccinations performed during the year will be found in tabulated form under the head of preventive measures.

Enteric.—Three cases of enteric fever among Europeans have been reported during the year, two at Zomba and one at Fort Johnston. Dr. Stannus also reports two cases in natives, in one of which a post-mortem examination confirmed the diagnosis, while in the second the serum sedimentation test was positive, as in the European cases. One European, an official, remained in hospital from the previous year and was subsequently invalided. In the cases which have been recorded at Zomba there was reason for believing that the infections were all contracted outside the township; and Dr. Bury, reporting the case which came under his care at Fort Johnston, also a European, stated that as the patient had just arrived from the north end of the Lake it was uncertain where infection had taken place.

Dysentery.—There were 221 cases of dysentery reported during the year, as compared with 317 in the previous year; the largest number of cases occurring during the period preceding the setting in of the rains. Blantyre, where the water supply of the natives is not only insufficient but much exposed to contamination, furnished the largest proportion of cases, namely, 81, as compared with 47 at Zomba, 45 at Port Herald and 4 at Fort Johnston.

Pneumonia.—Twenty-four cases of pneumonia were recorded, as compared with 74 in the previous year. These figures, however, convey a very misleading impression as to its incidence in the native villages. Diseases of the respiratory system, and more especially of the lower respiratory tract, are of special importance on account of their wide prevalence among the native population and the large mortality to which they give rise. Some, such as the milder cases of bronchial affection, are generally trivial; the acute pneumonias, on the other hand, are among the most widespread and fatal of all the acute diseases which affect the natives of this country. It is especially a disease of the cold season, most cases occurring during the months of May, June and July. The mortality is high, a large proportion of deaths in the native villages during the cold weather being due to this cause.

Phthisis.—Fifteen cases of tuberculosis of the lungs have been recorded during the year, and, in view of the fact that large numbers of natives from the South African mines, with damaged lungs, have been returning to the country within recent years, the existence of open tubercular lesions among the general population assumes a graver aspect. As it was desirable to

ascertain what proportion of repatriated natives from South Africa were the subjects of miners' phthisis, all repatriates were medically examined immediately on their arrival at Port Herald; some few who escaped examination at Port Herald were examined by the Medical Officer at Blantyre.

In all, 1,274 repatriates were so examined during the year ended the 31st March, 1913, and of this number 39, that is to say, 3·01 per cent., were found to be phthisical; and 122, or 9·5 per cent., were returned as "suspicious." Dr. Old, who conducted the major portion of these examinations, makes the following observations:—As a rule, the men (repatriates) look in robust health; some have a slight cough, but no dyspnoea is noticeable, and there is little spitting. The respiratory murmur in affected persons is tubular, and in some situations may often be described as roaring, usually dry, or with a dry click or crepitation, and sometimes with rhonchi. Expansion of the chest is deficient, and physical signs are most marked in the lower part of the chest, in the axillary lines, especially on the left side and below the scapulæ. A pleuritic rub has been heard occasionally. The cavernous, tubular breathing, due probably to the fibrous contraction of the alveolar structure and dilatation of the bronchial tubes and tubules, was fairly frequent. Sir Thomas Oliver states that "tubercular infection in this disease is an accidental infection and not a necessary event"; and the Committee of the Transvaal Medical Society found that, as regards tubercular infection, "the conjunction is only seen in a minority of cases." The lowered vitality of the damaged lungs in pneumokoniosis, however, needs to be borne in mind, and instructions have accordingly been issued to Medical Officers and to Residents of districts to keep all these cases under observation.

Beri-beri.—There were very few cases of beri-beri reported, and these mainly by Medical Officers who were engaged on Sleeping Sickness investigations, the physical signs of the disease simulating trypanosomiasis to some extent. The disease cannot be said to influence the death-rate to any appreciable extent.

Pellagra.—It was stated in last year's report that an outbreak of pellagra had occurred in the Central Prison at Zomba, and that the Medical Officer was devoting attention to the subject. Up to the month of April, 1911, some 40 cases of the disease had been noted, but by the end of March, 1913, the number had risen to 131. Dr. Stannus, who has had these cases under observation, lays particular stress on a characteristic affection of the angles of the mouth, which he regards as a diagnostic feature; and believing it to be pathognomonic of the disease, has based his diagnosis in a large number of cases on this appearance alone. Thus he states that of the 131 cases, 97 had a rash, and of these, 62 had the characteristic affection of the lips; of the 35 without lip affection, 9 had the tongue affected. Among the 34 cases which have shown no rash, 31 have the lips affected, and among these, 11 have the tongue also affected; two have only affection of the tongue; and the remaining case has none of these symptoms. In regard to other symptoms, it is noted that pain in the limbs was severe in 31 cases; in the abdomen in 13; in the back in 3. In two cases there was marked weakness of the upper extremities; in ten there was paralysis which rendered walking impossible; a number of cases with motor and sensory symptoms has also been noted. For a full description of the disease attention is directed to Dr. Stannus's paper at the end of this report, under Section VI.

Syphilis.—Sixty-one cases of syphilis were recorded—eight at Port Herald, three at Mlanje, four at Chiromo, twenty-seven at Blantyre, eight at Zomba, five at Fort Johnston and six at Karonga. A proposal to erect a Lock hospital at Blantyre was set aside for financial reasons.

Yaws is fairly prevalent in the Lake districts, but natives seldom apply for treatment for this complaint.

HELMINTHIC.

During the early part of the year 1912, it was resolved to make a helminthic survey of the Protectorate with a view to ascertaining what proportion of the population was affected, and whether any noteworthy variations in regard to place distribution could be made out. Investigations were accordingly commenced at Karonga and Fort Johnston, as representative of the Lake districts; at Zomba, in the Shire Highlands; and at Chiromo, on the Lower River.

The results obtained by Dr. Conran at Karonga, and generally in the North Nyasa district, are embodied in a paper which will be found under Section VI. of this report. Dr. Stannus's results have already been printed and circulated. The returns from Fort Johnston and Chiromo were furnished by Dr. Bury and Dr. Sanderson respectively. It will here suffice to briefly outline the results of these investigations, and this may perhaps be best accomplished by representing them in tabular form:—

District.	Ankylostome.	Schistosome.	Strongyloides.	Tricocephalus.	Tenia.	Bothriocephalus.	Ascaris.	Balantidium.	Ascarid.
	%	%	%	%	%	%	%	%	%
Karonga—North Nyasa district	40·4	32·3	—	1·54	—	—	·9	—	—
Fort Johnston—South Nyasa district	44·0	6·1	2·3	—	·4	—	—	—	—
Zomba—Zomba district	22·1	3·8	3·2	2·6	·8	·16	—	·12	·16
Chiromo—Ruo district	16·8	4·9	—	1·9	—	—	2·9	2·9	—

A. duodenale is much the commoner worm, though *N. americanus* has also been found.

Schistosomiasis.—It will be seen from the above table that, in addition to a high degree of infection with ankylostomes, the natives of Karonga, in the North Nyasa district, also show a relatively high infection with *S. mansoni*. Rectal bilharziasis is sometimes met with, but invasion of the bladder is more frequent, especially in the South Nyasa district, and generally along the Lake shore.

Dracontiasis.—Dr. Drummond has reported the recovery of two guinea-worms from the leg of a recruit in the King's African Rifles, at Zomba, whose history precludes the possibility of infection having been contracted outside the district. This is the first recorded case of infection by this worm, and it will therefore be of much interest to observe whether any further cases come under notice.

(B) EUROPEAN OFFICIALS.

The health of the officials has been fairly good in the Lower Shire and Ruo districts, and, as was the case last year, there have been no invalidings and no deaths. Health conditions in the Blantyre district have been quite satisfactory. Zomba again furnishes a comparatively heavy sick list, and three officials have been invalided this year, as compared with four in the

previous year. It needs to be borne in mind, however, that the bulk of officials are resident in Zomba, and that many of the cases of sickness are merely mild ailments. The officials at Fort Johnston, in the South Nyasa district, have, on the whole, had good health, as judged by the absence of any serious disease; one official was invalided.

(c) GENERAL EUROPEAN POPULATION.

This is mainly concentrated in and around Blantyre. There were nine cases of Blackwater fever among this portion of the community, though some of these occurred in the adjoining districts. Of these nine cases, seven occurred among planters. Malaria, as usual, accounted for a large proportion of the sickness, and in the Blantyre township gastro-intestinal disorders, due no doubt to the defective water supply, were fairly prevalent. There were three deaths from Blackwater fever, all three being planters.

(d) GENERAL NATIVE POPULATION.

No vital statistics are available for this portion of the community; the principal prevailing diseases have already been referred to.

TABLE SHOWING SICK, INVALIDING, AND DEATH RATES FOR EUROPEAN OFFICIALS, PORT HERALD.

	1911.	1912.
Total number of Officials resident	10	8
Average number resident	10	5
Total number on Sick List	10	7
Total number of days on Sick List	30	36
Average daily number on Sick List	·08	·09
Percentage of Sick to average number resident	100	140
Average number of days on Sick List for each patient	3	5·2
Average Sick time to each resident	3	7·2
Total number Invalided	Nil	Nil
Percentage of Invalidings to total residents	Nil	Nil
Total Deaths	Nil	Nil
Percentage of Deaths to total residents	Nil	Nil
Percentage of Deaths to average number resident	Nil	Nil
Number of cases of Sickness contracted away from residence	Nil	Nil

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

	1911.	1912.
Total number of Officials resident	30	17
Average number resident	10	11
Total number on Sick List	12	16
Total number of days on Sick List	100	46
Average daily number on Sick List	·27	·12
Percentage of Sick to average number resident	120	145
Average number of days on Sick List for each resident	8·3	4·1
Average Sick time to each resident	3·3	3·83
Total number Invalided	Nil	Nil
Percentage of Invalidings to total residents	Nil	Nil
Total Deaths	Nil	Nil
Percentage of Deaths to total residents	Nil	Nil
Percentage of Deaths to average number resident	Nil	Nil
Number of cases of Sickness contracted away from residence	Nil	Nil

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

	1911.	1912.
Total number of Officials resident	43	56
Average number resident	40	44
Total number on Sick List	36	48
Total number of days on Sick List	311	646
Average daily number on Sick List	·85	1·77
Percentage of Sick to average number resident	99	109
Average number of days on Sick List for each patient	8·3	13·4
Average Sick time to each resident	7·2	14·7
Total number Invalided	4	3
Percentage of Invalidings to total residents	10	5·3
Total Deaths	Nil	Nil
Percentage of Deaths to total residents	Nil	Nil
Percentage of Deaths to average number resident	Nil	Nil
Number of cases of Sickness contracted away from residence	6	Nil

TABLE SHOWING SICK, INVALIDING, AND DEATH RATES FOR EUROPEAN OFFICIALS, FORT JOHNSTON.

	1911.	1912.
Total number of Officials resident	6	12
Average number resident	6	8
Total number on Sick List	2	5
Total number of days on Sick List	9	91
Average daily number on Sick List	·02	·24
Percentage of Sick to average number resident	33·3	41·6
Average number of days on Sick List for each patient	4·5	18·2
Average Sick time to each resident	3·3	7·58
Total number Invalided	Nil	1
Percentage of Invalidings to total residents	Nil	8·3
Total Deaths	Nil	Nil
Percentage of Deaths to total residents	Nil	Nil
Percentage of Deaths to average number resident	Nil	Nil
Number of cases of Sickness contracted away from residence	Nil	2

III.—SANITATION.

It was stated in the last report, as in all previous reports, that there was no Sanitary Department in the Protectorate, but that the work of sanitation was attended to by Medical Officers at their respective stations. Now, however, there would appear to be some prospect of a Sanitary Department being instituted, and this unquestionably is a step forward in the right direction. There is little doubt but that the community will be more disposed to carry out the recommendations of a duly qualified Sanitary Officer and less inclined to question his opinions on matters pertaining to the public health.

1.—ADMINISTRATIVE.

The following ordinances, rules, orders, notices, &c., were passed during the year :—

- (a) The Townships Ordinance, No. 4 of 1912.
- (b) The Sale of Drugs and Poisons Ordinance, No. 20 of 1912.
- (c) Prisons Ordinance, 1905, Distribution of Prisoners.
- (d) The Townships Ordinance, 1912—Appointment of Medical Officer of Health at Port Herald and Limbe.
- (e) The Epidemic and Contagious Diseases Ordinance, 1903 and 1908, Rules *re* transport of persons suffering from Sleeping Sickness.

(*f*) The Townships Ordinance, 1912, Bye-laws by Zomba Town Council.

(*g*) The Townships Ordinance, 1912, New Bye-laws by Zomba Town Council.

(*h*) The Epidemic and Contagious Diseases Ordinance, 1903, Venereal Diseases amongst Natives.

(*i*) The District Administration (Native) Ordinance, 1912. (Sections dealing with sickness, deaths, conservation of water supply, &c., in villages.)

(*j*) An Ordinance to provide for the Detention and Care of Native Lunatics.

(*k*) The Townships Ordinance, 1912, Bye-laws by Blantyre Town Council.

2.—PREVENTIVE MEASURES.

MOSQUITO AND INSECT-BORNE DISEASES.

Malaria.—Prophylactic measures which are in general adoption may be summarized as follows:—(*a*) Mosquito reduction: periodical clearing of weeds, undergrowth and bush; filling up of hollows and depressions and draining of roads; screening of water tanks with wire gauze. (*b*) Personal prophylaxis: the taking of quinine; use of mosquito nets; protection of houses on the Lake and River levels with wire gauze netting. (*c*) Segregation of the general population in native locations.

Trypanosomiasis.—As up to the present the finding of cases of Sleeping Sickness has been practically limited to the one locality, namely, the proclaimed area in the subdistrict of Dowa, preventive measures have been applied mainly in this locality. Natives from the surrounding districts are prohibited from entering this area unless provided with passes; those residing in the area are similarly prohibited from leaving it except by the main road near Mvera, where a responsible native is stationed to issue passes to those only who are proceeding on business to the Assistant Resident at Dowa. There are in addition twelve policemen and two capitaos (overseers) posted at various points in the area to keep a check on the movements of natives.

During my inspection of the Sleeping Sickness area in company with Dr. Shircore, the Medical Officer who was then in charge of it, and in the course of which all the villages situated in the infected localities were visited, it was observed that tsetse flies were to be found in many of them. In a number of instances, however, there was no doubt but that the flies had been transported by our carriers. The danger of the spread of infection by this means in villages already infected was therefore present, and Dr. Shircore was accordingly instructed to commence clearing operations around these villages, with the assistance and co-operation of the Assistant Resident. It was evident from subsequent reports that these clearings, which consisted not only in cutting down all bush and scrub in and around the villages, but also lopping the overhanging branches of trees, had resulted in banishing the flies to a very marked extent. Dr. Conran, who is at present in charge of the area, has been continuing these clearing operations, and reports that the results obtained by this means are distinctly encouraging. There can be little doubt but that if clearings are made on an extensive scale so as to embrace the areas of land under cultivation, the danger of infection will be considerably minimised.

In order to carry out this measure effectively, it is necessary that (1) the premature firing of grass be prohibited, as this leaves large unburnt patches wherein flies can find shelter; (2) during the cold season the natives residing in the area be employed in cutting down all undergrowth, bush and scrub, and lopping the overhanging branches of such trees as need to be preserved; (3) at the end of the dry season, that is to say, before the commencement of the rains, the simultaneous destruction by fire of all this accumulation of

combustible material be carried out by order of the Officer administering the area, and not till such instructions are issued.

There will, however, still remain opportunities for natives to contract infection, and this mainly by their travelling along "bush" paths to visit friends and relatives in neighbouring villages, and getting bitten by flies en route; to place any effective check on such movements, *e.g.*, by ordering them to use only certain fly-cleared roads, would be almost impracticable. The predilection of the native for using the shortest route, no matter what its physical and other disadvantages may be, is too well known to need comment.

There is another point, namely, as to what extent domestic animals in the area, as apart from the wild mammalian fauna, harbour the trypanosome pathogenic to man. The only animals encountered in the villages during my inspection were largely goats, and dogs to a noticeably lesser extent. This point, however, is receiving the attention of the Scientific Commission, and their findings will justify such action as may later be necessary.

It is a matter for satisfaction that so far as one is in a position to judge, there appears to be no tendency up to the present to any marked spread of the disease. In view of this fact, and further that in many essential respects it is different to the Uganda disease which decimated the inhabitants on the islands and shores of Victoria Nyanza, the outlook as regards the future seems hopeful. That a scientific investigation into the etiology and mode of spread of the Nyasaland form of human trypanosomiasis was a pressing necessity, cannot be disputed, and the further connected question, namely, as to how far the wild mammalian fauna of the country may be responsible for its origin, persistence, and dissemination, has given rise to so many conflicting opinions, that an enquiry was inevitable, an enquiry which it was necessary should be conducted by the most competent authorities, whose findings and recommendations would not be questioned.

EPIDEMIC DISEASES.

Small-pox.—The return of vaccinations performed during the year is appended below. As stated in the last report, the lanolinated lymph which is supplied by the Lister Institute of Preventive Medicine, continues to give every satisfaction. A test inspection of natives which was made during the year in a large number of districts, with a view to ascertaining what proportion was vaccinated, yielded results which varied from 60 to 90 per cent. in the different districts. In regard to the question as to how long vaccination in the tropics confers immunity against small-pox, it can only be said that the subject is a most difficult one on which to express an opinion. Natives who have recently been vaccinated have sometimes contracted small-pox, and there are instances in which reaction to vaccination has been obtained in natives who have previously suffered from the disease.

	Successful.	Modified.	Failed.	Not seen.	Total.
Ruo and Lower Shire ...	4,632	489	398	37	5,555
West Shire ...	263	234	39	—	536
Mlanje ...	3,484	300	204	—	3,988
Blantyre ...	33,565	4,643	2,847	347	41,402
Zomba ...	3,526	1,075	861	937	6,399
Upper Shire ...	7,899	850	588	723	10,060
South Nyasa ...	9,220	1,051	3,668	491	14,430
Dedza ...	2,244	825	977	1,171	5,217
Angoniland ...	11,407	3,318	2,171	1,963	18,859
Marimba ...	13,183	539	529	—	14,251
West Nyasa ...	1,594	224	—	—	1,818
Mombera ...	8,327	631	974	545	10,477
Total ...	99,343	14,179	13,256	6,214	132,992

HELMINTHIC DISEASES.

Ankylostomiasis.—A Medical Officer has been placed on special duty this year at Karonga, in the North Nyasa district, with a view to initiating measures for dealing with this infection among the general population. Working from the Government station at Karonga as a centre, his efforts will be more particularly directed to instituting a system of deep trench latrines in the villages; and, with the co-operation of the Resident, introducing such sanitary reforms as are practicable and come within the scope of the Native Villages Ordinance. Dr. Eldred, to whom this work is entrusted, has been provided with a supply of thymol, beta naphthol and eucalyptus oil for the treatment of cases, and it is hoped that by these means results will be obtained which will minimise the evils of ankylostome infection, from which the natives of this district are reported particularly to suffer. The greatest attention will be devoted to the construction of latrines, and the assistance of the local Mission will be enlisted in making clear to the natives the object of these measures, in order to secure their co-operation.

3.—GENERAL MEASURES.

The existing methods of disposal of nightsoil and refuse in townships have been alluded to in previous reports, and it has been pointed out that the pail system is in general adoption and that the nightsoil is buried in pits; refuse is dealt with similarly, and in some instances burnt.

In 1911, a scheme of conservancy for Zomba township was initiated by the late Governor, which was based on a method which has fallen into desuetude; the purchase of Crowley carts was under contemplation, and enquiries have been made both in India and locally as to their cost. Early in 1912 the Director of Public Works, to whom the above enquiries had been entrusted, referred to me the scheme which had been set on foot, and it was then pointed out that the defects of the proposed scheme had been experienced in other countries, and that a much more suitable system of conservancy which had been installed in Khartoum by Dr. Andrew Balfour had met with marked success, and that it had been found to be both economical and effective, and in every way satisfactory. The outlines of this scheme will be found in my last annual Report, and Dr. Balfour has since been so good as to forward me additional details which will be of much value.

The scheme was thereafter worked out in all its details by the Medical Officer of Health and the Director of Public Works, together with an estimate of the cost, both capital and recurrent. The scheme was ultimately forwarded to the Secretary of State for approval, and a reply has since been received favourable to its adoption.

This system of conservancy is, I understand, already being adopted in a tentative manner by the township of Blantyre, and there is little doubt but that with modifications to suit local requirements it will prove to be the most economical and satisfactory of any.

It is perhaps unnecessary to point out that the question of cost has here, as in other countries, stood in the way of initiating methods of sanitation on modern lines; and there are accordingly no sanitary works which could fittingly be described as such. Subsoil drainage has not been seriously attempted, and such drains as exist need to be bricked and properly graded to be effective.

The following excerpts are taken from the reports submitted by Medical Officers of Health of their respective stations:—

Port Herald.—Reports from the Medical Officer of Port Herald indicate that his recommendations in regard to sanitary matters receive but little attention from the Town Council; and it is in instances such as this that it is hoped that the authority of a special Sanitary Officer would carry some weight. Public latrines with zinc buckets for the use of natives working or residing in the township have been substituted this year for the ordinary trench latrines which were formerly in use. In regard to the water supply at this station, the

Medical Officer emphasizes the necessity of having cisterns or tanks to each house to enable the rain water to be utilized for drinking purposes, the water from the River, which is at present used, being condemned as unfit for household purposes.

Blantyre.—In Blantyre the scheme of conservancy for the township is being modelled on that which was outlined in the last annual Report, the proposal being to deal with both nightsoil and refuse by incineration. The water supply of this town, which is derived mainly from shallow wells, continues in the same unsatisfactory condition as in the past, being not only insufficient for the growing needs of the community but also liable to contamination from surface percolation. As no practical means can be devised for bringing potable water from a distance, except at great cost, a more extended use of cisterns and tanks for storing rain water appears to be necessary. The Medical Officer draws attention to the urgent necessity for the appointment of a Sanitary Inspector for the township, pointing out that it is impossible for him to attend to his routine duties, and at the same time to discharge the duties of a Medical Officer of Health and Sanitary Inspector.

Zomba.—The Medical Officer of Health, Zomba, reports that several of the bye-laws of the new Townships Ordinance have, at his instigation, been re-drafted with a view to giving the Town Council more extended powers to deal with insanitary conditions. The number of water channels which flow through the township has been limited as far as possible, and drains have been cut through the marshes, but the many springs which cause water-logging of the soil would necessitate a large expenditure on public works. The borrow-pit nuisance is referred to as now almost wholly abated. As soon as a survey of land to the south-west of the township is completed, it is proposed to build new native locations and establish an Indian ward on this land, as far from the European settlement as possible. The scheme for dealing with night soil and refuse which was referred to in last year's Report is to be adopted shortly, both in the township and at the camp, where, in addition to the troops, there is a large number of prisoners and other natives.

Fort Johnston.—Regarding Fort Johnston the Medical Officer reports that the most noteworthy feature has been the exceptionally dry season and consequent extreme fall of the level of the water in the River, on the banks of which this township is situated. He states that for a large part of the year the River may now be regarded rather as a swamp, the effect of the stagnation of the water being (a) to promote the growth of river weeds, and consequently increase the number of mosquitoes; (b) to influence the water supply. Mosquitoes are reported to be much more numerous than in the previous year, and the consumption of the river water has given rise to diarrhœic symptoms. There are, however, two wells in the township, one of which has continued to supply water even during the dry season, a time of year when the supply in the other cannot be depended on.

Mlanje.—At Mlanje there was a Medical Officer resident for a period of about four months during the year. He reports that the station is singularly free from mosquitoes, possibly owing to suitable breeding conditions not existing; the streams are fast flowing, with few stagnant pools, and there is very little marshy ground near the station. The disposal of both nightsoil and refuse is by burial, the refuse being sometimes burned. The water supply is derived from the mountain streams, and this, when collected sufficiently high up to be above any possible source of infection, is of excellent quality.

Chiromo.—A Medical Officer has been resident at Chiromo for a period of less than four months during the year. The position of Chiromo does not admit of any high standard of sanitation being attained, situated as the station is in close proximity to extensive marshes. The Medical Officer, however, reports that all borrow-pits which had been made during the construction of the railway have been filled up, and the town is kept clear of weeds and overgrowth.

TABLE IV.

SUMMARY OF ROUTINE SANITARY WORK DONE DURING THE YEAR
IN THE TOWNS.

1. NAME OF TOWN—PORT HERALD.

—				Approximate Area.	Number of Proclaimed Open Spaces.
1911	...	...	...	200 acres	124 acres
1912	...	...	...	200 "	100 "
1913	...	...	...	200 "	100 "

2. POPULATION.

—				Number of Natives.		Number of Europeans.		Total.
				Males.	Females.	Males.	Females.	
1911	...	...	...	250	30	11	—	291
1912	...	...	...	150	60	14	2	226
1913	...	...	...	277	124	12	1	414

3. HOUSING.

—				Number occupied by Europeans.	Number occupied by Natives.
Number of Houses:—					
1911	...	...	...	21	—
1912	...	...	...	25	—
1913	...	...	...	32	—
Number of Huts:—					
1911	...	...	...	—	27
1912	...	...	...	—	49
1913	...	...	...	—	85

4. MOSQUITO PROTECTION OF HOUSES.

—				1911.	1912.	1913.
Number of European houses wholly mosquito-protected	...	...	...	2	3	4
Number of European houses with mosquito room	...	...	...	1	1	1
Number rendered during the year wholly mosquito-protected	...	...	...	—	—	—
Number rendered during the year partially mosquito-protected	...	...	...	—	—	—

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

—				1911.	1912.	1913.
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	...	...	...	—	2	—
Number of houses erected with sanction as to site, construction, and relation to other buildings	...	...	...	1	4	7
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	...	...	...	—	—	—

TABLE IV.—PORT HERALD—*continued.*

ACTION TAKEN.

	Number of Prosecutions.		Number Demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	Nil	Nil	Nil	Nil
1912	Nil	Nil	Nil	Nil
1913	Nil	Nil	Nil	Nil

6. MARKETS.

	Total Number.	Number Paved and Drained.	Number Unpaved.
1911	Nil	Nil	Nil
1912	Nil	Nil	Nil
1913	Nil	Nil	Nil

7. SLAUGHTER HOUSES.

	Total Number.	Number Paved and Drained.	Number Unpaved.
1911	Nil	Nil	Nil
1912	Nil	Nil	Nil
1913	Nil	Nil	Nil

8. LATRINES.

	For Males.		For Females.	
	Number.	Number of Seats.	Number.	Number of Seats.
Number of Public Latrines :—				
1911	3	—	3	—
1912	4	—	3	—
1913	4	—	3	—
Number of New Public Latrines erected during the year :—				
1911	—	—	—	—
1912	2	—	2	—
1913	1	—	—	—
Number of Public Latrines repaired during the year :—				
1911	—	—	—	—
1912	2	—	1	—
1913	2	—	1	—
Number of Public Latrines demolished during the year :—				
1911	—	—	—	—
1912	2	—	1	—
1913	1	—	—	—

TABLE IV.—PORT HERALD—*continued.*LATRINES—*continued.*

	1911.	1912.	1913.
Number of Private Latrines	28	37	33
Average number of pails of nightsoil removed daily ...	—	—	—
Average number of soiled pails removed and clean pails substituted	—	—	—
Number of nightsoil men employed to clean latrines and remove excreta	—	—	—
Number of cesspools	Nil	Nil	Nil
Number of cesspools cleansed	—	—	—
Number of new cesspools constructed during the year	—	—	—
Number of old cesspools abolished	—	—	—
Number of old cesspools oiled regularly by Department	—	—	—

9. REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	Nil	Nil	Nil
Number of carts at work daily to remove refuse from streets	Nil	Nil	Nil
Amount of refuse removed daily	Nil	Nil	Nil
Number of carts at work daily to remove refuse from yards and premises... ..	Nil	Nil	Nil
Amount of refuse removed daily from yards and premises ...	Nil	Nil	Nil
Number of men employed for removing refuse	Done privately		

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 Slaughter House and Market Offal.		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
Buried or trenched	Buried	Buried	Buried	Nil	Nil	Nil	Nil	Nil	Nil
Burnt	—	—	—	Nil	Nil	Nil	Nil	Nil	Nil
Otherwise dealt with... ..	—	—	—	Nil	Nil	Nil	Nil	Nil	Nil

State mode of disposal.

11. AVERAGE DAILY NUMBER OF CARTLOADS OF TIN CANS, BOTTLES, BROKEN CROCKERY, AND OTHER INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES, HUTS, AND COMPOUNDS.

1911.	1912.	1913.
Not estimated	Not estimated	Not estimated

TABLE IV.—PORT HERALD—*continued.*

12. WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water :—			
Source (river, lake, or spring)	Water drawn	from the	River Shire
Number of linear yards	—	—	—
Number of stand-pipes along roads	—	—	—
Number of stand-pipes in compounds and houses	—	—	—
Wells :—			
Public :—			
Number	Nil	Nil	Nil
Number with pumps protected against surface water and mosquito-protected	—	—	—
Private :—			
Number	2	2	2
Number protected against surface water and mosquito-protected	2	2	2
Tanks :—			
Public :—			
Number underground	Nil	Nil	Nil
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	Nil	Nil	Nil
Number mosquito-protected	—	—	—
Number above ground	—	—	—
Number mosquito-protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Nature of Tanks :—			
Wood	—	—	—
Iron	—	—	—
Concrete	—	—	—
Barrels :—			
Number	—	—	7
Number mosquito-protected	—	—	—

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Lineal yards of masonry drains :—		
1911	35 yards	Nil
1912	35 "	Nil
1913	35 "	Nil
Lineal yards reconstructed during the year :—		
1911	Nil	Nil
1912	Nil	Nil
1913	Nil	Nil
Lineal yards repaired during the year :—		
1911	Nil	Nil
1912	Nil	Nil
1913	Nil	Nil
Lineal yards of new drains constructed during the year :—		
1911	Nil	Nil
1912	Nil	Nil
1913	Nil	Nil

TABLE IV.—PORT HERALD—*continued.*DRAINAGE—*continued.*

Nature of Drainage.	Public.	Private.
Earth drains or ditches :—		
Number of linear yards of ditches cleaned :—		
1911	Cleaned	periodically
1912	"	"
1913	"	"
Number of linear yards of ditches dug and graded :—		
1911	No record	Nil
1912	"	Nil
1913	"	Nil
Average frequency of clearing ditches of grass :—		
1911	"	Nil
1912	"	Nil
1913	Twice	a year

14. CLEARANCE OF UNDERGROWTH, LONG GRASS, AND JUNGLE.

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed	225 acres	225 acres	225 acres
Average frequency of clearance of rank vegetation on same area		Twice a year	

15. EXCAVATIONS AND LOW-LYING LAND.

	1911.	1912.	1913.
Number of pools and excavations	Nil	Nil	Nil
Number of excavations filled up	Nil	Nil	Nil
Amount of low-lying and marsh land raised and drained ...	Nil	Nil	Nil
Number of pools, marshes, &c., fish-stocked	Nil	Nil	Nil
Number of cubic yards of material used for filling up pools and excavations	Nil	Nil	Nil
Average number of men daily employed in filling up pools, &c.	Nil	Nil	Nil

16. OILING.

	1911.	1912.	1913.
Number of drains oiled	Nil	Nil	Nil
Number of pools and excavations oiled	Nil	Nil	Nil
Number of tanks and barrels oiled	Nil	Nil	Nil
Average number of men daily employed for oiling drains, pools and watertanks or barrels	Nil	Nil	Nil

17. INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of inspectors employed	Nil	Nil	Nil
Number of houses inspected	Inspections by Medical Officer.		
Number of houses where larvæ were found	—	—	8
Number of notices served to remove conditions causing the breeding of larvæ	—	—	4
Number of persons fined for having mosquito larvæ on premises	—	—	4
Number of notices served to remove insanitary conditions on premises	}		1 on Town Council.
Number of persons fined for not removing insanitary conditions after notice	}		
Number of soda and aerated water factories inspected ...	—	—	—

TABLE IV.—*continued.*SUMMARY OF ROUTINE SANITARY WORK DONE DURING THE YEAR
IN THE TOWNS.

1. NAME OF TOWN—CHIROMO.

—	Approximate Area.	Number of Proclaimed Open Spaces.
1911	113 acres	54 acres
1912	113 "	54 "
1913	113 "	54 "

2. POPULATION.

—	Number of Natives.		Number of Europeans.		Total.
	Males.	Females.	Males.	Females.	
1911	261	84	9	1	355
1912	60	20	6	1	87
1913	37	12	6	2	57

3. HOUSING.

—	Number occupied by Europeans.	Number occupied by Natives.
Number of Houses :—		
1911	8	Nil
1912	9	Nil
1913	6	Nil
Number of Huts :—		
1911	Nil	61
1912	Nil	30
1913	Nil	27

4. MOSQUITO PROTECTION OF HOUSES.

—	1911.	1912.	1913.
Number of European houses wholly mosquito-protected ...	Nil	Nil	Nil
Number of European houses with mosquito room	3	3	3
Number rendered during the year wholly mosquito-protected	Nil	Nil	Nil
Number rendered during the year partially mosquito-protected	Nil	1	Nil

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

—	1911.	1912.	1913.
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	Nil	2	Nil
Number of houses erected with sanction as to site, construction, and relation to other buildings	Nil	4	Nil
Number of huts erected with sanction as to site, construction, and relation to other buildings	Nil	Nil	Nil
Number of houses built without sanction	Nil	Nil	Nil
Number of huts built without sanction	Nil	Nil	Nil

TABLE IV.—CHIROMO—continued.

ACTION TAKEN.

	Number Prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	Nil	Nil	1	Nil
1912	Nil	Nil	Nil	Nil
1913	Nil	Nil	Nil	Nil

6. MARKETS.

	Total number.	Number paved and drained.	Number unpaved.
1911	Nil	Nil	Nil
1912	Nil	Nil	Nil
1913	Nil	Nil	Nil

7. SLAUGHTER HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1911	Nil	Nil	Nil
1912	Nil	Nil	Nil
1913	Nil	Nil	Nil

8. LATRINES.

	For Males.		For Females.	
	Number.	Number of seats.	Number.	Number of seats.
Number of Public Latrines :—				
1911	2	—	2	—
1912	2	—	2	—
1913	2	—	2	—
Number of new Public Latrines erected during the year :—				
1911	2	—	2	—
1912	Nil	—	Nil	—
1913	Nil	—	Nil	—
Number of Public Latrines repaired during the year :—				
1911	1	—	1	—
1912	2	—	1	—
1913	2	—	1	—
Number of Public Latrines demolished during the year :—				
1911	Nil	—	Nil	—
1912	Nil	—	Nil	—
1913	Nil	—	Nil	—

TABLE IV.—CHIROMO—continued.

LATRINES—continued.

	1911.	1912.	1913.
Number of Private Latrines	19	15	11
Average number of pails of nightsoil removed daily	—	—	—
Average number of soiled pails removed and clean pails substituted	—	—	—
Number of nightsoil men employed to clean latrines and remove excreta	One to each latrine		
Number of cesspools	Nil	Nil	Nil
Number of cesspools cleansed	—	—	—
Number of new cesspools constructed during the year	—	—	—
Number of old cesspools abolished	—	—	—
Number of cesspools oiled regularly by Department	—	—	—

9.—REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	—	—	—
Number of carts at work daily to remove refuse from seats	—	—	—
Amount of refuse removed daily	—	—	—
Number of carts at work daily to remove refuse from yards and premises	—	—	—
Amount of refuse removed daily from yards and premises	—	—	—
Number of men employed for removing refuse	8	8	8

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.		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
Buried or trenched	Buried	Buried	Buried	—	—	—	—	—	—
Burnt	—	—	—	—	—	—	—	—	—
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with	—	—	—	—	—	—	—	—	—

State mode of disposal.

11. AVERAGE DAILY NUMBER OF CARTLOADS OF TIN CANS, BOTTLES, BROKEN CROCKERY, AND OTHER INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES, HUTS, AND COMPOUNDS.

1911.	1912.	1913.
Not estimated	Not estimated	Not estimated

TABLE IV.—CHIROMO—continued.

12. WATER SUPPLY.			
Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water :—			
Source (river, lake, or spring)	Water is obtained from Ruo river		
Number of linear yards	—	—	—
Number of stand-pipes along roads	—	—	—
Number of stand-pipes in compounds and houses ...	—	—	—
Wells :—			
Public :—			
Number	Nil	Nil	Nil
Number with pumps protected against surface water and mosquito-protected... ..	—	—	—
Private :—			
Number	—	—	—
Number protected against surface water and mosquito-protected	—	—	—
Tanks :—			
Public :—			
Number underground	Nil	Nil	Nil
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	Nil	Nil	Nil
Number mosquito-protected	—	—	—
Number above ground	—	—	—
Number mosquito-protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Nature of tanks :—			
Wood	—	—	—
Iron	—	—	—
Concrete	—	—	—
Barrels :—			
Number	4	4	3
Number mosquito-protected	—	—	—

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Lineal yards of masonry drains :—		
1911	300 yards	Nil
1912	300 "	Nil
1913	300 "	Nil
Lineal yards reconstructed during the year :—		
1911	Nil	Nil
1912	Nil	Nil
1913	Nil	Nil
Lineal yards repaired during the year :—		
1911	Nil	Nil
1912	Nil	Nil
1913	Nil	Nil
Lineal yards of new drains constructed during the year :—		
1911	Nil	Nil
1912	60 yards	Nil
1913	60 "	Nil

TABLE IV.—CHIROMO—continued.

DRAINAGE—continued.

Nature of Drainage.	Public.	Private.	
Earth drains or ditches:—			
Number of linear yards of ditches cleaned:—			
1911	460 yards	Nil	
1912	460 "	Nil	
1913	460 "	Nil	
Number of linear yards of ditches dug and graded:—			
1911	Nil	Nil	
1912	Nil	Nil	
1913	Nil	Nil	
Average frequency of clearing ditches of grass:—			
1911	Periodically	Nil	
1912	"	Nil	
1913	"	Nil	
14. CLEARANCE OF UNDERGROWTH, LONG GRASS, AND JUNGLE.			
	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed	59 acres	38 acres	38 acres
Average frequency of clearance of rank vegetation on same area	Periodically	Periodically	Periodically
15. EXCAVATIONS AND LOW-LYING LAND.			
	1911.	1912.	1913.
Number of pools and excavations	Nil	Nil	Nil
Number of excavations filled up	—	—	—
Amount of low-lying and marsh land raised and drained ...	—	—	—
Number of pools, marshes, &c., 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, &c.	—	—	—
16. OILING.			
	1911.	1912.	1913.
Number of drains oiled... ..	Nil	Nil	Nil
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	—
Average number of men daily employed for oiling drains, pools, and watertanks or barrels	—	—	—
17. INSPECTIONS AND PROSECUTIONS.			
	1911.	1912.	1913.
Number of inspectors employed	1	1	Nil
Number of houses inspected	No record	No record	Nil
Number of houses where larvæ were found	—	—	Nil
Number of notices served to remove conditions causing the breeding of larvæ	—	—	Nil
Number of persons fined for having mosquito larvæ on premises	—	—	Nil
Number of notices served to remove insanitary conditions on premises	—	—	Nil
Number of persons fined for not removing insanitary conditions after notice	—	—	Nil
Number of soda and aerated water factories inspected ...	—	—	Nil

TABLE IV.—*continued.*

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

1. NAME OF TOWN—BLANTYRE.

—	Approximate Area.	Number of proclaimed open spaces.
1911	—	1. Boma.
1912	1,685 acres.	2. Sports ground.
1913	—	3. Golf links.

2. POPULATION.

—	Number of Natives.		Number of Europeans.		Total.
	Males.	Females.	Males.	Females.	
1911	786	114	*194	*84	1,178
1912	853	175	*197	*79	1,304
1913	987	232	*199	*80	1,498

* European population of Blantyre District.

3. HOUSING.

—	Number occupied by Europeans.	Number occupied by Natives.
Number of Houses :—		
1911	22	Nil
1912	26	Nil
1913	26	Nil
Number of Huts :—		
1911	Nil	No record
1912	Nil	No record
1913	Nil	No record

4. MOSQUITO PROTECTION OF HOUSES.

—	1911.	1912.	1913.
Number of European houses wholly mosquito protected ...	1	1	1
Number of European houses with mosquito room	—	—	—
Number rendered during the year wholly mosquito protected	—	—	1
Number rendered during the year partially mosquito protected	—	—	—

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

—	1911.	1912.	1913.
Number of public buildings erected with sanction as to site, construction and relation to other buildings	2	1	—
Number of houses erected with sanction as to site, construction and relation to other buildings	—	4	1
Number of huts erected with sanction as to site, construction and relation to other buildings	—	—	—
Number of houses built without sanction	—	—	1
Number of huts built without sanction	—	—	—

TABLE IV.—BLANTYRE—continued.

ACTION TAKEN.

	Number Prosecution.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	Nil	Nil	No record	Nil
1912	Nil	Nil	No record	Nil
1913	Nil	Nil	No record	Nil

6. MARKETS.

	Total number.	Number paved and drained.	Number unpaved.
1911	1	—	1
1912	1	—	1
1913	1	—	1

7. SLAUGHTER HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1911	1	—	1
1912	1	—	1
1913	1	—	1

8. LATRINES.

	For Males.		For Females.	
	Number.	Number of Seats.	Number.	Number of Seats.
Number of Public Latrines :—				
1911	1	—	1	—
1912	3	—	3	—
1913	4	—	4	—
Number of new Public Latrines erected during the year :—				
1911	—	—	—	—
1912	2	—	2	—
1913	1	—	1	—
Number of Public Latrines repaired during the year :—				
1911	—	—	—	—
1912	—	—	—	—
1913	—	—	—	—
Number of Public Latrines demolished during the year :—				
1911	—	—	—	—
1912	2	—	2	—
1913	—	—	—	—

TABLE IV.—BLANTYRE—continued.

LATRINES—continued.

	1911.	1912.	1913.
Number of Private Latrines	1 to each house occupied by Europeans.		
Average number of pails of nightsoil removed daily ...	—	—	—
Average number of soiled pails removed and clean pails substituted	1 to each house.		
Number of nightsoil men employed to clean latrines and remove excreta	1 to each house.		
Number of cesspools	—	—	—
Number of cesspools cleansed	—	—	—
Number of new cesspools constructed during the year	—	—	—
Number of old cesspools abolished	—	—	—
Number of cesspools oiled regularly by Department ...	—	—	—

9. REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	—	—	6
Number of carts at work daily to remove seats	—	—	1
Amount of refuse removed daily	—	—	—
Number of carts at work daily to remove from yards and premises	—	—	1
Amount of refuse removed daily from yards and premises ...	—	—	—
Number of men employed for moving refuse	—	—	3

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.		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
Buried or trenched	Buried	Buried	—	—	—	—	—	—	—
Burnt	—	—	—	Burnt	Burnt	—	—	—	—
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with... ..	—	—	—	—	—	—	—	—	—

State mode of disposal.

11. AVERAGE DAILY NUMBER OF CARTLOADS OF TIN CANS, BOTTLES, BROKEN CROCKERY, AND OTHER INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES, HUTS AND COMPOUNDS.

1911.	1912.	1913.
No record	No record	No record

12. WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
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 :—			
Private	2	2	3
Public :—			
Number	1	1	2
Number protected against surface and mosquito-protected	—	—	—

TABLE IV.—BLANTYRE—*continued.*WATER SUPPLY—*continued.*

Nature of Water Supply.	1911.	1912.	1913.
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	—	—	5
Number mosquito protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Nature of Tanks :—			
Wood	—	—	—
Iron	—	—	5
Concrete	—	—	—
Barrels :—			
Number	—	—	—
Number mosquito protected	—	—	—

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Linear yards of masonry drains :—		
1911	} A few roads with brick drains on the sides.	
1912		
1913		
Linear yards reconstructed during the year :—		
1911	—	—
1912	—	—
1913	—	—
Linear yards repaired during the year :—		
1911	—	—
1912	—	—
1913	—	—
Linear yards of new drains constructed during the year :—		
1911	—	—
1912	—	—
1913	—	—
Earth drains or ditches :—		
Number of linear yards of ditches cleansed :—		
1911	} Roadside borrow pits drained.	
1912		
1913		
Number of linear yards of ditches dug and graded :—		
1911	—	—
1912	—	—
1913	—	—
Average frequency of clearing ditches of grass :—		
1911	Periodically.	—
1912	—	—
1913	—	—

TABLE IV.—BLANTYRE—*continued*.

14. CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE.

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed	Periodically	Periodically	Periodically
Average frequency of clearance of rank vegetation on same area... ..	—	—	—

15. EXCAVATIONS AND LOW-LYING LAND.

	1911.	1912.	1913.
Number of pools and excavations	—	—	—
Number of excavations filled up	—	—	—
Amount of low-lying and marsh land raised and drained ...	—	—	—
Number of pools, marshes, 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, &c.	—	—	—

16. OILING.

	1911.	1912.	1913.
Number of drains oiled... ..	Nil	Nil	Nil
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	—
Average number of men employed for oiling drains, pools and watertanks or barrels	—	—	—

17. INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of inspectors employed	Nil	M.O. inspects	—
Number of houses inspected	—	—	—
Number of houses where larvæ were found	—	2	1
Number of notices served to remove condition causing the breeding of larvæ	—	2	1
Number of persons fined for having mosquito larvæ on premises	—	—	—
Number of notices served to remove insanitary conditions on premises	—	14	30
Number of persons fined for not removing insanitary conditions after notice	1	6	7
Number of soda and aerated water factories inspected ...	—	2	2

TABLE IV.—*continued.*SUMMARY OF ROUTINE SANITARY WORK DONE DURING THE YEAR
IN THE TOWN.

1. NAME OF TOWN.—ZOMBA.

—	Approximate Area.	Number of proclaimed Open Spaces.
1911	1,050 acres	Golf Links
1912		Sports Grounds.
1913		Botanical Gardens.

2. POPULATION.

—	Number of Natives.		Number of Europeans.		Total.
	Males.	Females.	Males.	Females.	
1911	237	84	57	29	407
1912	200	70	62	28	360
1913	263	87	59	31	440

3. HOUSING.

—	Number occupied by Europeans.	Number occupied by Natives.
Number of Houses :—		
1911	62	Nil
1912	62	Nil
1913	62	Nil
Number of Huts :—		
1911	Nil	271
1912	Nil	268
1913	Nil	275

4. MOSQUITO PROTECTION OF HOUSES.

—	1911.	1912.	1913.
Number of European houses wholly mosquito protected ...	Nil	Nil	Nil
Number of European houses with mosquito room	Nil	Nil	Nil
Number rendered during the year wholly mosquito protected	Nil	Nil	Nil
Number rendered during the year partially mosquito protected	Nil	Nil	Nil

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

—	1911.	1912.	1913.
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	Nil	Nil	Nil
Number of houses erected with sanction as to site, construction, and relation to other buildings	Nil	Nil	Nil
Number of huts erected with sanction as to site, construction, and relation to other buildings	Nil	Nil	Nil
Number of houses built without sanction	Nil	Nil	Nil
Number of huts built without sanction	Nil	Nil	20

TABLE IV.—ZOMBA—continued.

ACTION TAKEN.

	Number of prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	Nil	Nil	Nil	Nil
1912	Nil	Nil	Nil	Nil
1913	20	Nil	20	Nil

6. MARKETS.

	Total number.	Number paved and drained.	Number unpaved.
1911	1	1	Nil
1912	1	1	Nil
1913	1	1	Nil

7. SLAUGHTER HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1911	Nil	—	—
1912	Nil	—	—
1913	Nil	—	—

8. LATRINES.

	For Males.		For Females.	
	Number.	Number of Seats.	Number.	Number of Seats.
Number of Public Latrines:—				
1911	1	3	1	—
1912	1	3	1	—
1913	3	7	2	—
Number of New Public Latrines erected during the year:—				
1911	Nil	—	Nil	—
1912	Nil	—	Nil	—
1913	2	4	1	—
Number of Public Latrines repaired during the year:—				
1911	Nil	—	Nil	—
1912	Nil	—	—	—
1913	Nil	—	—	—
Number of Public Latrines demolished during the year:—				
1911	Nil	—	—	—
1912	Nil	—	—	—
1913	Nil	—	—	—

TABLE IV.—ZOMBA—continued.

LATRINES—continued.

	1911.	1912.	1913.
Number of Private Latrines	62	62	62
Average number of pails of nightsoil removed daily	—	—	—
Average number of soiled pails removed and clean pails substituted	—	—	—
Number of nightsoil men employed to clean latrines and remove excreta	62	62	62
Number of cesspools	Nil	Nil	Nil
Number of cesspools cleansed	—	—	—
Number of new cesspools constructed during the year	—	—	—
Number of old cesspools abolished	—	—	—
Number of old cesspools oiled regularly by Department	—	—	—

9. REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dust bins	Nil	Nil	Nil
Number of carts at work daily to remove refuse from streets	Nil	Nil	Nil
Amount of refuse removed daily	—	—	—
Number of carts at work daily to remove refuse from yards and premises	Nil	Nil	Nil
Amount of refuse removed daily from yards and premises	—	—	—
Number of men employed for removing refuse	62	62	62

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 Slaughter House and Market offal.		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
Buried or trenched	Buried	Buried	Buried	Nil	Nil	Nil	Nil	Nil	Nil
Burnt... ..	—	—	—	—	—	—	—	—	—
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with	—	—	—	—	—	—	—	—	—

State mode of disposal.

11. AVERAGE DAILY NUMBER OF CARTLOADS OF TIN CANS, BOTTLES, BROKEN CROCKERY AND OTHER INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES, HUTS AND COMPOUNDS.

1911.	1912.	1913.
No record	No record	No record

12. WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water:—			
Source (river, lake, or spring):—			
Number of linear yards	Water obtained from stream		
Number of stand-pipes along roads	—	—	—
Number of stand-pipes in compounds and houses	—	—	—
Wells:—			
Public:—			
Number	1	1	Nil
Number with pumps protected against surface water and mosquito-protected	Nil	Nil	Nil

TABLE IV.—ZOMBA—continued.

WATER SUPPLY—continued.

Nature of Water Supply.	1911.	1912.	1913.
Wells :—			
Private :—			
Number	Nil	Nil	Nil
Number protected against surface water and mosquito-protected	Nil	Nil	Nil
Tanks :—			
Public :—			
Number underground	Nil	Nil	Nil
Number mosquito-protected and served by pumps ...	Nil	Nil	Nil
Number above ground	Nil	Nil	Nil
Number mosquito protected	Nil	Nil	Nil
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Private :—			
Number underground	Nil	Nil	Nil
Number mosquito-protected	—	—	—
Number above ground	Nil	Nil	Nil
Number mosquito-protected	Nil	Nil	Nil
Number of 400 gallons capacity or less	Nil	—	1
Number above 400 gallons	Nil	Nil	Nil
Nature of Tanks :—			
Wood	Nil	Nil	Nil
Iron	Nil	Nil	Nil
Concrete	Nil	Nil	Nil
Barrels :—			
Number	Nil	Nil	Nil
Number mosquito-protected	Nil	Nil	Nil

13. DRAINAGE.

	Public.	Private.
Masonry drains :—		
Lineal yards of masonry drains :—	A few roads with brick drains on the sides	
1911		
1912		
1913		
Lineal yards reconstructed during the year :—		
1911		
1912		
1913		
Lineal yards repaired during the year :—		
1911		
1912		
1913		
Lineal yards of new drains constructed during the year :—		
1911		
1912		
1913		
Earth drains or ditches :—		
Number of lineal yards of ditches cleaned :—		
1911		
1912		
1913		
Number of lineal yards of ditches dug and graded :—		
1911		
1912		
1913		
Average frequency of clearing ditches of grass :—		
1911		
1912		
1913		

TABLE IV.—ZOMBA—continued.

14. CLEARANCE OF UNDERGROWTH, LONG GRASS, AND JUNGLE.

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed	No record	No record	
Average frequency of clearance of rank vegetation on same area	Cleared periodically.		

15. EXCAVATIONS AND LOW-LYING LAND.

	1911.	1912.	1913.
Number of cesspools and excavations	—	—	13
Number of excavations filled up	—	—	10
Amount of low-lying and marsh land and drained	—	—	3
Number of pools, marshes, &c., fish-stocked	—	—	Nil
Number of cubic yards of material used for filling up pools and excavations	—	—	—
Number of persons fined for making new excavations	—	—	Nil
Average number of men daily employed in filling up pools, &c.	—	—	—

16. OILING.

	1911.	1912.	1913.
Number of drains oiled	Nil	Nil	Nil
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	—
Average number of men daily employed for oiling drains, pools and water tanks or barrels	—	—	—

17. INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of inspectors employed	M. O. H. inspectors.		
Number of houses inspected	all	all	all
Number of houses where larvæ were found	—	2	22
Number of notices served to remove conditions causing the breeding of larvæ	—	14	74
Number of persons fined for having mosquito larvæ on premises	—	—	—
Number of notices served to remove insanitary conditions on premises	—	6	12
Number of persons fined for not removing insanitary conditions after notice... ..	—	—	—
Number of soda and aerated water factories inspected	—	—	—

TABLE IV.—*continued.*SUMMARY OF ROUTINE SANITARY WORK DONE DURING THE YEAR
IN THE TOWNS.

1. NAME OF TOWN—FORT JOHNSTON.

—	Approximate Area.	Number of Proclaimed Open Spaces.
1911	44 acres	Nil
1912		
1913		

2. POPULATION.

—	Number of Natives.		Number of Europeans.		Total.
	Males.	Females.	Males.	Females.	
1911	73	24	15	1	113
1912	76	21	15	6	118
1913	77	26	15	7	125

3. HOUSING.

—	Number occupied by Europeans.	Number occupied by Natives.
Number of Houses :—		
1911	12	Nil
1912	12	Nil
1913	13	Nil
Number of Huts :—		
1911	Nil	36
1912	Nil	33
1913	Nil	35

4. MOSQUITO PROTECTION OF HOUSES.

—	1911.	1912.	1913.
Number of European houses wholly mosquito-protected ...	Nil	Nil	Nil
Number of European houses with mosquito room	8	9	11
Number rendered during the year wholly mosquito-protected	Nil	Nil	Nil
Number rendered during the year partially mosquito-protected	Nil	1	2

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

—	1911.	1912.	1913.
Number of public buildings erected with sanction as to site, construction and relation to other buildings	Nil	Nil	Nil
Number of houses erected with sanction as to site, construction, and relation to other buildings	Nil	Nil	3
Number of huts erected with sanction as to site, construction, and relation to other buildings	Nil	Nil	Nil
Number of houses built without sanction	Nil	Nil	Nil
Number of huts built without sanction	Nil	Nil	Nil

TABLE IV.—FORT JOHNSTON—*continued.*

ACTION TAKEN.

	Number of Prosecutions.		Number Demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	Nil	Nil	Nil	Nil
1912	Nil	Nil	Nil	Nil
1913	Nil	Nil	2	Nil

6. MARKETS.

	Total Number.	Number Paved and Drained.	Number Unpaved.
1911	1	Nil	1
1912	1	Nil	1
1913	1	Nil	1

7. SLAUGHTER HOUSES.

	Total Number.	Number Paved and Drained.	Number Unpaved.
1911	Nil	—	—
1912	Nil	—	—
1913	Nil	—	—

8. LATRINES.

	For Males.		For Females.	
	Number.	Number of seats.	Number.	Number of seats.
Number of Public Latrines :—				
1911	1	—	1	—
1912	1	—	1	—
1913	2	—	1	—
Number of new Public Latrines erected during the year :—				
1911	Nil	—	Nil	—
1912	Nil	—	Nil	—
1913	1	—	Nil	—
Number of Public Latrines repaired during the year :—				
1911	Nil	—	Nil	—
1912	Nil	—	Nil	—
1913	1	—	1	—
Number of Public Latrines demolished during the year :—				
1911	Nil	—	Nil	—
1912	Nil	—	Nil	—
1913	Nil	—	Nil	—

TABLE IV.—FORT JOHNSTON—*continued.*LATRINES—*continued.*

	1911.	1912.	1913.
Number of Private Latrines	12	12	14
Average number of pails nightsoil removed daily	12	12	14
Average number of soiled pails removed and clean pails substituted	12	12	14
Number of nightsoil men employed to clean latrines and remove excreta	12	12	14
Number of cesspools	Nil	Nil	Nil
Number of cesspools cleansed	—	—	—
Number of new cesspools constructed during the year	—	—	—
Number of old cesspools abolished	—	—	—
Number of cesspools oiled regularly by Department	—	—	—

9. REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	Nil	Nil	Nil
Number of carts at work daily to remove refuse from streets	Refuse removed daily in boxes or baskets.		
Amount of refuse removed daily	—	—	—
Number of carts at work daily to remove refuse from yards and premises	—	—	—
Amount of refuse removed daily from yards and premises	—	—	—
Number of men employed for removing refuse	—	—	—

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.		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
Buried or trenched	Buried	Buried	Buried	Nil	Nil	Nil	Nil	Nil	Nil
Burnt... ..	—	—	—	—	—	—	—	—	—
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with	—	—	—	—	—	—	—	—	—

State mode of disposal.

11. AVERAGE DAILY NUMBER OF CARTLOADS OF TIN CANS, BOTTLES, BROKEN CROCKERY, AND OTHER INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES, HUTS, AND COMPOUNDS.

1911.	1912.	1913.
Nil	Nil	Nil

12. WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water :—			
Source (river, lake or spring)	Water obtained from river and wells.		
Number of linear yards	—	—	—
Number of stand-pipes along roads	—	—	—
Number of stand-pipes in compounds and houses	—	—	—
Wells :—			
Public :—			
Number	Nil	Nil	Nil
Number with pumps protected against surface water and mosquito-protected	—	—	—

TABLE IV.—FORT JOHNSTON—*continued.*

WATER SUPPLY— <i>continued.</i>			
Nature of Water Supply.	1911.	1912.	1913.
Wells :—			
Private :—			
Number	3	3	3
Number protected against surface water and mosquito-protected	—	—	—
Tanks :—			
Public :—			
Number underground	Nil	Nil	Nil
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	Nil	Nil	Nil
Number mosquito-protected	—	—	—
Number above ground	—	—	—
Number mosquito-protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Nature of Tanks :—			
Wood	—	—	—
Iron	—	—	—
Concrete	—	—	—
Barrels :—			
Number	—	—	—
Number mosquito-protected	—	—	—

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Lineal yards of masonry drains :—		
1911	} Brick gutters along sides of roads.	
1912		
1913		
Lineal yards reconstructed during the year :—		
1911	}	—
1912		
1913		
Lineal yards repaired during the year :—		
1911	}	—
1912		
1913		
Lineal yards of new drains constructed during the year :—		
1911	}	—
1912		
1913		
Earth drains or ditches :—		
Number of linear yards of ditches cleaned :—		
1911	}	—
1912		
1913		
Number of linear yards of ditches dug and graded :—		
1911	}	—
1912		
1913		
Average frequency of clearing ditches of grass :—		
1911	}	—
1912		
1913		

TABLE IV.—FORT JOHNSTON—*continued.*

14. CLEARANCE OF UNDERGROWTH, LONG GRASS, AND JUNGLE.

	1911.	1912.	1913.
Number of square yards of weeds, grass, and vegetation cut and removed	Not estimated		
Average frequency of clearance of rank vegetation on same area	Cleared periodically		

15. EXCAVATIONS AND LOW-LYING LAND.

	1911.	1912.	1913.
Number of cesspools and excavations	Nil	Nil	Nil
Number of excavations filled up	—	—	—
Amount of low-lying and marsh land raised and drained ...	—	—	—
Number of pools, marshes, &c., 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, &c.	—	—	—

16. OILING.

	1911.	1912.	1913.
Number of drains oiled... ..	Nil	Nil	Nil
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	—
Average number of men daily employed for oiling drains, pools, and watertanks or barrels... ..	—	—	—

17. INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of inspectors employed	M.O. H.	Inspects.	
Number of houses inspected	All	All	All
Number of houses where larvæ were found	Nil	Nil	Nil
Number of notices served to remove conditions causing the breeding of larvæ	—	—	—
Number of persons fined for having mosquito larvæ on premises	—	—	—
Number of notices served to remove insanitary conditions on premises	—	—	4
Number of persons fined for not removing insanitary conditions after notice... ..	—	—	—
Number of soda and aerated water factories inspected ...	—	—	—

IV.—METEOROLOGICAL RETURN FOR THE YEAR 1912.

	TEMPERATURE.					RAINFALL.		WINDS.		REMARKS.
	Solar Maximum.	Minimum on grass.	Shade Minimum.	Range.	Mean.	Amount in inches.	Degree of Humidity.	General Direction.	Average Force.	
January ...	145	59.5	61.9	18.6	72.6	11.79	82	E	0.6	
February ...	140	54.6	59	20.2	71.5	10.14	84	E	0.8	
March ...	142	56.6	57.9	21.6	70.5	2.27	78	E	0.7	
April ...	148	57.7	57.8	22.5	72.2	0.01	74	E	1.2	
May ...	139	55.4	54.0	22.1	69.6	0.61	78	E	1.0	
June ...	122	50.5	44.9	23.2	64.3	0.54	76	E	4.0	
July ...	114	48.7	44.8	23.5	60.7	0.37	78	E	4.5	
August ...	122	49.9	49.5	22.7	64.3	0.40	76	E	0.8	
September ...	129	54.3	52.0	25.8	70.5	0.37	67	E	1.9	
October ...	135	52.2	52.4	25.4	73.0	0.74	60	E	1.5	
November ...	139	65.6	60.0	24.5	78.1	11.56	58	E	1.9	
December ...	112	60.4	62.0	15.8	71.5	19.86	82	E	1.0	
Year's means ...	132	55.4	44.8	22.1	69.9	58.66	74	—	1.6	

V.—HOSPITALS AND DISPENSARIES.

Owing to so large a proportion of the staff having been engaged on sleeping sickness investigations only four stations were permanently occupied by Medical Officers during the year, namely, Port Herald, Blantyre, Zomba and Fort Johnston. There was a Medical Officer at Chiromo for about four months in the year, and another at Mlanje for a similar period. Karonga station was occupied for broken periods of time only.

A point of much interest to record this year is that houses for Medical Officers are to be built at Mlanje and Kota Kota, and Dispensaries at both these stations as well as at Chinteche, and a Native Hospital at Port Herald. When these buildings have been erected it will be possible to ensure the carrying on of medical work at stations in many more districts of the Protectorate than has hitherto been possible. The disposition of Medical Officers will then be as follows :—

1.	North Nyasa district,	M.O. in charge	Karonga Dispensary.
2.	West Nyasa	„ „ „	Chinteche Dispensary.
3.	Marimba	„ „ „	Kota Kota Dispensary.
4.	Lilongwe	„ „ „	Ngani. S.S. Area.
5.	South Nyasa	„ „ „	Fort Johnston Dispensary.
			„ Native Hospital.
			„ European Hospital.
6.	Zomba	„ „ „	Zomba Dispensary.
			„ European Hospital.
			„ Native Hospital.
			„ Camp Hospital.
7.	Blantyre	„ „ „	Blantyre Dispensary.
			„ European Hospital.
			„ Native Hospital.
8.	Mlanje	„ „ „	Mlanje Dispensary.
9.	Lower Shire	„ „ „	Port Herald Dispensary.
			„ „ Native Hospital.

It is hoped that later it may be possible to build Native Hospitals at stations where at present only Dispensaries exist. There is a great deal of medical work to be done among the native population, but this cannot be satisfactorily taken in hand unless means are provided for the reception and treatment of in-patients.

It has been pointed out in previous reports that the need of an efficient subordinate staff is greatly felt, and, in the absence of natives of the country possessing the necessary qualifications and on whom reliance could be placed, we are obliged to fall back on Sub-Assistant Surgeons of the subordinate grade of the Indian Medical Service. The general usefulness of these men is recognised on all hands, and native patients fully appreciate their services. Medical Officers have expressed the opinion that with the assistance of Sub-Assistant Surgeons they could do more surgical work, these men administering chloroform and helping at operations. They would also be useful for leaving in charge of Native Hospitals and Dispensaries when a Medical Officer left his station to visit his district, and continuity of work would thus be ensured during his absence. They would, moreover, be useful as Dispensers and in assisting Medical Officers in their clerical work. Again, there are many stations in the country where, for financial reasons, it is impossible to make any provision for Medical Officers. At such stations Sub-Assistant Surgeons would be useful, the local (Protectorate) pay of men in the 1st grade of this branch of the I.M.S. being £124 per annum, plus £17

for rations; the cost of their passages to and from the Protectorate is also proportionately low. In the Protectorates of East Africa and Uganda these men are very largely employed, as may be seen by consulting the staff lists.

The Returns of Diseases treated at the various Institutions are appended below. It has not been possible to class all the cases treated as Hospital and Dispensary cases only (Table VI. and VII.), as there is a third class of patients (Europeans) who are treated either at their own houses, or by consulting a Medical Officer at his residence, and these have accordingly to be returned under a separate heading.

As regards malaria the returns this year again show the various forms of infection under the one heading, "malaria." Medical Officers have now been instructed to classify their cases in future according to the associated parasite.

In last year's Report Register A. was omitted by request, and not from inadvertence. This Register is again omitted as the requisite information cannot be obtained, but instructions have now been issued which will remedy this omission in the future.

Register C. was omitted last year, and is again omitted this year, in consequence of the issue of instructions to this effect by the late Governor, and the Secretary of State has been notified accordingly.

Registers B. and D. are not shown, as there are no native employees who can be classed as "officials."

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1912-13.
BLANTYRE EUROPEAN HOSPITAL.

Disease.	Admissions.	Deaths.	Remarks.
GENERAL DISEASES.			
Malaria	22	—	
Blackwater Fever	4	—	
Rheumatism	1	—	
Sleeping Sickness	1	—	Died in Europe.
Gonorrhœa	1	—	
Dysentery	4	—	
LOCAL DISEASES.			
Nervous System—			
Neurasthenia	1	—	
Circulatory System—			
Dilation of Heart (with gouty kidneys) ...	1	1	
Digestive System—			
Appendicitis (with liver abscess)	1	1	
Gastritis	1	—	
Jaundice	2	—	
Vomiting	1	—	
Generative System—			
Accouchements	4	—	
Miscarriage... ..	1	—	
Pseudocyesis	1	—	
Circumcision	1	—	
Malignant growth of Breast	1	—	Invalided.
Cellular Tissue—			
Abscess	2	—	
INJURIES.			
Injury to Knee	1	—	
Total	51	2	

TABLE VI.—IN-PATIENTS—*continued.*

ZOMBA EUROPEAN HOSPITAL.

Disease.	Admissions.	Deaths.
GENERAL DISEASES.		
Enteric Fever	2	—
Anæmia and Debility	1	—
Malaria	4	—
Trypanosomiasis	1	—
Blackwater Fever	2	2
Dysentery	1	—
Rheumatism	1	—
LOCAL DISEASES.		
Nervous System— Aphasia	1	—
Digestive System— Chronic Diarrhœa	2	—
Generative System— Confinement	7	—
Miscarriage	1	—
Diseases of Skin— Tropical Ulcer	1	—
INJURIES.		
Fracture	1	—
Fracture and Dislocation	1	—
ANIMAL PARASITE.		
Ankylostomiasis	1	—
	27	2

ZOMBA NATIVE HOSPITAL.

Disease.	Admissions.	Deaths.
GENERAL DISEASES.		
Dysentery	10	2
Malaria	21	—
Syphilis	4	1
Rheumatism	5	—
Chicken-pox	1	—
Phthisis	2	—
Pellagra	2	—
Secondary Syphilis	2	—
Debility and Anæmia	4	—
Measles	2	—
Enteric Fever	2	1
Yaws	1	—
LOCAL DISEASES.		
Nervous System— Meningitis	1	1
Cerebral Tumour	1	—
Mania, Acute	2	—
Headache	1	—
Paralysis	1	—
Neuralgia	6	—
Epilepsy, with severe burn of legs	1	1

TABLE VI.—IN-PATIENTS—*continued.*ZOMBA NATIVE HOSPITAL—*continued.*

Disease.	Admissions.	Deaths.
LOCAL DISEASES— <i>continued.</i>		
Diseases of the Eye—		
Conjunctivitis	7	—
Ulcer of Cornea	1	—
Conjunctivo-iritis	1	—
„ Keratitis	1	—
Diseases of the Ear—		
Otitis	1	—
Circulatory System—		
Syncope	2	—
Respiratory System—		
Pneumonia	11	3
Pleurisy	10	—
Broncho-pneumonia	2	1
Digestive System—		
Constipation	16	—
Diarrhoea	5	—
Dental Caries	6	—
Dyspepsia	4	—
Tonsillitis	2	—
Dysenteric Abscess of Liver	1	—
Colitis: Bilharzial?	1	—
Ulcer of Fauces	1	—
Gastro-enteritis	1	1
Abdominal Tumour (from prison)	1	—
Generative System—		
Orchitis	1	—
Confinement	1	—
Hydrocele	2	—
Obstructed Labour	1	1
Cellulitis of Penis	2	—
Organs of Locomotion—		
Periostitis	1	—
Cellular tissue—		
Cellulitis	2	—
Diseases of the Skin—		
Scabies	5	—
Ulcer	38	—
Impetigo	1	—
Herpes	1	—
INJURIES.		
Superficial wound and abrasions	21	—
Sprains and bruises	2	—
Severe deep wounds with complications	4	3
Fracture of clavicle	1	—
Injury by lion... ..	1	—
Subluxation of wrist	1	—
Poisoning with Lin. Camph. Co.	2	—
Under observation	2	—
ANIMAL PARASITES.		
Ankylostomiasis	2	—
Jiggers	9	—

TABLE VI.—IN-PATIENTS—*continued.*

ZOMBA CAMP HOSPITAL.

Disease.	Indians.		Native Troops.		Prisoners.		General Population.		Remarks.
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
GENERAL DISEASES.									
Malaria Fever	6	—	7	—	2	—	—	—	
Rheumatism	2	—	—	—	1	—	—	—	
Pellagra	—	—	—	—	27	3	—	—	
Dysentery	2	—	3	—	11	—	—	—	
Syphilis, Primary	—	—	2	—	—	—	—	—	
„ Secondary	—	—	1	—	—	—	—	—	
Pneumonia	—	—	3	—	3	—	—	—	
Tuberculosis	—	—	—	—	2	2	—	—	
Debility and Anæmia	—	—	—	—	3	—	1	—	
Chicken pox	—	—	10	—	37	—	—	—	
Erysipelas	—	—	—	—	1	—	—	—	
Gonorrhœa	—	—	3	—	—	—	—	—	
LOCAL DISEASES.									
Nervous System—									
Meningitis, Septic	—	—	—	—	1	1	—	—	
Epilepsy	—	—	1	—	—	—	—	—	
Paraplegia, Spastic	—	—	—	—	—	—	—	—	
Pellagra	—	—	—	—	1	—	—	—	
Diseases of the Eye—									
Conjunctivitis	—	—	8	—	—	—	1	—	
Ulcer of Cornea	—	—	1	—	—	—	—	—	
Diseases of the Ear—									
Otitis	—	—	1	—	—	—	—	—	
Diseases of the Nose—									
Nasal Catarrh	1	—	—	—	—	—	—	—	
Respiratory System—									
Bronchitis	2	—	3	—	2	—	—	—	
Pleurisy	—	—	4	—	2	—	—	—	
Septic Pneumonia, with Abscess of Lung	—	—	—	—	1	1	—	—	
Asthma	2	—	2	—	—	—	—	—	2 Indian cases invalidated.
Digestive System—									
Dental Caries	—	—	—	—	1	—	—	—	
Diarrhœa	1	—	2	—	10	—	—	—	
Constipation	—	—	1	—	3	—	—	—	
Ascites	—	—	—	—	1	—	—	—	
Tumour of Liver, Carcinoma?	—	—	—	—	1	1	—	—	
Generative System—									
Pruritis Vulvæ	—	—	—	—	1	—	—	—	
Orchitis, Traumatic	—	—	—	—	2	—	—	—	
Soft Chancre	—	—	1	—	—	—	—	—	
Organs of Locomotion—									
Synovitis	—	—	1	—	—	—	—	—	
Cellular Tissue—									
Cellulitis	1	—	5	—	8	—	—	—	
Abscess	2	—	6	—	3	—	—	—	

TABLE VI.—IN-PATIENTS—*continued.*ZOMBA CAMP HOSPITAL.—*continued.*

Disease.	Indians.		Native Troops.		Prisoners.		General Population.		Remarks.
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
LOCAL DISEASES—<i>contd.</i>									
Diseases of the Skin—									
Ulcer	—	—	1	—	—	—	—	—	
Scabies	—	—	—	—	3	—	—	—	
Boil	—	—	—	—	1	—	—	—	
INJURIES.									
Wounds and Abrasions ...	3	—	6	—	6	—	—	—	
Sprains	3	—	2	—	1	—	—	—	
Fracture	1	—	—	—	1	—	—	—	Indian in- valided.
ANIMAL PARASITES.									
Ankylostomiasis	—	—	6	—	70	1	—	—	
Infection with Balantidium Coli	—	—	—	—	1	—	—	—	
Schistosomiasis	—	—	—	—	1	1	—	—	

FORT JOHNSTON EUROPEAN HOSPITAL.

Disease.	Admissions.	Deaths.	Total treated	Remarks.
Pharyngo-oesophagitis ...	1		1	In Hospital 4 days.
Blackwater Fever	1		1	" " 12 "
Malaria	1		1	" " 4 "
Enteric Fever	1		1	" " 44 "
Rectal Fistula	1		1	" " 28 "
Total	5	Nil	5	

OPERATIONS UNDER GENERAL ANÆSTHESIA.

Avulsion of Nail	1
For rectal Fistula	1
Total	2

TABLE VI.—IN-PATIENTS—*continued.*

FORT JOHNSTON NATIVE HOSPITAL.

Disease.	Admissions.	Deaths.	Remarks.
GENERAL DISEASES.			
Malaria	11	1	An Asiatic.
Syphilis	2	—	
Leprosy	1	—	Anæsthetic variety.
Chicken-pox	1	—	
LOCAL DISEASES.			
Diseases of Digestive System—			
Dental cyst... ..	1	—	
Dysentery	2	—	
Constipation	1	—	
Diseases of Respiratory System—			
Pleurisy	1	—	
Diseases of the Blood—			
Anæmia	1	—	
Diseases of the Genito-Urinary System—			
Urethral Stricture... ..	1	—	
Soft Chancre	1	—	
Gangrene of Penis... ..	1	1	Moribund on admission.
Diseases of Nervous System—			
Spastic Paraplegia... ..	1	—	Patient a lunatic.
Diseases of Bone—			
Periostitis	1	—	
Diseases of Peritoneum—			
Ascites	1	—	
Tumour—			
Lymphadenoma	1	—	
Lipomata	1	—	
WOUNDS, INJURIES, &c.			
Fracture of Femur	1	—	
Compound fracture of Ribs	1	1	Injury caused by a lion; moribund on admission.
Burns	1	—	
Wounds	8	—	
Hanging	1	—	
ULCERS, ABSCESS, &c.			
Ulcers	24	—	
Abscess	3	—	
Cellulitis... ..	2	—	

TABLE VII.

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1912-13.

PORT HERALD DISPENSARY.

Disease.	Europeans.	Asiatics.	Natives.	Deaths.	Totals.
GENERAL DISEASES.					
Chicken-pox	—	—	2	—	2
Measles	—	—	1	—	1
Whooping Cough	—	—	2	—	2
Pneumonia	—	—	12	—	12
Dysentery	—	—	40	2	40
Malarial Fever	7	1	92	1	100
Tubercular Leprosy	—	—	1	—	1
Syphilis—					
Primary	—	—	6	—	6
Secondary	—	—	1	—	1
Tertiary	—	—	1	1	1
Gonorrhœa	—	1	5	—	6
Rheumatism	3	—	12	—	15
Rheumatic Fever	—	—	1	—	1
Debility	—	—	3	—	3
Starvation	—	—	2	—	2
Blackwater Fever	—	1	—	—	1
LOCAL DISEASES.					
Nervous System—					
(a) Meningitis	—	—	1	1	1
(b) Epilepsy	—	—	4	—	4
Headache	—	—	23	—	23
Herpes Zoster	—	—	1	—	1
Diseases of the Eye—					
Conjunctivitis	—	2	51	—	53
Iritis	—	1	3	—	4
Diseases of the Ear—					
Otitis Media	—	—	32	—	32
Respiratory System—					
Bronchitis	2	3	122	—	127
Pleurodynia	—	—	16	—	16
Pleurisy	—	—	7	—	7
Pneumokoniosis	—	—	1	—	1
Digestive System—					
Toothache	1	—	7	—	8
Diarrhœa	—	1	154	—	155
Constipation	—	—	46	—	46
Intestinal Obstruction	—	—	1	1	1
Hæmorrhoids	—	—	1	—	1
Bleeding from Intestine	—	—	1	—	1
Stomatitis	—	—	1	—	1
Hiccough	—	1	2	—	3
Indigestion	—	1	2	—	3
Gastric Ulcer	—	—	1	—	1
Lymphatic System—					
Adenitis... ..	—	—	2	—	2
Lymphangitis	—	—	2	—	2
Carried forward	13	12	662	6	687

TABLE VII.—OUT-PATIENTS—*continued.*PORT HERALD DISPENSARY—*continued.*

Disease.	Europeans.	Asiatics.	Natives.	Deaths.	Totals.
<i>LOCAL DISEASES—continued.</i>					
Brought forward	13	12	662	6	687
Urinary System—					
Endemic Hæmaturia	—	—	18	—	18
Organs, Locomotion—					
Inflamed Foot	—	—	1	—	1
Synovitis	—	—	12	—	12
Old comp. fract. leg	—	—	1	—	1
Cellular Tissue—					
Lumbago	1	—	29	—	30
Cellulitis	—	—	10	—	10
Alveolar Abscess	—	—	1	—	1
Integumentary System—					
Papillary Corn	1	—	—	—	1
Ulcers	1	1	374	—	376
Boils	1	—	29	—	30
Eczema	—	—	1	—	1
Scabies	—	—	83	—	83
<i>INJURIES, LOCAL.</i>					
Fractured pelvis	—	—	1	1	1
Contused finger	—	—	3	—	3
Contused toe	—	—	10	—	10
Contused elbow	—	—	1	—	1
Wounds, general	1	—	210	—	211
Mauled by lion	—	—	1	1	1
Mauled by buffalo	—	—	1	—	1
Mauled by bull	—	—	1	—	1
Fractured fibula	—	—	1	—	1
Fractured tibia	—	—	1	—	1
<i>SURGICAL OPERATIONS, MINOR.</i>					
Incision of Cyst (Antrum Highmore)	—	—	1	—	1
Extract. of Teeth	1	—	54	—	55
<i>POISONS.</i>					
Snake Bite	—	—	1	—	1
Toxic Eruption	—	—	1	—	1
<i>ANIMAL PARASITES.</i>					
Tænia... ..	—	—	1	—	1
Totals	19	13	1,509	8	1,541

EUROPEANS TREATED IN THEIR OWN HOUSES.

Malaria	3
Boil	1
Lumbago	1
Total	5

TABLE VII.—OUT-PATIENTS—*continued.*

RETURN OF DISEASES (OUT-PATIENTS) FOR THE FOUR MONTHS,
DECEMBER, 1912, TO MARCH, 1913.

MLANJE.

Disease.	Number of Cases.	Deaths.
GENERAL DISEASES.		
Pneumonia	2	1
Dysentery	3	
Syphilis	3	
Malaria	14	
Gonorrhœa	1	
LOCAL DISEASES.		
Nervous System—		
Epilepsy	1	
Melancholia	1	
Eye—		
Conjunctivitis	3	
Cataract	1	
Trachoma	1	
Respiratory System—		
Catarrh	27	
Bronchitis	6	
Pleurisy	4	
Digestive System—		
Tonsilitis	2	
Constipation	16	
Diarrhœa	15	
Colic	11	
Caries of Teeth	12	
Hepatitis	2	
Hernia, Inguinal	1	
Urinary System—		
Cystitis	1	
Generative System—		
Hydrocele	1	
Soft Chancre	3	
Skin—		
Scabies	6	
Eczema	2	
INJURIES	73	
PARASITIC.		
Bilharzia	5	

TABLE VII.—OUT-PATIENTS—*continued.*

RETURN OF EUROPEAN CASES TREATED AT THEIR OWN HOUSES DURING
THE FOUR MONTHS, DECEMBER, 1912, TO MARCH, 1913.

MLANJE.

Disease.	Number of Cases.	Deaths.
GENERAL DISEASES.		
Malaria	4	
Blackwater Fever	2	
LOCAL DISEASES.		
Respiratory System—		
Bronchitis and Asthma	1	Nil
Digestive System—		
Diarrhœa	1	
Dyspepsia	2	
Cellular—		
Septic infection of Foot	1	
INJURIES.		
Periostitis due to Traumatism	1	

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1912-13.

BLANTYRE DISPENSARY.

Disease.	Number of Cases.	Deaths.
GENERAL DISEASES.		
Malaria	25	
Rheumatism	18	
Syphilis	10	
Chicken-pox	5	
Pneumonia	6	
Dysentery	65	} Prisoners, 4. G. population, 7.
Pellagra	2	
LOCAL DISEASES.		
Nervous System—		
Headache... ..	35	
Delusional Insanity	1	
Diseases of the Eye—		
Conjunctivitis	29	
Diseases of the Ear—		
Otitis Media	21	
Circulatory System—		
Valvular Disease	2	
Respiratory System—		
Bronchitis	108	
Pleurodynia	1	
Catarrh	14	

TABLE VII.—OUT-PATIENTS—*continued.*BLANTYRE DISPENSARY—*continued.*

Disease.	Number of Cases.	Deaths.
LOCAL DISEASES—<i>continued.</i>		
Digestive System—		
Constipation	73	} Prisoners, 2. G. population, 2.
Colic	1	
Diarrhoea... ..	97	
Dental Caries	31	
Cellular Tissue—		
Cellulitis	7	
Diseases of the Skin—		
Scabies	38	
Boil	11	
Eczema	1	
INJURIES.		
Minor Wounds	141	
Burns	9	
Sprains	7	
Contusions	2	
Abrasions	1	
ANIMAL PARASITES.		
Ankylostomiasis	2	

ZOMBA DISPENSARY.

Disease.	Number of Cases.
GENERAL DISEASES.	
Dysentery	10
Malaria	81
Gonorrhoea	6
Syphilis	7
Rheumatism	59
Chicken-pox	3
Whooping Cough	1
Leprosy	1
Phthisis	2
Pellagra	3
Secondary Syphilis	1
Tertiary "	1
LOCAL DISEASES.	
Nervous System—	
Neuralgia	8
Diseases of the Eye—	
Conjunctivitis	56
Stye	1
Foreign body in the Eye	1
Ulcer of Cornea	2
Ulcerative Kerato-iritis	1
Conjunctivo-iritis	1

TABLE VII.—OUT-PATIENTS—*continued.*ZOMBA DISPENSARY—*continued.*

Disease.	Number of Cases.
LOCAL DISEASES—<i>continued.</i>	
Diseases of the Ear—	
Otitis	10
Otorrhœa	33
Diseases of the Nose—	
Ozœna	1
Coryza	4
Respiratory System—	
Bronchitis	111
Pleurisy	15
Broncho-pneumonia	1
Digestive System—	
Constipation	184
Colic	4
Diarrhœa	58
Dental Caries	105
Dyspepsia	39
Tonsilitis	6
Stomatitis	5
Pharyngitis	2
Gumboil	2
Lymphatic System—	
Adenitis	1
Urinary System—	
Acute Nephritis	1
Cystitis	1
Generative System—	
Metrorrhagia	2
Organs of Locomotion—	
Periostitis	2
Cellular Tissue—	
Abscess	20
Cellulitis	15
Diseases of the Skin—	
Scabies	114
Lichen	3
Ulcer	296
Eczema	2
Impetigo	5
Ziemans' Leucoderma	2
Ringworm	3
Herpes	1
INJURIES.	
Superficial Wounds and Abrasions	332
Sprains and Bruises	14
Infected Wounds... ..	6
Burns	48
ANIMAL PARASITES.	
Bilharziasis	4
Jiggers	6

TABLE VII.—OUT-PATIENTS—*continued.*

RETURN OF EUROPEAN CASES TREATED AT THEIR OWN HOUSES OR AT DISPENSARY DURING THE YEAR 1912-13.

ZOMBA.

Disease.	Number of cases.
GENERAL DISEASES.	
Gonorrhœa	4
Anæmia and Debility	5
Malaria	41
Gout	1
Syphilis	3
Delirium Tremens	1
Dysentery	4
Rheumatism	9
Phthisis	2
LOCAL DISEASES.	
Nervous System—	
Nervous Debility	3
Neuralgia	2
Convulsions	1
Diseases of the Eye—	
Conjunctivitis	3
Astigmatism	1
Ametropia	1
Presbyopia	1
Subconjunct. Cyst	1
Diseases of the Nose—	
Chronic Rhinitis	1
Circulatory System—	
Tachycardia	1
Respiratory System—	
Pleurisy	2
Pharyngitis, Chronic	5
Bronchitis and Bronchial Catarrh... ..	9
Coryza and Naso-pharyngeal Catarrh	1
Influenzal Catarrh	1
Empyema	1
Digestive System—	
Teething	1
Jaundice	1
Colic... ..	1
Dental Caries	27
Acute Diarrhœa	22
Pyorrhœa, Gingivitis and Stomatitis	2
Tonsillitis, acute	8
Vomiting	1
Dyspepsia	15
Hæmorrhoids	1
Lymphatic System—	
Adenitis	2
Urinary System—	
Hydronephrosis	1
Renal Calculus	1
Cystitis	3

TABLE VII.—OUT-PATIENTS—*continued.*ZOMBA—*continued.*

Disease.	Number of Cases.
LOCAL DISEASES—<i>continued.</i>	
Generative System—	
Menorrhagia and Metrorrhagia	2
Circumcision	1
Retroflexion of Uterus	1
Vaginitis	1
Stricture of Urethra	1
Uterus, Prolapse of... ..	1
Organs of Locomotion—	
Rheumatic Fibromyositis	1
Strain of Back	1
Synovitis	3
" of Wrist	1
" " Elbow	1
Cellular Tissue—	
Cellulitis	8
Diseases of Skin—	
Sudamina	1
Furunculosis	3
Impetigo	1
Jiggers	1
Urticaria	3
Tinea Cruris... ..	1
Tinea	1
Onychia	1
Ulcer	3
INJURIES.	
Wound	2
Burn	2
Injury	7
Fracture and Dislocation	1
Abrasion	1
Contusion... ..	2
Sprain	2
Inguinal Bubonocoele	1
Sebaceous Cyst	1
Varicose Vein	2

OFFICERS TREATED AT THEIR OWN HOUSES DURING THE YEAR 1912-13.
ZOMBA CAMP.

Disease.	Number of Cases.
GENERAL DISEASES.	
Malarial Fever	3
Rheumatism	1
LOCAL DISEASES.	
Respiratory System—	
Bronchitis	1
Pharyngitis	1
Digestive System—	
Dental Caries	2
Diarrhœa	2
Hæmorrhoids	1
Cellular Tissue—	
Cellulitis	1
INJURIES.	
Wounds and Abrasions	5
Sprains	1

TABLE VII.—OUT-PATIENTS—*continued.*

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1912-13.

CAMP DISPENSARY, ZOMBA.

Disease.	Cases.				Deaths.
	Indians.	Native Troops.	Prisoners.	General Population.	
GENERAL DISEASES.					
Malarial Fever	72	12	20	25	—
Yaws	—	—	—	2	—
Rheumatism	13	13	39	22	—
Pellagra... ..	—	1	95	7	—
Dysentery	5	3	3	5	—
Syphilis, Inherited	—	—	—	2	—
„ , Secondary	—	—	—	1	—
Pneumonia	—	—	—	1	—
Tuberculosis	—	—	2	1	—
Debility and Anæmia	1	1	—	1	—
Gonorrhœa	—	1	—	—	—
LOCAL DISEASES.					
Nervous System—					
Neuralgia	7	—	2	1	—
Headache	1	1	23	14	—
Epilepsy	—	1	2	4	—
Acute Mania	—	—	1	—	—
Diseases of the Eye—					
Conjunctivitis	4	9	10	89	—
Ulcer of Cornea	1	4	3	—	—
Diseases of the Ear—					
Otitis and Otorrhœa	—	3	6	14	—
Diseases of the Nose—					
Nasal Catarrh	11	—	—	—	—
Ozena	1	—	—	—	—
Circulatory System—					
Syncope	—	1	2	—	—
Respiratory System—					
Bronchitis	51	23	91	60	—
Pleurisy	3	7	11	7	—
Laryngitis	—	—	—	1	—
Pharyngitis	—	8	7	—	—
Digestive System—					
Stomatitis	22	18	30	7	—
Dental Caries	9	57	22	53	—
Diarrhœa	2	16	35	53	—
Constipation	60	20	42	43	—
Colic	23	15	18	22	—
Ascites	—	—	—	1	—
Dyspepsia	65	9	14	8	—
Tonsillitis	3	2	6	5	—
Gumboil	2	—	—	—	—
Lymphatic System—					
Adenitis	1	—	—	—	—

TABLE VII.—OUT-PATIENTS—*continued.*CAMP DISPENSARY, ZOMBA—*continued.*

Disease.	Cases.				Deaths.
	Indians.	Native Troops.	Prisoners.	General Population.	
LOCAL DISEASES—<i>continued.</i>					
Generative System—					
Ulcer of Penis	—	—	—	1	—
Metritis	—	—	—	1	—
Mastitis	—	—	—	1	—
Spermatorrhœa	1	—	—	—	—
Organs of Locomotion—					
Myositis	—	1	—	—	—
Synovitis	2	1	—	1	—
Cellular Tissue—					
Cellulitis	—	5	17	10	—
Abscess	—	1	9	2	—
Diseases of the Skin—					
Herpes	—	—	1	1	—
Ulcer	3	28	55	—	—
Scabies	—	23	16	32	—
Boil	2	—	1	62	—
Eczema	—	1	4	2	—
Ringworm... ..	4	21	10	4	—
Urticaria	4	1	1	—	—
Tinea Barbae	—	—	11	—	—
Erythema	—	1	—	—	—
Favus	—	1	—	—	—
INJURIES.					
Burns	1	3	1	7	—
Wounds and Abrasions	70	204	180	300	—
Sprains	7	11	21	2	—
Contusions	15	3	3	1	—
ANIMAL PARASITES.					
Ankylostomiasis	—	19	45	9	—
Infection with Bothriocephalus	—	3	3	—	—
Infection with Strongyloides Stercoralis	—	9	1	2	—
Infection with Trochocephalus Trichiuris	—	4	1	2	—
Infection with Balantidium Coli	—	—	2	—	—
Infection with Ascaris Lumbricoides	—	2	3	—	—
Infection with Taenia	—	9	—	—	—
Jigger	—	1	—	—	—
MINOR OPERATIONS—81					

TABLE VII.—OUT-PATIENTS—*continued.*RETURN OF EUROPEAN CASES TREATED AT THEIR OWN HOUSES OR AT
DISPENSARY DURING THE YEAR 1912-13.

FORT JOHNSTON.

Disease.	Number of cases.	Deaths.
GENERAL DISEASES.		
Malaria	8	
Relapsing Fever	1	
LOCAL DISEASES.		
Diseases of Digestive System—		
Stomatitis	1	
Follicular Tonsilitis	1	
Pharyngitis	1	
Dysentery	1	
Diarrhoea	2	
Diseases of the Blood—		
Urticaria... ..	1	
Diseases of the Eye—		
Ocular Paralysis... ..	1	
Diseases of Nasal Sinuses—		
Empyema of Antrum of Highmore	1	
ULCERS, ABSCESS, &c.		
Ulcer	1	
Furunculosis	1	
OBSTETRICS.		
Accouchement	1	
Total	21	Nil

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1912-13.

FORT JOHNSTON DISPENSARY.

Disease.	Number of cases.	Remarks.
GENERAL DISEASES.		
Malaria	17	
Syphilis	2	One secondary, one tertiary.
Gonorrhoea	3	
Leprosy	1	Anæsthetic variety, patient an Asiatic.
LOCAL DISEASES.		
Diseases of Digestive System—		
Stomatitis	1	
Dental Caries	25	
„ Cyst	1	
Pyorrhoea Alveolaris	1	
Dyspepsia	4	
Diarrhoea	54	
Constipation	220	
Diseases of Respiratory System—		
Bronchitis	79	
Diseases of the Skin—		
Scabies	179	
Eczema	5	
Sebaceous Cyst	1	

TABLE VII.—OUT-PATIENTS—*continued.*FORT JOHNSTON DISPENSARY—*continued.*

Disease.	Number of cases.	Remarks.
LOCAL DISEASES—<i>continued.</i>		
Diseases of the Eye—		
Catarrhal Conjunctivitis	16	
Purulent „	4	
Diseases of the Ear—		
Wax in Auditory Canal	2	
Otitis Media	2	
Diseases of Genito-Urinary System—		
Hematuria	1	Patient a Sikh soldier.
Paraphimosis	1	
Diseases of Muscle—		
Muscular Rheumatism	47	
Diseases of Nervous System—		
Headache	69	
Neuralgia	2	
Herpes Zoster	1	
Diseases of bones, Joints and Ligaments—		
Arthritis	1	One patient an Asiatic.
WOUNDS, INJURIES, &c.		
Wounds	214	
Fracture of Ulna	1	
Sprains	5	
Burns	4	
ULCERS, ABSCESS, &c.		
Ulcers	30	
Cellulitis	1	
OBSTETRICS.		
Accouchement	1	

CENTRAL LUNATIC ASYLUM, ZOMBA.

Type of Insanity.	Remaining in Asylum at end of 1911-12.	Yearly Total.		Total Cases Treated.	Remaining in Asylum at end of 1912-13.	Remarks.
		Admissions.	Deaths.			
Dementia	1	—	—	1	1	
Epileptic	1	—	—	1	1	
Mania	8	1	—	9	9	
Melancholia	3	1	—	4	4	
Delusional... ..	5	—	—	5	5	
Pellagrous	—	1	1	1	1	

NOTE.—Of the cases remaining at the end of the year 1911-12, four males and one female were confined in the Prison, owing to lack of accommodation in the Asylum.

RESTRAINT.—Two cases have been kept under restraint for considerable periods.

DEATH.—The pellagrous case, a male about 25 years of age, died from pyæmia following homicidal head injuries.

VI.—SCIENTIFIC.

INVESTIGATIONS INTO DISEASES.

The Papers which are appended have been furnished by members of the Medical Staff, and comprise:—

1. A Report on Ankylostomiasis in the North Nyasa District, by Dr. P. C. Conran, lately Medical Officer, Karonga.
2. Nyasaland Trypanosome Fever, by Dr. J. O. Shircore, lately Medical Officer in charge of Sleeping Sickness Investigations in the Proclaimed Area, Dowa sub-district.
3. Pellagra in Nyasaland, by Dr. H. S. Stannus, Medical Officer, Zomba.

A REPORT ON ANKYLOSTOMIASIS IN THE NORTH NYASA DISTRICT,
BY P. C. CONRAN, LATELY MEDICAL OFFICER, KARONGA,
NYASALAND.

In June, 1912, on my assumption of duty as Medical Officer at Karonga, I was requested by the Principal Medical Officer to investigate the extent of Ankylostomiasis infection in the district. In the course of my observations I found that a large number of cases were complicated by the presence of other helminths in the intestines, notably *Schistosomum haematobium*, so that these also are included in my report.

It is noteworthy that my observations extended over the dry period of the year only, that is to say, the period during which the minimum number of infections occur.

The fact of my arrival becoming known, a large number of natives came to the Dispensary for treatment, not only from Karonga itself, but also from distant villages.

A large number of these complained of pain in the epigastrium, "as if something were biting them inside," accompanied by constipation or diarrhoea, often with blood in the stools, examination of which revealed the presence of ova of *Ankylostomum*, *Schistosomum*, or both.

The number of cases which came for treatment showed that there must be a very great many natives who, while harbouring parasites, refrained from coming owing to lack of severe symptoms or for other reasons.

I now proceeded to make preparations from the stools of 522 natives who were taken, haphazard and irrespective of age or sex, from Karonga and the adjoining villages.

These preparations were examined after as short an interval as possible, and the presence or absence of ova noted. My results are seen in Tables I. to IV.

Table I. shows the number of individuals infected with *Ankylostomum*, *Schistosomum*, *Ascaris*, and *Tricocephalus* respectively, each number expressed both in actual figures and as a percentage of the whole number examined.

The *Schistosomum* ova were in nearly every case of the lateral-spined variety. In a few instances, however, terminal-spined ova were seen, possibly owing to admixture of urine with the stool.

Table II. shows the comparative incidence of the infection in the case of men, women, boys, girls and infants.

The result of the extent of the disease among children is seen in the exceedingly high infant mortality in the district, diseases from which a healthy child would easily recover proving fatal owing to lack of resisting power.

Table III. shows the variation observed in regard to locality in some of the larger villages of the neighbourhood.

It is noteworthy that Mwangolera and Mwambungo, the districts with the highest percentage of *Ankylostomum* infections, lie inland at some distance from the shore of the Lake, while Chisindiri and Kambombo are near the mouth of the river Rukuru.

In the two former districts the whole population derives its water supply from the upper Rukuru and its tributaries or from shallow pools; in the two latter, from the Lake or the wide mouth of the river. As regards race, the bulk of the population round Karonga is Wankonde; Chisindiri, however, is a Wahenga village.

Table IV. indicates the relative number of pure and of mixed infections in the case of *Ankylostomum* and *Schistosomum*.

Judging from my observations, malæna is never observed with the naked eye in the case of a pure *Ankylostomum* infection.

When *Schistosomum* is present, however, the case may closely simulate one of Dysentery, almost pure blood being passed with mucus, and accompanied by marked griping and tenesmus.

Having by this time ascertained to some extent the condition of the Karonga district, which probably typifies the whole strip of flat country lying along the shore of the Lake between it and the inland hills, I proceeded to Fort Hill, which is situated at an elevation of 4,400 feet, and at a distance of about 40 miles from the Lake. Here I examined the stools of 100 natives from the small and scattered mountain villages. My results are shown in Tables V. and VI. These natives were mostly of the Mambwe tribe and their water supply is derived from mud-holes, shallow pools, and streams which are rapidly flowing during the rains but almost stagnant during the dry season, at the latter end of which they are represented by a series of pools.

In December I was transferred elsewhere, but I venture to think that the foregoing statements are sufficient to indicate with some degree of accuracy the state of North Nyasa in general as regards infection with the helminths considered.

Bass states that, in examining stools for *Ankylostomum* ova, some 20 cases per cent. examined are missed.

This being so, the true number of natives infected at the Lake level is probably 60 per cent. of the total, and in the hills about 33 per cent.

A few observations on the subject of the chief symptoms and signs observed in my cases of *Ankylostomiasis*, and of the chief difficulties to be overcome in the institution of efficient prophylaxis, may not be out of place.

Most of the symptoms usually described were observed, but certain of them were particularly emphasized.

Of these the most constant were pain and tenderness in the epigastric region, symptoms of which all the cases who came for treatment complained. Next, in order of frequency, came dyspnoea, palpitation, weakness, dizziness, headache.

Joint pains, simulating rheumatism, were common.

Many patients complained of blood passed with the motions, but this was invariably accounted for by the presence of *Schistosomum* infection. From information indirectly obtained it seems certain that earth-eating is common, especially among children. Every patient, however, stoutly denies the fact when questioned concerning his own case.

The chief signs were a dull, listless, vacant expression; a coated, flabby, enlarged tongue; rapid, low-tension pulse; hæmic murmurs, and flabby muscles.

No reliable information concerning ground itch could be obtained owing to the fact that my observations were made during the dry season. Few cases had any recollection of a definite attack.

Treatment, whether with Thymol, B. Naphthol, or Eucalyptus and Castor Oil, was most successful, especially when the vermifuge was followed by a short course of iron.

In every case the patient at once began to put on weight, his intellect became clearer, the troublesome symptoms disappeared, and his capacity for work increased daily.

Prophylaxis offers difficulties which cannot be appreciated unless one is already acquainted in some measure with the special local condition in North Nyasa, so that the following short description of these may be of use.

The natives of the district belong to various tribes, of which the chief are the Wankonde and the Wahenga, who inhabit the strip of low-lying land along the shore of Lake Nyasa, and a large portion of the mountainous hinterland as well.

Several other tribes are scattered among the hills to the North and West, such as the Mambwe and Awemba, and, with a few Swahili and Arabs, complete the entire population.

As regards their mode of living, for the present purpose all the aforesaid tribes can be classed together.

All live in so-called villages which, for the most part, consist of widely-scattered groups of huts, each group being connected with the rest of the village by narrow bush paths.

Each village thus covers a large area and has no definite boundaries and, although there is a headman, his authority, such as it is, only extends over the immediate neighbourhood of his own hut.

The Wankonde and, to a less extent, the other tribes, are enthusiastic cattle breeders, and all grow maize, millet, and other grain, almost everyone working in the fields during the months immediately preceding and during the rains.

Their diet is mainly vegetarian, but fowls, eggs and fish are used as relish, fish being caught for the most part during the rains.

It is of interest to note that Looss states that a pure vegetable diet produces a less favourable medium for *Ankylostomum ova* than a mixed diet. Now both fish and fowls are more abundant near the Lake, where *Ankylostomiasis* is rife, than in the hills, where it is comparatively rare.

Their water supply is derived to a very small extent from the Lake; more often from rivers and their tributaries, especially during the rains; most often, at any rate during the dry season, from muddy water holes.

Defaecation and micturition are performed, whenever the desire arises, at the nearest spot sheltered, or partly sheltered, from the public gaze. If the person concerned is on a path he steps into the bush or one side of it; if in a village he makes his way to the nearest clump of bushes, a shady spot that has probably been used for years for the same purpose, and which, every rainy season, must be saturated with very slightly diluted faeces mixed with the sandy soil.

During the night he is afraid to venture so far from his hut, and merely goes a few yards from his door to a spot where his children may be playing about next day.

The headmen make no attempt to set apart certain spots for latrines, nor would such an attempt succeed, owing to the scattered nature of the villages; in the bush near a village, therefore, we have, during the rains, all the chief factors favourable to the existence of *Ankylostomum* infection in a district, namely, a high temperature, the optimum being from 77° to 95° F., moisture, shade, and dilution of the faeces with sand.

So that, during at least five months in the year, natural conditions and the habits of the people combine to produce an ideal state of things for the production of *Ankylostomiasis* on a vast scale.

In the dry cool months from May to September, however, and even in the heat of October and November, the conditions are much less favourable to the spread of the disease.

The south-west wind dries up the soil; the temperature falls below the optimum; the long grass withers and the leaves fall from the trees, allowing the direct sunlight to reach the soil.

There are now no rains to scatter the faeces nor to mix them with sand, and so help to apply the infective material to the skin.

In addition, the soil over a great part of the district is very efficiently disinfected; for the natives, in order to prepare it for cultivation, kindle the long grass, and great bush fires sweep over the country sterilising the surface of the ground.

These fires are allowed to burn close up to the huts, and by the end of November a comparatively small area of the bush is left untouched.

Thus one would expect that there would be an annual rise in the number of fresh and of acute cases of *Ankylostomiasis* during the rains, followed by an annual fall during the dry season, and my observations fully confirmed this view.

Any patient, when questioned, will date his troubles from the rainy season, and, although no reliable death statistics are obtainable, the constant sound of wailing throughout the district testifies to the great rise in the mortality at this time of the year.

The above brief description of the local conditions will, I hope, make it clear that, before any prophylactic measures can be successfully applied, a drastic reform of the village system is necessary.

Preventive measures, to be effective, must attain three objects:—

1. To destroy the mature worms in the bodies of the population.
2. To prevent the growth and existence of larvæ in the places where they develop.
3. To prevent infection by larvæ that have developed.

1. The first object can be effected by a systematic examination of the natives, and treatment of those in whose motions ova are found. Under present conditions this would be a most difficult task, but with concentration of the villages, the installation of responsible headmen, and a census of the population, it would be rendered comparatively simple.

2. The second object resolves itself into the prevention of soil infection. If an efficient public latrine were installed in each village and the inhabitants induced to use it the disease would steadily decrease and eventually disappear.

Here, again, the scattered arrangement of the huts and the lack of any local authority nullify any efforts in this direction.

Under improved conditions each headman would be responsible for the sanitary state of his village and, by periodical visits from the Medical Officer or Resident, would be induced to do his duty.

The latrine should be of as simple a description as possible, such as a deep trench or pit, sheltered by an open thatched shed, and so situated that it cannot be flooded during the rains.

3. Prevention of infection by larvæ is to be effected only by educating the natives with regard to the subject.

This, under improved conditions, could be done, firstly, through the village headmen, secondly, through the native teachers at the Mission Schools. A few of the headmen to whom I have spoken on the subject quite realise the gravity of the situation, and would willingly assist the Medical Officer. The native teachers, for the most part, have been educated at Livingstonia, where great interest is taken in the subject, and the Minister at Karonga would gladly arrange for the instruction of the members of his school.

TABLE I.

Ova.	Number of persons infected.	Percentage of total number examined.
Ankylostomum	211	40·42 %
Schistosomum	169	32·38 %
Ascaris	47	9 %
Tricocephalus	8	1·54 %
Negative	87	16·66 %

TABLE II.

Ova.	Men.	Women.	Boys.	Girls.	Infants.
Ankylostomum	44 %	42·67 %	30 %	32·35 %	45·83 %
Schistosomum	31 %	16 %	48·57 %	44·12 %	29·17 %
Ascaris	5 %	11·33 %	1·43 %	8·82 %	22·92 %
Tricocephalus	1 %	1·33 %	1·43 %	2·94 %	2·08 %

TABLE III.

Ova.	Chisindiri.	Kambombo.	Mwangolera	Mwambungo.
Ankylostomum	41·6 %	25·4 %	43·4 %	50·9 %
Schistosomum	31·6 %	38·1 %	38·5 %	38·18 %
Ascaris	3·3 %	6·3 %	13·2 %	10·9 %
Tricocephalus	—	—	2·4 %	—

TABLE IV.

Ova.	Number of persons infected.	Percentage of total number examined.
Ankylostomum alone	149	28·54 %
Ankylostomum and Schistosomum	62	11·85 %
Schistosomum alone	98	18·77 %

TABLE V.

Ova.	Number of persons infected out of 100 examined.
Ankylostomum	13
Schistosomum	11
Ascaris	7
Tricocephalus	2
Negative	67

TABLE VI.

Ova.	Men.	Women.	Boys.	Girls.
Ankylostomum	15·79 %	16·22 %	12 %	5·26 %
Schistosomum	10·53 %	8·11 %	8 %	21·03 %
Ascaris	5·26 %	5·41 %	8 %	10·53 %
Tricocephalus	—	—	4 %	5·26 %

NYASALAND TRYPANOSOME FEVER; BY J. O. SHIRCORE, M.B., M.R.C.P.,
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SYNONYMS.

Native names—Kaozera, to nod. This term is of recent European introduction, unknown to the native, and probably taken from the Luganda word mongota, to nod. The native name for Trypanosome disease, though confused by them with other diseases and certain forms of poisoning, has always been Ndulu in the Dowa "Sleeping Sickness Area."

DEFINITION.

An endemic trypanosome fever occurring in Nyasaland, and characterised by pyrexia, usually of a regularly intermittent type, early acceleration of the cardiac and respiratory rates, tremors, local oedemas, progressive emaciation and weakness; later, some implication of the nervous system, terminating in death by acute or subacute stages.

HISTORY.

One cannot do better than refer to Dr. Sanderson's account in this connection, which was published in the "Transactions of the Journal of Tropical Medicine and Hygiene," Vol. v., No. 8, pp. 295, 296, July, 1912. Two points, however, need to be mentioned, namely: (1) That Dr. J. E. S. Old, of the Nyasaland Medical Staff, was the first to discover trypanosomes in cattle, and (2) that Dr. W. A. Murray, of the Mvera Mission, Dowa, diagnosed the first case of the Nyasaland disease in man.

DISTRIBUTION.

Cases have been found in other parts of the Protectorate, but it has been conjectured that these chiefly originated in the "proclaimed area," the flat country lying between the Lintipi and the Lingadzi Rivers of the Dowa sub-district. The returns from the middle of May till the end of October give a total of 32 cases, namely, 18 from the villages along the course and below the junction of the Lintipi and Lilongwe rivers, as compared with 14 cases for the rest of the area.

AGE INCIDENCE.

The age incidence appears to be between youth and old age. No child has so far been found infected, but elderly or old people return a good proportion of cases: males, 65·62 per cent.; females, 34·37 per cent.

SYMPTOMS AND SIGNS.

After a varying but short incubation period, the patients in most cases complain of headache (*litsipa*) or pain in the legs (*kasipa*), frequently both. Pains in the chest and, in a few cases, abdominal pain and diarrhoea mark the onset of the disease. These symptoms are either constant and occur concurrently, or one or other is a prominent feature. Later, changes in the mental condition are shown by marked dulness and apathy, slovenly habits, the absolute disregard of personal cleanliness, and marked maniacal symptoms have been noted during the early stages. Local œdemas are constant, the face, feet and hands, sometimes also the arms and legs, being involved. The feet often are much swollen; the face, though puffy, is seldom swollen to any marked extent. There was great œdema, however, of the cheeks, lips and eyelids, accompanied with lachrymation noted in one case. The œdemas are frequently evanescent, attacking different situations at intervals. The tendency to sleep at odd hours is not common, yet a typical somnolent stage of some three weeks has been recorded in three instances. The cases are usually found in the intermediate stage of the disease, the common clinical picture being:—Patient's expression dull and dreamy; slight puffiness of the face; speech somewhat thick—in some people, thin-voiced and high-pitched. The lips are dry, with particles of food adhering to them and between the teeth; this is very typical. The breath is foul. There are fine tremors of the tongue and hands. Intelligence is somewhat impaired. Skin dry, rough and scaly. Glandular enlargement in the posterior triangles + or - variable, though usually palpable, and sometimes puncturable, are frequently not so. Epitrochlears almost invariably palpable and enlarged, sometimes puncturable (the position of the epitrochlear glands is not constant; in some they are situated just above the internal condyle, in others, inches above. Of twenty-one cases where this enlargement has been looked for it has been absent in only one). Gait, shuffling. Pulse rate, 100 to 140 per minute. Respirations shallow; rate, 25 to 40 per minute. Temperature taken during the course of examination varies with the condition of the patient and with the time of day, whether above normal or subnormal. When the disease is well established there is an evening rise of usually some degrees, and a morning fall to subnormal, rarely normal, *i.e.*, a regular daily, markedly swinging, intermittent fever. For some days before death the temperature falls to subnormal and stays there till the end. In an early case the temperature is remittent or irregularly intermittent. There are no concomitant symptoms with the rise of temperature and the patient appears not to be inconvenienced.

Circulatory System.—The frequency of the pulse has been found to range between 100 to 142 per minute. There appears to be no definite correlation between the temperature and the pulse and respiration rates. Depending on the height of pyrexia the pulse and respiration rates are of course somewhat accelerated, but the ratio is unreliable. With great fluctuations between morning and evening temperature the pulse and respiration rates differ slightly from day to day. The pulse and respiration rates, however, show an almost constant ratio of 4:1. The force and frequency of the pulse is regular, the wave is easily compressible, the volume is small. When the temperature becomes subnormal before death the pulse and respiration rates also diminish in frequency, and this diminution is progressive until the fatal issue.

On examination of the heart, one sees in most cases præcordial pulsation over the mitral area. Pulsation is always present, and sometimes strikingly so, above the clavicles and upwards along the course of the carotids at the root of the neck. This is more particularly marked in strong, robust individuals in whom a moderate hypertrophy of the heart precedes degenerative changes and dilatation. In such cases, on palpation, a strong cardiac impulse is felt, of a slightly heaving character. In the majority of cases, however, hypertrophy—if it does occur—does so only to a small extent, and dilatation, on the other hand, is never extreme. A soft, blowing murmur over the apex has been heard in two cases, but no irregularity of the pulse or other indications of endocardial mischief have been observed. Whatever changes take place are myocardial, and these of probably such a nature that the heart's muscle is not rapidly damaged. Sudden death from syncope does not occur; nor has acute dilatation or any history of cardiac uneasiness, palpitation, dyspnoea, &c., been recorded, except in one instance, when it occurred during the onset of the disease, and was therefore of different origin. The early tachycardia indicates that it is due to nervous influence rather than to myocardial causes. At the period when myocardial changes are established, indicated by "floppy" heart sounds, badly sustained pulse-pressure, and some increase in the transverse diameter of deep cardiac dulness, the pulse-rate diminishes slightly in frequency, and from this time onwards there is a gradual diminution till the end. The time of ventricular systole is lengthened and the first and second sounds are almost equally spaced, so that on auscultation a pendulum rhythm is heard. It

is in those individuals with strong hearts and good arteries that the greatest resistance is offered to the disease, the course of which is prolonged. Young people under twenty appear to succumb quickly; a girl, aged about eighteen years, died in two months; a boy, aged fourteen years, in about the same time.

Respiratory System.—The respirations are regular in frequency, but are quiet and shallow. The rate lies between 24 and 40 per minute. Sometimes, but not commonly, Cheyne-Stokes breathing closes the scene; at other times pulse and respiration gradually diminish till they quietly cease. Cough, bronchitis and oedema of the lungs are associated with most cases at some period.

Alimentary System.—Complaints relating to this system are unusual. The appetite is good and patients eat well until nearing their end. The lips are dry, the tongue dirty, and the breath foul. Sometimes there is abdominal pain, rarely vomiting, more frequently diarrhoea. In two cases great enlargement of the spleen was observed. The organ was firm, somewhat hard, and presented a well-defined rounded edge, extending to about three inches below the costal border. The liver was found enlarged in one case only.

Integumentary System.—A harsh, dry skin, with a scaly, brawny desquamation, which is best observed on the trunk and the lower part of the neck, above the clavicles. A papulopustular eruption of the wrists, arms, inner surfaces of the thighs and on the pubes has been noted. Large patches of localised oedema of the skin has only been observed in one case. Loss of hair is often seen, even in young people.

Lymphatic System.—The enlargement of glands in the posterior triangles of the neck is not a prominent feature; they are sometimes impalpable, and often merely shotty. The epitrochlears have been found enlarged, with only one exception. The size varies between that of a small bean to that of a large almond; they are frequently puncturable. (*Vide table.*)

Nervous System.—The expression of the face is dull and dreamy, and the speech is thick and mumbling. Cerebration is inhibited early, though the intelligence and memory are affected later. Headache and neuralgic pains in the legs are the rule.

Sensory Functions.—Hyperæsthesia, deep (Kerandels) and superficial, is constantly present, but varies in intensity with the condition of the patient. There is no anaesthesia. Patients are very sensitive to cold.

Motor Functions.—There is general muscular weakness; the patient is lethargic, and fatigue occurs. The muscles are flaccid and wasted. Tremors of the hands and tongue are very constant; sometimes of the legs and neck. The gait is shuffling. Later there is occasionally loss of power in the legs and sometimes rigidity of muscles. Epileptiform movements of not a very definite character were once noted.

Reflex Functions.—The superficial reflexes are undisturbed, the deep reflexes are at times exaggerated early; later elicited with difficulty or not at all. No ankles clonus; no Babinski. The bladder and rectum are unaffected, but shortly before death the sphincters are sometimes relaxed.

Special Senses.—Eyes. Pupils are equal and regular; they react to light and accommodation. Some diminution of acuity of vision has been complained of, irrespective of interstitial keratitis present in five out of twenty-nine cases. Nystagmus was very remarkable in one case, and was well displayed on orienting upwards and outwards to either side.

Mental Condition.—There is a decided change in character. In early cases the patients appear highly-strung and nervous. Later they lose interest in their surroundings and the effort of thinking is irksome. Then there follows an inability to concentrate the mind in order to answer questions, and at this stage they are sometimes emotional. Still later they appear confused and can neither express themselves intelligently nor comprehend what is being said. Delirium and maniacal symptoms are not usually early manifestations. Three cases were distinctly somnolent for some three weeks before death.

Sexual Functions.—Impotence develops during this fever, apparently early.

Hæmopoietic System.—The red blood corpuscles have been found to be about 3,200,000 to 3,500,000 per c.m. The hæmoglobin per cent. taken in over 25 cases at various periods of the disease was between 35 per cent. to 40 per cent. It has been seen as low as between 25 per cent. and 30 per cent., but only in one case was it as high as 60 per cent. The colour index calculated in two cases was about .5. The white blood corpuscles were between 7,000 to 12,000 per c.m. Differential leucocyte counts indicate an early relative increase of lymphocytes, sometimes an actual increase, over the polymorphonuclear neutrophils, which are diminished. About midway during the course of the disease actual increase of the lymphocytes is uncommon, and during the last stages there is invariably a return or approximation of the polymorphonuclear neutrophils to their normal percentage. Eosinophils

are generally absent, or in small numbers: 40 per cent.; basophils, 20 per cent.; abnormal mononuclears are present, and the large mononuclears (hyaline cells) are increased, *i.e.*, 10 per cent. to 14 per cent. Myelocytes are seldom seen. While making differential counts normoblasts are sometimes found; when this is so they return between 20 per cent. to 40 per cent. Megaloblasts are extremely rare. Counts of 500 cells were made as a rule; in three cases over 100 cells were counted. The blood platelets appear to be much increased. Trypanosomes showing dividing forms are of frequent occurrence late in the disease.

Urinary System.—Urine pale, low specific gravity, no sugar, no albumen. But many examinations have not been made.

Complications.—Bedsores have not been met with. Bronchial catarrh is almost invariable. Oedema of the glottis and of the lungs is not uncommon; in fact, the latter appears to form part of the disease. Otitis media has been seen in one case; keratitis in several.

Incubation Period and Course of the Disease.—Histories point to a period of from five to ten days; after which symptoms, usually severe, immediately supervene. In two cases after this initial period a remission of the severe symptoms, from about a week to fifteen days, took place. Patients, nevertheless, get progressively worse. There are roughly three stages, divisible in the majority of cases as follows:—

1. Incubation period and subsequent headache, pains in the chest and limbs, or abdominal pain and diarrhoea. There is no loss of intelligence, or indication of any organic interference with mental functions. Delirium is, however, sometimes associated with the intensity of the initial pyrexia which is remittent. There is an increase of pulse and respiration rates, well above the normal, and the patient appears nervous. Trypanosomes few in number.

2. With these symptoms a change of character takes place. Cerebration is impaired; asthenia marked and increasing; oedema of feet and other oedemas; muscular wasting; tremors. The temperature, swinging and intermittent. Pulse and respiration rates continue high. The patient can still walk or sit about. Trypanosomes increased.

3. Patient is now unable to sit up, and crawls. Marked mental change; seems oblivious of surroundings; mumbles or is unable to talk; drowsy or comatose. Temperature either still intermittent for a few days, or absolutely subnormal for the 24 hours. Pulse and respiration rates subnormal, and diminishing in frequency. Trypanosomes numerous. Death.

The duration of these stages is approximately three weeks to a month for the first, up to four or even five months for the second, a few days to four weeks for the third. An average duration for the whole course is about four-and-a-half months. Six months has been found to be exceptional. In the young the course is very rapid. The trypanosomes must be observed to justify the diagnosis of trypanosomiasis. Sick people are seen among natives, who have a striking superficial resemblance to this disease, *e.g.*, oedema and a puffy countenance is frequently seen in ankylostomiasis, or illness with oedema due to other causes. On the other hand, a case of some months' standing has been seen where several of the outstanding symptoms were insignificant or absent. One example may be quoted:—A woman ill from early in February, 1912, till the 30th July, when she died. She was first seen and diagnosed on the 11th June, when her condition was as follows:—Pulse 100, respirations 18, temperature 98.8° F. Still carries her child and works in the garden. Glands in the poster or triangles few and small. Epitrochlears palpable. Some diminution of acuity of vision. No oedema of face or feet. Nothing else to note. She was again seen on the 19th and 28th June, when she appeared much about the same. Slides from this woman were sent in during February, April and May, and late in May I had an opportunity of examining some. Mine were negative, presumably also the previous ones. A fresh preparation examined on the 11th June (the first time this had been done) showed two trypanosomes in over a hundred fields (obj. $\frac{1}{2}$). This experience is not a solitary one, and much more importance is, therefore, to be attached to the examination of fresh coverslip preparations than to films. When trypanosomes have once been observed they have invariably been found at every subsequent examination. The blood of suspects has never subsequently shown trypanosomes, though examined repeatedly at various intervals for a month or longer; this in well over 100 different individuals. I therefore conclude that the trypanosomes, from their first appearance in the blood, shortly after infection, are always present, and markedly so during the last month. Six per field, or even eight or more, are quite usual till death.

Auto-agglutination is not at all marked on all occasions, even with trypanosomes numerous in the blood. It is also seen in people not suffering from trypanosomiasis, and lately has been observed here in tick fever.

In the average cases the points to observe in diagnosis are:—The expression and puffiness of the face; mental condition; tremors; emaciation; enlargement of epitrochlear glands. The glands in the posterior triangles variable, + or -. Increased frequency of

pulse and respiration rates. Temperature depends on the time of day when examination takes place, but if markedly subnormal in the morning indicates a fairly advanced stage, *i.e.*, of two or three months' duration; as also any decided change in the mental condition. Speech, thick; sometimes the voice is high-pitched, at other times hoarse. Skin, harsh, dry and scaly. Oedema usually of feet. Gait, shuffling, short-stepped; the feet just clear the ground, as if the patient were pushing something along with them.

Interstitial keratitis occurs in some 17 per cent. of cases. The above combined with a history of headache, pain in the chest or legs, sometimes abdominal pain and diarrhoea or vomiting, as features marking the onset, are almost pathognomonic. The headache, as once described, was a left-sided hemicrania, with pains shooting backwards to the occiput and forwards to the left eyeball.

To differentiate this from the acute form of the Uganda disease, one may say that there is nearly always a very definite and usually severe onset in our cases, which is far from insidious. The diagnostic value of the glands in the posterior cervical triangles is practically nil as regards palpation. A large per cent. of cases show interstitial keratitis, and further, in 27 cases examined (fresh coverslip preparations) the trypanosomes have always been found in the peripheral blood whenever sought for. They are invariably few in the early stages, one or two in the whole preparation; later they are numerous, several to a field. It has never once been necessary to examine a second fresh preparation of a known case in order to find the organisms. This cannot be said of the Uganda fever.

PROGNOSIS.

The disease is invariably fatal in a few months. The first well-defined diminution in the frequency of the pulse-rate indicates that the case is on its downward course, and that vital resistance has been overcome. The state of the pulse is the main feature in prognosis.

TREATMENT.

Few attempts have been made in this direction. Tartar emetic, 10 c.gm., given intravenously, did not entirely banish the trypanosomes from the peripheral circulation. Arsamin, grs. X, on the following day, however, did so, and with another 10 c.gm. tartar emetic, on the second day following, the trypanosomes did not reappear after their first disappearance, till the tenth day. A method of subcutaneous introduction of tartar emetic, in normal saline solution, mixed with egg albumen, has been tried without the production of pain, swelling or inflammation; some eucaine was added; but as the patient, who was in an advanced condition, died a few days later, one is unable to state whether there may not have been any after-effects.

PROPHYLAXIS.

The methods of investigation recently adopted have been as follows:—

1. The abolition of the pass-census system, mainly because (*a*) it is not possible to maintain for months such a rigid system among a peaceful population, (*b*) too many possibilities of error arise unless large numbers of police are relegated for this purpose and their duties stringently carried out; this is not found desirable.

2. The "Patrols" now act as "Itinerant Informers of Sick," of which there are five, the Medical Officer making it his duty to visit and examine each sick person as soon after being reported as possible.

3. Slides made by the "Informers" are chiefly confined to those who are seriously ill, in the event of the Medical Officer not being able to arrive before death takes place.

4. Importance has been attached entirely to the examination of fresh coverslip preparations.

5. A figure of eight circuit round the district has been made practically every month, in order that the "Informers," S.S. Police, Chiefs, Headmen and relatives of the sick may have frequent access to the Medical Officer. In this manner the sick over an area of ten to fifteen or more miles can be examined in a day with better results than by inspecting healthy people in two or three villages.

DIFFERENTIAL LEUCOCYTE COUNTS OF TWELVE CASES.

Chimpazi, of Chimubi, male.—Ill since February, 1912; slide made 16th May, 1912; died 24th May, 1912. Polymorphs, 63.05 per cent.; lymphocytes, 26.39 per cent.; hyaline cells, 10.55 per cent. (1,800 cells counted).

Mucapano, of Chiunda, female.—Ill since February, 1912; slide made 11th June, 1912; died 30th July, 1912. Polymorphs, 49.14 per cent.; lymphocytes, 44.56 per cent.; hyaline cells, 10.56 per cent.; mast cells, 1.14 per cent.

Delekana, of Mulungu, female.—Ill since April, 1912; slide made 15th June, 1912; died 17th June, 1912. Polymorphs, 76 per cent.; lymphocytes, 12.72 per cent.; hyaline cells, 11.26 per cent.

Chitukula, of Mkokwambo, male.—Ill since early May, 1912; slide made 20th July, 1912; died 13th August, 1912. Polymorphs, 50.59 per cent.; lymphocytes, 40.35 per cent.; hyaline cells, 9.05 per cent. (508 cells counted).

Ndachiona, of Mtonga, female.—Ill since May, 1912; slide made 28th June, 1912; died 4th August, 1912. Polymorphs, 37.80 per cent.; lymphocytes, 51 per cent.; hyaline cells, 8.60 per cent.; abnormal cells, 2.60 per cent. (500 cells counted).

Chemvuzia, of Mtonga, female.—Ill (?), 1912; slide made 20th June, 1912; died a few days after. Polymorphs, 48.40 per cent.; lymphocytes, 41.40 per cent.; mast cells, 0.20 per cent.; hyaline cells, 8.80 per cent.; abnormal cells, 1.20 per cent. Four normoblasts observed (500 cells counted).

Chinkankeni, of Chimonjo, male.—Ill since end of May, 1912; slide made 7th July, 1912; died 26th July, 1912. Polymorphs, 45.50 per cent.; lymphocytes, 39.25 per cent.; hyaline cells, 13.25 per cent.; abnormal cells, 1 per cent.; eosinophils, 1 per cent. (400 cells counted).

Chipochola, of Njati, male.—Ill since third week June, 1912; slide made 23rd July, 1912; died 22nd September, 1912. Polymorphs, 39.80 per cent.; lymphocytes, 45.20 per cent.; hyaline cells, 10.80 per cent.; eosinophils, 1.40 per cent.; mast cells, 0.80 per cent.; myelocyte, 0.20 per cent. (500 cells counted).

Inje, of Kawanga, male.—Ill since early May, 1912; slide made 1st August, 1912; died 3rd September, 1912. Polymorphs, 39.80 per cent.; lymphocytes, 47.80 per cent.; hyaline cells, 11.60 per cent.; eosinophils, 0.80 per cent. (500 cells counted).

Thumveke, of Mtonga, female.—Ill since second week February, 1912; slide made 31st July, 1912; died 17th August, 1912. Polymorphs, 61.40 per cent.; lymphocytes, 22.40 per cent.; hyaline cells, 6.00 per cent.; mast cells, 0.20 per cent. (500 cells counted).

Bendu, of Kamfumu, male.—Ill since middle June, 1912; slide made 3rd August, 1912; died 23rd September, 1912. Polymorphs, 46.75 per cent.; lymphocytes, 45.36 per cent.; hyaline cells, 7.04 per cent.; eosinophils, 0.56 per cent.; abnormal lymphocytes, 0.57 per cent.; mast cells, 0.20 per cent. (1,050 cells counted).

Disca, of Kambciri, male.—Ill since last week May, 1912; slide made 13th August, 1912; died 16th August, 1912. Polymorphs, 50.40 per cent.; lymphocytes, 42.80 per cent.; hyaline cells, 5.50 per cent.; abnormal cells, 0.90 per cent.; eosinophils, 0.40 per cent. Two normoblasts observed (1,000 cells counted).

Comparative table of enlargement of glands in the posterior cervical triangles, and epitrochlear glands, in 21 cases where both have been looked for:—

—	Shotty.	+ -	+	+P.
Posterior Triangles, 33.33 per cent.	9.52 per cent.	38.57 per cent.	4.71 per cent.	14.28 per cent.
Epitrochlear Glands, 4.71 per cent.	—	19.04 per cent.	47.61 per cent.	28.57 per cent.

Percentages of frequency of palpable glands in posterior cervical triangles and epitrochlear glands, in the neck:—

Posterior Triangles, 66.66 per cent.

Epitrochlear Glands, 95.23 per cent.

Percentages of 100 healthy people examined for enlargement of epitrochlear glands; sexes about equally divided:—

—	Shotty.	+ -	+	+P.
53 per cent.	14 per cent.	11 per cent.	13 per cent.	9 per cent.

Comparison between epitrochlear enlargement:—

In healthy, 47 per cent.

In trypanosomiasis, 95.23 per cent.

N.B.—+ - about $\frac{1}{4}$ inch diameter.

+ " $\frac{1}{2}$ " " "

+P more than this, and easily puncturable.

The 100 healthy people were composed of men and women in villages, and carriers and machilamen who are constantly travelling with me, in the "area."

PELLAGRA IN NYASALAND, BY HUGH S. STANNUS, M.D. (LOND.),
MEDICAL OFFICER, ZOMBA.

During the 15 months preceding my going on furlough in April, 1911, I had seen some 40 cases, all among inmates of the Central Prison, Zomba, none having then been seen among the general population, with one possible exception. I returned to Zomba in March, 1912. The records of these early cases and others which were noted during my absence were not very complete, but during the past twelve months, that is, till March 31st, 1913, I have had under careful observation the institution above mentioned, and have now to record a very large increase in the number of cases occurring therein, 131 in all.

The diagnosis of the disease in the earlier cases rested upon the typical rash, its evolution, site, symmetry, constitutional symptoms, character of the pain in back and limbs, parietic symptoms, the presence of a mononuclear leucocytosis, and the fact of the occurrence of relapse. Among other symptoms, I laid stress on a characteristic affection of the angles of the mouth, which I likened to the "rhagades" of syphilis.

My further observations among the inmates of the Central Prison have led me to believe that this affection of the lips is pathognomic of the disease, and in a number of cases the diagnosis rests upon this one sign. It will be dealt with at greater length later, especially when considering cases among others than inmates of the Central Prison, to which I shall have for the first time to refer.

Though there is evidence that Pellagra may be scattered widely over the Protectorate, its rate of spread in and around the Central Prison can only be characterised as an "epidemic," and such an event has been probably but rarely seen, and the observations made may be of value from an etiological point of view.

I may here refer briefly to the statistics for the Central Prison. On January 1st, 1910, there were 176 inmates. On March 1st, 1913, 230; there have been 297 admissions during this period, and an average of 80 to 90 released each year; these numbers include from 10 to 15 lunatics and 6 to 8 women, none of whom have been affected. The average number of prisoners in the Central Prison for the four years 1910-13 may be put down at 175, 200, 225 and 250 respectively.

The inmates are serving terms of imprisonment from six months to life. It is therefore impossible to give statistics of, say, percentage infected, &c., as many may leave just before symptoms manifest themselves, and so on.

Of the total 131 cases, 34 have already been released and 10 are dead.

During my previous residence in Zomba, as I have said above, I saw, with one possible exception, no case outside the prison, but since my return I have instituted investigations among other sections of the native population as far as limited time and opportunity have permitted, but the results will not be considered until I come to deal with the distribution and local epidemiology of the disease.

Symptoms, Rash.—I have been more and more impressed with the exact symmetry; the site of first appearance and extension to other surfaces are very constant, namely, antero-lateral surfaces of upper third of forearm, antecubital fossa and lower third of upper arm, followed by the back of the hand, the supraclavicular fossa, triangles of neck, "butterfly" area of face, forehead and upper surface of pinna; there may be rather characteristic semilunar patches under the eyes. There may be a prolongation down the back as far as the angle of the scapula, and in front a triangular area with the apex at the xyphisternum. In one case who sat with his back bared to the sun every day, as he thought it eased his pain, the whole back was affected.

On the lower extremities, the skin and dorsum of the foot are involved, together with an area corresponding roughly to the popliteal space. These are all positions which are included under "areas exposed to the sun."

Special Situations.—The scrotum may be involved, and on account of the special formation of the skin in this situation the rash has slightly different characters.

In two cases with affection of the scrotum I found a condition of the skin in the groin-folds resembling an intertrigo which I think was really pellagrous.

Lips, Prepuce, Tongue and Mouth.—The characteristic condition of the angles of the mouth has already been described as consisting of sodden and thickened epithelium with cracks which appear white on the black skin. It affects not only the skin but is prolonged across the muco-cutaneous junction a little way into the mouth. The affection of the free

margin of the prepuce is exactly similar. In some of the older and severer cases a similar change is seen at the external canthus of the palpebral fissure and also at the nostril.

The evolution of the affection of the tongue when typically seen is very characteristic. Very commonly associated with constitutional symptoms it is found covered with a creamy white thick fur. Exfoliation takes place and the superficial epithelium is thrown off, leaving a bright smooth shining surface devoid of visible papillæ. This commonly commences at the tip and sides, but progresses irregularly in many cases, so that irregular areas of denudation are produced, giving an appearance which I have called "geographical" tongue.

Ulceration is rarely seen, but cracking at the sides is not uncommon in these cases. A similar process may attack the whole mucous membrane of the mouth, a catarrhal stomatitis of considerable intensity, causing great suffering, and from the symptoms seen in some of these cases I think the process spreads to the fauces and pharynx.

Incidence and Distribution of Rash.—Observations on these cases have led me to the conclusion that the amount of the rash is not a definite indication of the severity of the infection. Many cases with the most marked subjective symptoms have a minimal amount of rash, and in some a diagnosis of Pellagra has been made in the entire absence of this feature during long periods of observation; in other words, I believe there are undoubted cases of Pellagra sine pellagra, or say they are better termed Pellagra sine exanthemata. In a large proportion of these cases, while the ordinary exanthem is absent the affection of the angles of the lips is commonly present.

Of 131 cases, 97 show rash; of these 62 have the lips affected, and of the 35 without lips affected 9 have the tongue affected.

Thirty-four cases have shown no rash, which includes 14 cases diagnosed on the lip affection only during the last four months, a season when rash is not commonly seen.

Of the 34 cases, 31 have the lips affected, of which 11 also have tongue affected, two have the tongue only affected and one case has none of these symptoms.

The rate of evolution of the rash is very variable; in some it is a matter only of days before many situations are involved; in others, weeks or months. It may be evanescent—have disappeared entirely in a week or persist for months, gradually fading and leaving for a much longer time a dark staining of the skin, best seen in the lighter skinned individuals. The same is true of the lips and tongue, either or both of which may precede for some time the rash and linger long after it has disappeared.

In other cases rash over a single area or the affection of the lips may "come and go" over a more or less long period of weeks.

In dealing with skin lesions I should again like to refer to a rash which I described as a folliculitis. This rash has been found in 19 of the 131 cases among the prisoners, of whom five showed no pellagrous rash, but only lip and often tongue affection; among the whole 14 with pellagrous rash the lips were affected in all cases and the tongue in all but three. No case was met with among non-pellagrins; the two such cases mentioned by me in 1910 later developed sore lips. A lunatic with lip affection also has this folliculitis rash.

Pain.—Pain in the dorsal region of the spine, though common, is not such a constant symptom among my cases as some writers would lead one to believe. In the lower limbs it is more commonly complained of and is referred to the ends of the long bones, but not to the joints, and is likened by sufferers to the pains felt in the limbs in malaria; the same may be true of the upper limbs.

Headache as such is seldom complained of. Burning pain in the areas of the rash is fairly constant and seems also to be felt in the soles of the foot. Pain comparable to "lightning" occurs as a symptom in the more severe cases with parietic symptoms.

Epigastric discomfort and pain are very frequent symptoms for which cases seek treatment, and appear to be of a definite character; thus pain in limbs was severe in 31 cases, in the abdomen in 13, in the back in 3. The anæmia, debility, loss of weight, slight irregular pyrexia, &c., I shall not mention further.

Several lunatics who were confined in the prison developed symptoms of Pellagra. One case became insane with symptoms of agitated melancholia. He refused food, smeared himself with feces, had hallucinations of cannibal spirits around him and delusions that there were flies in his stomach which were biting him, and tried to commit suicide by hanging. He was transferred to the asylum, where he died shortly afterwards of septicæmia following on head injuries received at the hands of an epileptic lunatic. A second case has been reported to me as becoming insane after his release from prison. Three or four cases have

shown slighter degrees of mental upset; one resembles very much an early stage in general paralysis. He has slurred speech, associated with weakness of lower face muscles and tongue, so that there is puffing out of cheeks and lips, and saliva drips from the mouth; the upper face shows over-action. He is also very emotional. A second case often throws off his cloth and exposes himself, a thing which no native would do in the ordinary way. A third, though bedridden for many months, entertains the idea of returning to work. Mental depression is, however, the rule often associated with a marked degree of listlessness. A number of cases with motor and sensory symptoms have now been observed. Some degree of muscular weakness in the lower extremities is commonly seen associated with pain already referred to, while in some ten cases there has been paralysis rendering walking impossible. The paralysis may have the character of a flaccid paraplegia, with absent knee-jerk and foot-drop, or of a spastic paraplegia, with increased knee-jerk and ankle-clonus. Rhombergism, in some cases, is very marked.

With paraplegia there may be associated increased epigastric reflex and muscle and tendon-jerks in the arms, or there may be a flaccid paralysis of the upper extremities, with wrist-drop. In three cases there was marked incoordination in the arms and intention tremor (finger to nose test), with inability to pick up a pencil from a table or to handle food.

In two cases with marked weakness of the upper extremities there was ulnar-deflexion of the hands and tetanoid-like movements of the fingers; one of these cases is dead, but the other has recovered somewhat, and the movements of the hands and fingers, when told to grasp a small object, are peculiar. The attempt is made with the first finger and thumb, each fully extended but flexed markedly on the metacarpus, so that they become crossed, at the same time the other fingers are almost hyper-extended, though the little finger may be flexed on the metacarpus.

The knee-jerk is difficult to obtain in all natives, and where easily obtained is, I think, an intimation of increase in the reflex; in these cases where it was not obtained the negative sign is not of great value. Fine tremor of tongue and hands has been noted in a few cases. Objective sensory changes are very difficult to make out in any native patients, and the difficulty is increased when the patient is ill and depressed. In one case there appeared to be definite hyperæsthesia to pin-prick of the skin of the feet, with anaesthesia of the legs and diminished sensibility of the thighs and lower part of body to level of umbilicus. In other cases there appeared to be either diminution or hypersensitiveness to pin-prick, but the observations are of no exact value.

The association of the Pellagra rash in the paralysis cases is very variable. Three cases had suffered from marked paralysis for one to two years before anything appeared, and then in one case the tongue and lips were affected with only one patch of rash on the face. Two of these cases had been diagnosed as beri-beri. In others, up to a year had passed with the disease before the paralysis was noted. Two cases in late stages have had incontinence of urine and faeces. Bed sores have never been seen in these cases. In exactly half of these ten paralytic cases the follicular rash referred to above was present.

Relapse and Prognosis.—As the disease in this country has only been under careful observation by myself for two out of the three years since it was first noticed, and a large number of the cases have been released from prison and passed out of observation, it is not possible to give any definite figures as to relapse; a sufficient number, however, have occurred to establish the fact. The relapse has been accompanied by severer symptoms, as a rule, than in the first attack, but this has not been universal. For the same reasons no definite prognosis can be given.

Complications.—Whether certain affections now to be dealt with should be considered as symptoms of the disease or as complications is a moot point. Diarrhoea of a rather intractable character or actual dysenteric symptoms are not uncommon; in some cases this is undoubtedly due to bilharziasis of the large bowel, in others it is a true dysentery, due to dysenteric organisms, but in a third class the symptoms are undoubtedly part of the disease. The gastro-intestinal symptoms are due probably to pathological changes comparable to the exanthem and stomatitis.

Bilharzial infection of the gut was found in 5 per cent. of all prisoners by microscopical examination of faeces. Ankylostomiasis is also common among them; I found ova in the stools of 40 per cent. of prisoners. They were all subsequently treated, to put them on as good a footing as possible.

Pneumonia and pleurisy have been met with in a small proportion of cases, three of each disease among the 131 cases. A few have had ulcerative keratitis. One case died of acute hæmorrhage into the adrenal bodies. An outbreak of varicella in the prison affected many of them very severely indeed.

Duration of the Disease.—Of the 131 cases Nos. 6, 15, 18, 24, 25, 26, 29, 31, 40 and 112 are dead; the duration of the disease from the first symptoms was respectively 25 (circ. 20), (killed), 12, 5, 25, 20, 9 and 8 months; case No. 11 still under observation, first showed symptoms of Pellagra 28 months ago.

Morbid Appearances and Pathology.—Nos. 24, 25, 31 and 40 died while I was in England and no necropsies were made, but the immediate cause of death in these was noted as:—(24) diarrhoea exhaustion; (25) sloughing stomatitis; (31) diarrhoea, exhaustion; (40) heart failure, debility, senility. Cases 6, 15, 18, 26, 29 and 112 were submitted to post-mortem examination. The cause of death in these cases was in (6) heart failure; (15) heart failure and purulent pleurisy; (18) trauma, septicæmia; (29) hæmorrhagic adrenalitis; (112) necrosis of jaw, gangrene, septic pneumonia.

Treatment so far has been symptomatic, and no systematic use of the arsenic compounds has yet been tried.

THE DISEASE AS MET WITH IN NYASALAND OUTSIDE THE CENTRAL PRISON.

So far I have only had the opportunity of pursuing my investigations in a limited area of Zomba district, and nearly all these at a time of year when the rash is very seldom seen.

In the earlier part of this paper I may have appeared to labour to show the importance I placed upon the condition of the angles of the mouth found in the prison cases. My chief reason was to endeavour to show that this symptom might be used as a means of diagnosis of the disease. In the majority of the cases now to be considered that has been the only sign, but I believe reliance can be placed upon it for the reasons I have given, and I think that further observations in the right season of the year, when the rash may be expected to be found, will confirm this.

Sikhs.—An Indian contingent has been stationed in Zomba from 12th March, 1910, to 19th November, 1912, since when there have been no Indian troops in Zomba. No case of Pellagra occurred among these 70 men.

Warders.—There are 27 warders constantly employed supervising the various gangs of prisoners; 5 of these were affected.

Native Troops.—These number about 150, and 16 were affected.

In both sets of men even these symptoms were largely absent in the month of March, 1913. All these men, I may say, are examined at least once every week, and during my previous term in Zomba were similarly seen, but no cases were then found.

Lunatic Asylum.—Three cases occurred among inmates of the asylum.

Nine machine-gun porters, 20 machila men and 25 followers who live to the S.E. of the prison were also examined, but found to be free of any symptom.

The following cases are noticed together as they are womenfolk belonging to the warders or troops. In August, 1912, the wives and children of prisoners who came to visit at the prison on Sundays were examined to the number of 110 without finding any case. In March, 1913, the same was done, and among 79 women and 41 children two women were seen with sore angles of the mouth; one lived in the vicinity of the prison, the other at a village 16 miles away on the Namadzi stream; in neither case was the prisoner affected.

The next group of cases numbering six, are some met with casually in Zomba. During the past year I have made it a habit to observe all natives passing me in the roadway, &c., with only these results.

In January, 1913, I examined sample populations from the villages along the foot-hills of Zomba mountain to the north-east, finding seven cases; and the school children at Domasi Mission, five cases.

In February the same was done with villages among the hills to the south of Zomba in the Ulumba district and nine cases were found.

In January I travelled by Chikala mountain and through the Chikala district and saw some dozen persons, mostly children, with the typical condition of the angles of the lips, but no case exhibiting rash.

In 1910 I examined 36,000 natives of West Nyasa and Momberas districts, in the north of the Protectorate, on Sleeping Sickness investigation, especially looking out for skin rashes, but saw no case of Pellagra.

Dr. Drummond while employed in searching for cases of human Trypanosomiasis, reported a single case from a village near the south-west arm of Lake Nyasa, a woman

aged 25, with typical pellagrous rash. Dr. Eldred notified a single case in the Blantyre district prison. In reply to a circular letter sent to all Medical Officers, only one case was reported, Mwasambo a man of Mambo village near Ngani, seen by Dr. Conran. He presented a symmetrical rash of an exfoliating character distributed over the back and extensor aspects of the limbs. The angles of the mouth are affected. For the past five years he has suffered from dementia of a melancholic type with occasional maniacal outbursts, the latter only during the rainy season.

Some natives stated that they had seen the disease in Chinde, the port at the mouth of the Zambesi, and Dr. Davey on his way on leave saw cases among the Consulate Guards there and very kindly sent me notes on them. I subsequently wrote to the Acting Consul for further information and also had the opportunity of seeing one of the Consulate Guards invalided back to Nyasaland. From the various observations, I am able to state that a large proportion of the British Consulate Guards at Chinde have had from time to time symptoms of Pellagra. Dr. Davey states that all had the affection of the lips, one a typical tongue and several had typical rash at the time they were seen by him (October, 1912). The man seen by me (Kamchocho by name) on his return to this country presented a typical picture of the semi-paralysed Pellagrin without "pellagra." These guards are all Nyasaland natives, often old soldiers, and their diet is mainly rice, practically they never eat maize. Local Chinde natives are said not to be affected.

Sex.—Both sexes are liable, but, owing to some special factor, males are more commonly attacked than females; in my series of cases none of the six to ten women prisoners were affected.

Age.—Again most of my cases are under special conditions. Among prisoners all ages from 20 to 60 were affected. Among the general population examined, children between six and twelve were met with.

Occupation.—Dealing with the Central Prison first. Prisoners are employed in gangs, road-making, clearing bush, and clearing the many streams in Zomba, others in tile-making, others in and about the prison as scavengers, water-carriers, &c., a number in brick-making and building new barrack lines, and a few in the workshops within the prison precincts.

I attempted to find out the different work and the period spent at each which every prisoner had engaged in for three years past, but I could not get very exact information. It seemed clear, however, that all had their turn at the different varieties of work. This was, I think, certainly true of the Pellagrins—all had done township work, all had done labour in connection with building, either in the township or camp.

The women (all non-pellagrous), on the other hand, were employed cutting the short grass immediately around the prison, or in mat-making or cooking within the prison.

The warders, of course, accompanied their gangs of prisoners, and were under the same conditions as these during the day time.

The Sikhs, native troops and their women and warders' women, live more or less under the same conditions in the camp, and their occupations present nothing intrinsically different from one another, except that the women are the water-carriers and from time to time return to live in their villages for varying periods.

Lunatics and Lunatic Warders.—The native asylum provides for the accommodation of 14 lunatics, the six warders living with their families in huts some 20 yards away. Thirteen lunatics had been immured in the asylum for three or four or more years. The fourteenth was confined in the Central Prison till March, 1912. In the prison he had marked folliculitis rash, but developed a typical pellagrous tongue (14.1.12) and lips (1.2.13) after going to the lunatic asylum. One of the long time lunatics (No. 109) was removed from the asylum to the prison (25.3.12), as he was quiet, to allow another lunatic to be put in the asylum; this man developed Pellagra in the prison. A number of other lunatics beyond this number have had to be accommodated in the prison hospital. Two of these appear in the prison list of Pellagrins, Nos. 82 and 128. They have been constantly in the prison since their sentence. These four cases of lunatics, therefore, are included among the prison cases. Pellagrous prisoner Robert (No. 18), who became insane, was removed to the asylum on 18.11.12 and died 21.12.12. The lunatic Nkumbi (No. 129), admitted to the prison on 6.6.12, and who developed Pellagra on 8.11.12, was transferred to the asylum in November, 1912. These also appear among the prison cases. No case, therefore, appeared spontaneously in the lunatic asylum until over two years after the first case in the prison.

Among the lunatics who had never been in the prison, but who had lived in the asylum for several years, the first case was Lemu, who developed sore lips, ulcers on tongue and follicular rash in the middle of November, 1912, then Matawanya, 28.12.12, and Gladstone on the same date.

The lunatics never move from the asylum and a patch of ground, an acre or so in extent, which they plant with maize and potatoes.

Of the cases among villagers there is little to be said, the children play about the villages, in the gardens, and on the streams.

Season.—So far observations have not been carried over a sufficient number of years to bring out any true seasonal variation in the occurrence of cases, but some facts may here be mentioned. During February and March, 1913, there was not a single case among the prisoners showing a typical rash, though many showed the affection of the angles of the mouth. As I pointed out when speaking of the village populations examined, the examinations were made in January and February, and only lip affections were seen or were expected to be found. The months August and September correspond to the end of the dry season, when it is beginning to get hot and the sun is powerful.

Food.—The ration issued to prisoners consists of $1\frac{1}{2}$ lbs. of rice per diem, plus salt. They are able in a very small way to supplement this diet by buying green foods with the salt. In normal seasons fish or meat is supplied once a fortnight. From November, 1912, to March, 1913, however, practically nothing but the plain ration has been given.

A number of prisoners have their wives living in the vicinity of the prison, and the practice of allowing the wives to prepare the prisoner husband's food has been allowed, in some cases supplemented with other food. In a few cases I have found that the rice and salt ration have been sold by the wives and other food purchased and supplied to the prisoner.

Interrogation among the prisoners with Pellagra and others has elicited the fact that but few have had anything but rice, and one can certainly say that in a large number, maize has not entered into their diet at all for years. Among 131 pellagrous prisoners 28 had their wives in attendance for some time, but only four ate maize.

Among non-pellagrous prisoners a rather larger proportion had the opportunity of getting maize; of 118, 67 had wives in attendance, and the majority said maize was brought them to eat. The women prisoners have the same ration issued to them, but they always supplement this with green foods, which they find growing among the grass near the prison.

The Sikhs had the normal diet of their country, including 35 lbs. atta (wheat flour), 7 lbs. rice, and 7 lbs. dhal (beans) per month and ghee.

To troops and warders are issued a rice ration as to the prisoners.

The rice to prisoners, Sikhs, troops and warders is drawn from the same supply of rice.

The women folk belonging to troops and warders may partake of their husbands' rice rations, but both men and women have practically a mixed diet of rice, maize, meat, fish, beans, green stuffs, etc.

Lunatics in Asylum.—Up till about the autumn of 1912 these men had a diet of half and half rice and maize; part of the maize was that supplied to them from the prison store, grown by a European planter 10 miles distant from Zomba, from seed-maize originally imported from South Africa some years ago; the same maize has been supplied for years. This was supplemented by maize and sweet potatoes, grown by themselves round the asylum, and a fish and beans ration once a week. During the three months to the end of March, 1913, little or no maize has been eaten in the asylum, the inmates having been practically on the prison rice ration.

Among the village population in this district maize flour is the staple diet; small amounts of other cereals are eaten, including some millets; fish, beans, greenstuffs, ground nuts, pumpkins, and sweet potato make up the diet.

During the rainy season, October, 1912, to March, 1913, food has been short, amounting to a famine in other districts. In Zomba district there has been a considerable amount of "hunger," and the natives have been on short commons, but their state has not necessitated relief measures.

Simuliidae.—In my first paper I was only able to state that simuliidæ were present in Zomba. Since then I have made what observations time and opportunity have allowed. In January, 1913, I invoked the aid of Mr. Edward Ballard, Entomologist to the Agricultural Department, and together we investigated all the streams in Zomba Township. We hope to deal fully with this subject at a later date, but I may here say that every stream was found to harbour simulium larvæ and pupæ. Their numbers were roughly proportional to the swiftness of the stream, and in many of these, which might be described as rushing cascades, the submerged grass was literally "black with them"; none were found attached to rocks.

Here I may also remark that the month of January is that during which there is a maximum amount of water passing uninterruptedly down these water-courses; later in the year a very large number become mere trickles of water or are completely dry. Already in March, 1913, many are greatly reduced in volume, except during the heavy intermittent showers, and in these larvæ are no longer to be found or only in very small numbers, although in some of those in which the flow is in no way diminished, their number is still very large.

One may say, therefore, of Zomba that the maximum number of simuliidæ is to be found during the months of January and February, though this may vary from year to year according to the "Rains." I next investigated all the streams running from Zomba mountain to the N.E. and found larvæ in practically every stream. Observations were likewise made into the conditions of the streams between Zomba and Chikala and in nearly every stream they were found. The two streams rising on Chikala mountain both also contained numerous larvæ. The streams among the hills to the S.W. of Zomba, examined in February during a fine spell of weather, contained but little water and no larvæ were found.

Dr. Eldred, in answer to my request, very kindly examined streams in the neighbourhood of the Government station on the foot-hills of Mlanje mountain and had no difficulty in finding larvæ. Dr. J. E. S. Old informs me that he has found simulium in the Livunzu stream near Cholo, and that they are met with in large numbers in the N. Nyasa district. I have encountered them in Blantyre township and in the W. Nyasa district. Dr. Conran reports finding larvæ in the streams which run down Ngani hill in the rainy season.

I believe that larvæ would be found in all streams in Nyasaland which, for a sufficiently long period in the year, carried enough water and fulfilled the other well-known conditions necessary for breeding simulium.

One might expect to find them breeding during certain months of the year in all streams at the foot-hills of mountains and on all mountain ranges and plateaux which form such characteristic features in the Protectorate; I therefore think they will be found to be very widespread in their distribution, though their seasonal variation will be marked.

Historical.—Since the first cases were seen in the Zomba Gaol I have tried to tap all sources of information on the subject of Pellagra, but so far have only obtained such from natives. No medical practitioners in the country are familiar with Pellagra or had, to their knowledge, seen cases till I showed them prisoners suffering from the disease.

The prisoners themselves all deny knowledge of it, of ever having had symptoms themselves before or seen signs of it in others. Some of the more educated natives state that it was unknown till five years ago (1909), and these and some of the native troops state that they and others suffered from the disease when stationed in Zanzibar; while recognising that they had paresis and pain in the legs, they seem doubtful about the exanthem, though they say they had sore lips. Beri-beri is said to have been rife in Zanzibar among the rice-fed Nyasaland troops, and it seems to be to this they may really refer. My informants go on to say that it reached Chinde from Zanzibar and there attacked the British Consulate Guards, many of whom are old soldiers from the King's African Rifles. At Chinde, I believe, originated the word "Nchocho," now used in the prison for Pellagra. Originally, I believe, it meant any irritating eruption; be that as it may, very little reliance can be placed on a symptom name in tracing the disease.

The Virus.—At the present time writers on the subject of Pellagra may be divided into the anti-zeists and pro-zeists, the former group being headed by Sambon in Europe, who would narrow the problem down to a protozoal infection carried by simulium, and the latter group centering their theories about maize only. With regard to maize every conceivable theory has at some time been advanced in support of this foodstuff playing a part in the production of Pellagra. The facts which I have adduced, to my own mind, absolutely put all maize theories, as such, out of the question. Men in the Central Prison, Zomba, developed Pellagra who had been under observation in the prison for years, and who had had no maize for years or, in other cases, only in very small amount.

A much wider view of the question may be, however, taken, and the set of possibilities have to be considered which occur if for the word maize "grain" be substituted in the various theories which have been put forward. One then might postulate as possible causes of Pellagra:—

1. Normal grain.
2. Damaged grain.
 - (a) Fungi.
 - (b) Bacteria.
 - (c) Chemical substances.

1. There are many reasons for supporting the possibility that Pellagra is a deficiency disease and that a diet consisting of some one or other grain to the exclusion of other food substances may produce the disease, as in the case of beri-beri.

2. Damaged grain. It is possible that Pellagra may be due to the ingestion of the products of chemical changes taking place in grain, maize or otherwise, in consequence of mode of preparation, &c., or that it may be due to infection with organisms contaminating grain, whether fungoid or bacterial or with their toxins.

As I have stated above, the prison ration consists of rice and salt, and in the majority of cases nothing or little else. The rice supplied is grown in swampy areas bordering Lake Nyasa near Chinteché, Kota-Kota, and Fort Maguire, by natives from whom it is accepted in lieu of a money tax, and used for feeding, besides prisoners and troops, other labourers employed by the Government. The surplus grown is purchased by traders for feeding labour and for sale. Rice is not eaten by any tribe in Nyasaland, and was not grown until the industry was fostered by the Government; maize flour, millet and cassava being the staple diets.

Among a certain section of more educated natives it has become the "fashion" to eat rice (with other food-stuffs), copying the Swahili and Indian habit, and some is eaten in Kota-Kota. Many natives object strongly to being fed on rice, saying they cannot digest it, this in part being true and due to want of proper preparation. The rice as it is received and distributed preserves part of the pericarp on the grain. Rice is harvested in May to June, and shipped in plaited grass bags to the southern end of the Lake to be transported by river barge and native porters to Zomba. A certain proportion may and certainly does get damaged. In Zomba the rice is stored in galvanised iron bins, into these the bags are emptied, any damaged rice at this time being separated, that is to say, conglomerate masses of mouldy rice, which are always found in any consignment, are picked out. The proportion of damaged rice is of course small, considering some 11 tons per month are used in the camp and prison.

The supply of rice usually arrives in Zomba between August and September. In 1911, owing to difficulties in transport, it did not arrive till between December, 1911, and March, 1912. In 1912 the supply began in August and September, but again owing to difficulties further transport was delayed till March, and will not be completed till next month (April, 1913).

Rice to be served out is withdrawn from near the bottom of the tank, so that it happens that in the months of September and August the finishings of the rice are being used; this would be the longest stored rice and might be expected to contain most of the dust and any fragments and spores of moulds, &c. In 1911-12 and 1912-13 transport took place during the rainy season and greater damage might have been expected to the rice in these years. Samples of rice served out appeared, however, sound to the unaided eye.

In the prison, rice is usually prepared by the prisoners themselves by simply boiling; the few have it ground into flour to make a kind of porridge.

The rice supplied to the Consulate Guards at Chinde is grown in the same areas, but has to be transported a further three or four hundred miles by open motor-lorry, train and river barge, and therefore undergoes the extra risk of damage.

I have dealt with the subject of rice at some length as there are some significant facts in this connection. It would appear quite possible that the unsupplemented rice diet may be so low in some particular food value as to be the cause of Pellagra—as is the polished rice of beri-beri. Or again, the damaged "grain" theory seems to receive possibly some support. Cases of Pellagra seen among the general population might be due to want of food of proper nutritional value owing to the famine, or to the eating of damaged foodstuffs in the recent times of want.

Turning now to the theory of protozoal infection with transmission by some arthropod; the data in this country go a good way to support Sambon's contention that simulium is the porter. I have shown that simuliidæ breed in very large numbers in Zomba; that the prisoners are particularly liable to be bitten by these insects owing to their work—clearing streams of grass, during the season when simulium is breeding in greatest numbers—also the position of the prison cells is such that the prevailing winds blow from the simulium-laden streams straight into the barred ventilation openings in the cells; that, as far as my investigations go, the incidence of Pellagra among other groups of natives is roughly proportional to the liability to attack by simulium; that there is reason to believe that no cases are seen where simulium is not found, though of course cases are not found wherever simulium is present.

Other possible carriers include mosquitoes, which are ubiquitous, bugs (*cimex rotundatus*), which are constantly found in the prison and most native dwellings, lice (*pediculus capitis* and *vestimentorum*), which are introduced from time to time, and some biting flies such as stomoxys and (less common) a tabanid. So far I have no observations to offer directly bearing on the nature of the virus. There is one point in the disease which is worthy of consideration and that is the cessation of symptoms and the so-called relapse in the following year. These features of the disease are remarked by all writers on the subject.

Among my prison cases I have noted the same course in many, though in some, especially those ending fatally, the disease has been progressive from start to finish. Now in no disease caused by a living virus is a regular complete cessation of symptoms seen with relapse at a definite season many months later, as in Pellagra.

In syphilis the disease is progressive or irregular in its evolution. In Trypanosomiasis and Kala-azar some symptoms may be intermittent, but the intermissions are of short duration and other symptoms may be progressive. This leads me to believe that possibly there is a seasonal "reinfection" or "intoxication" and not a "relapse."

Conclusions:—

1. Pellagra is endemic in Nyasaland.
2. The outbreak in the Central Prison has assumed the proportions of an institutional epidemic.
3. All maize theories of causation, as such, are disproved.
4. There is some evidence in favour of the disease being caused by an intoxication due to the ingestion of damaged grain, whether it be rice, maize or other.
5. The theory of an infection carried by simulium (Sambon) receives very considerable support, and so far in this country there are no facts militating against that theory.

It is to be carefully noted, however, that the data brought forward equally support the theory which lays the cause of the disease at the door of malnutrition, that is, nutrition wanting in some necessary principle.
