

Annual medical report / East Africa Protectorate.

Contributors

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EAST AFRICA PROTECTORATE.

ANNUAL MEDICAL REPORT

FOR THE

YEAR ENDING 31ST DECEMBER, 1913.



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MEDICAL DEPARTMENT,
HEADQUARTER OFFICES,
BRITISH EAST AFRICA.

NAIROBI,

1st September, 1914.

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 East Africa Protectorate for the year 1913, together with the Returns, &c., appended thereto.

I have the honour to be,

SIR,

Your obedient servant,

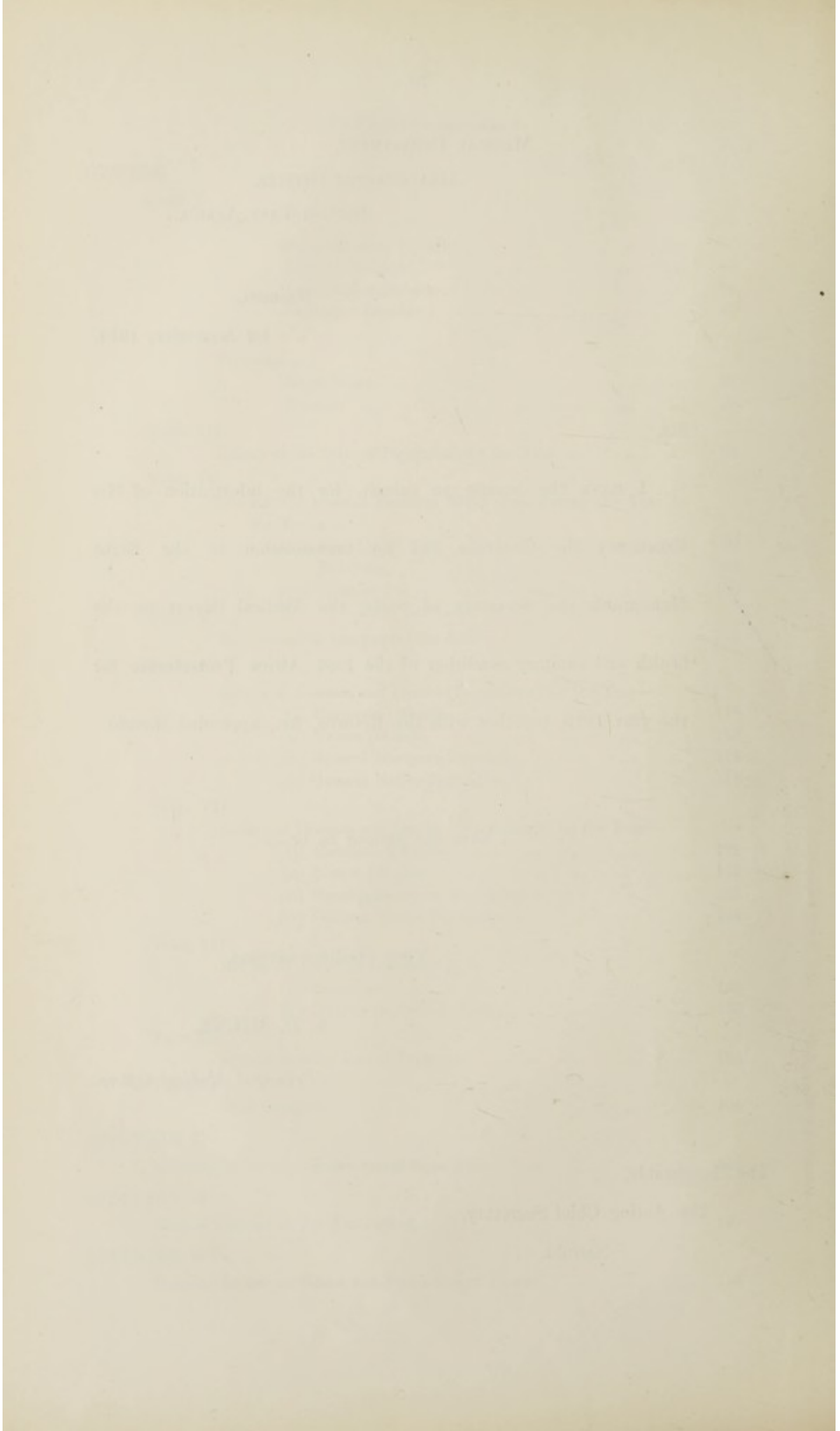
A. D. MILNE,

Principal Medical Officer.

The Honourable,

The Acting Chief Secretary,

Nairobi.



EAST AFRICA PROTECTORATE.

ANNUAL MEDICAL REPORT

FOR THE

YEAR ENDING 31ST DECEMBER, 1913.

PREFACE.

The arrangement of the report is the same as that presented last year, the division of the country into four areas the conditions in which are more or less identical. This is done for convenience and compression in framing the necessary statistics.

The total square mileage of the Protectorate is, approximately, 245,060 square miles—rather more than twice the size of the United Kingdom. This is divided up for administrative purpose into eight provinces. These eight provinces have, for the purposes of this report, been considered in groups of two, making the above mentioned four areas.

The officers of the Survey Department have very kindly prepared a coloured map showing the position and extent of these areas ; it does not pretend to any accuracy with regard to the provincial boundaries, being more of a diagram of the conditions which the report endeavours to contrast. Thus :—

No. 1.—The Coast Area, coloured blue on the map, comprises the provinces of Seyidie and Tanaland, representing an approximate extent of 41,490 square miles.

No. 2.—The Mountainous Area, coloured pink on map, contains :—

The provinces of Ukamba and Naivasha, the latter including the Uasin Gishu Plateau, and the newly thrown open Trans-Nzoia settlement. It represents fairly accurately that portion of the country most in favour with the

white settlers, and contains some 85,960 square miles, 12,250 of which represent the close settlement area of the white population.

No. 3.—*The Desert Area*, coloured yellow on the map, is made up chiefly of the province of Jubaland and the Northern Frontier District, and contains approximately 90,420 square miles.

No. 4.—The two great labour provinces of Nyanza and the greater part of Kenia, coloured green on the map, the square mileage of which amounts to 27,190 miles.

It must not be imagined that the outstanding physical and climatic features of the one area cannot be pointed to in the other three, *e.g.*, there are white colonies in all of them, while the uninhabited expanses of the Coast Area closely correspond to the deserts dominated by the river Juba.

I.—ADMINISTRATION.

SECTION I.—DEPARTMENTAL.

1.—ESTABLISHMENT.

The Medical Staff of the Protectorate as sanctioned for the year 1913-14 was as follows :—

ADMINISTRATIVE DIVISION.

Principal Medical Officer	1
Deputy Principal Medical Officer	1

MEDICAL DIVISION.

Senior Medical Officers	2
Medical Officers, permanent staff	8
Medical Officers, probationary staff	9

SANITATION DIVISION.

Chief Sanitation Officer	1
Medical Officers of Health	3

LABORATORY DIVISION.

Bacteriologist	1
Analyst	1

27

EUROPEAN NURSING ESTABLISHMENT.

Matron	1
Nursing Sisters	8
Nursing Sister, Sanitation Division	1

10

JUNIOR EUROPEAN ESTABLISHMENT.

Chief Clerk, P.M.O.'s Office	1
Assistant Clerk, do.	1
Medical Storekeeper	1
Superintendent, Lunatic Asylum	1
Matron, do.	1
Dispensers	3
Sanitary Inspectors	4

12

SUBORDINATE ESTABLISHMENT.

Medical :—

Assistant Surgeons	5
Sub-Assistant Surgeons	36
Hospital Compounders	15
Laboratory Assistants	2

Sanitation :—

Assistant Surgeons	1
Sub-Assistant Surgeons	3
Hospital Compounders	—

Clerical :—

3rd Grade Clerks	5
4th do. do.	3

70

NATIVE ESTABLISHMENT.

Asiatics and Africans—Medical	...	...	...	124
Sanitation	...	...	...	101
Laboratory	...	...	...	11
Lunatic Asylum	...	...	...	16
Headquarters Office	...	...	...	7
Total	...	...	...	<u>259</u>

In addition to the foregoing, to cope with the plague and the insanitary conditions of the town of Mombasa, the following extraordinary increase of staff was sanctioned in August under special warrant:—

SANITATION DIVISION.

Medical Officers	...	...	...	...	6
Junior European Staff	...	...	...	...	2
Clerical	...	...	...	...	3
Asiatics and Africans	...	...	...	...	82
Total	...	...	...	...	<u>93</u>

Eight officers were engaged in all, two of them locally pending the arrival of the complement from home, but there was no overlapping in point of time.

The total number of the staff employed in the Medical Department was, therefore, 471 as against 280 last year. The increase has been principally due to the inception of sanitation work, and special precautionary measures against plague.

2.—APPOINTMENTS.

The most marked feature of the year—as will be noticed in comparing the above list with that submitted last year—has been the internal reorganization of the Department consequent on the reinstitution of the office of Deputy Principal Medical Officer (abolished in 1908), and the creation of a Sanitation Division. This has permitted of a systematization and distribution of work which has greatly extended the scope of the Department. For the first time it has been possible to allot executive functions to the Senior Medical Officers, relieving the Head Office of a good deal of unnecessary detail.

The following appointments were made during the year :—

PROBATIONARY MEDICAL OFFICERS.

Dr. T. H. Massey.
Dr. G. Dunderdale.
Dr. P. J. Nunan.
Dr. J. H. Thomson.
Dr. J. H. Pirie.

NURSING SISTERS.

Miss M. A. Thomlinson.
" R. Paul.
" L. Merryweather.
" I. L. Majendie.

JUNIOR EUROPEAN STAFF.

Mr. H. Ogden, Dispenser.
Mr. H. Lyon, Sanitary Inspector.
Mr. W. H. Wood, Sanitary Inspector.
Mr. A. F. Dennett, Sanitary Inspector.
Mr. B. E. Wetkin, Sanitary Inspector.

SUBORDINATE ESTABLISHMENT.

Assistant Surgeon	...	H. Holmes.
	...	A. N. Nyss.
Sub-"Assistant" Surgeon	...	Diwan Chand.
"	"	P. J. Andrews.
"	"	Sardara Singh.
"	"	Wilayat Shah.
"	"	Sukhram Das.
"	"	Chuhar Khan.
"	"	Kesar Chand.
"	"	K. R. Diwan.
"	"	Milkhi Ram.
"	"	K. H. Bhatt.
"	"	D. P. Chablani.
"	"	Dula Ram.
"	"	Zorawar Singh.
"	"	Waryam Singh.
"	"	Jaswant Singh.
"	"	Abdul Karim.
"	"	Hassan Khan.

CLERICAL ESTABLISHMENT.

Mr. F. X. De Gama Rose	...	3rd Grade Clerk.
Mr. P. J. R. Mirandi...	...	" " "
Mr. A. J. Pereira	...	" " "
Mr. Mohammad Hussain	...	4th Grade Clerk.
Mr. A. G. D. Carasco	...	" " "

SPECIAL PLAGUE STAFF.

MEDICAL OFFICERS.

Capt. D. S. Skelton, R.A.M.C.,	on 7th August, 1913.
Dr. W. Morrison,	on 27th July, 1913.
" A. M. Freitas,	on 21st August, 1913.
" W. Tudhope,	on 1st October, 1913.
" H. H. V. Welch,	on 27th October, 1913.
" F. Collar,	on 27th October, 1913.
" E. N. Russell,	on 27th October, 1913.
" R. W. Spence,	on 25th December, 1913.
" J. Mackinnon,	on 26th December, 1913.

OTHER STAFF.

Mr. H. Vickerstaff,	European Clerk.
" J. Egerton,	Conservancy.
" C. F. de Souza,	Clerical.
" Hassan Obaid,	"
Miss Chaves,	"

3.—REDUCTIONS IN STAFF.

INVALIDING.

- Dr. H. A. Bodeker permanently, on 4th November, 1913, after 13½ years' service.
- Dr. P. H. Ross, Bacteriologist, sick leave to Europe, on 31st October, 1913.
- Dr. J. O. Shircore, Medical Officer, sick leave to Europe, on 16th September, 1913.
- Sub-Assistant Surgeon Sukhram Das, permanently, to India, on 17th February.

RESIGNATIONS.

Nursing Sister D. Turner.

TRANSFERS.

Dr. N. M. Leys to Nyassaland.

SURPLUS TO SANCTIONED ESTABLISHMENT.

Compounder Abdul Rahim Khan.

" A.M.S. Mudeliar.

" Mehr Din.

RECALLED TO INDIAN ARMY.

Sub-Assistant Surgeon Kesar Singh.

DISMISSALS.

Compounder E. P. Theophil.

4.—PROMOTIONS.

Dr. J. A. Haran, C.M.G., was promoted to fill the post of Deputy Principal Medical Officer, and acted as Principal Medical Officer from 18th March to 14th June during the absence on leave of Dr. A. D. Milne.

Dr. W. J. Radford was selected for the new post of Chief Sanitation Officer. The vacancy in the ranks of the Senior Medical Officers, occasioned by promotion of the last named, was filled by Dr. W. Owen Prichard.

5.—CHANGES.

Dr. R. Small was confirmed in his appointment as Medical Officer of Health, Mombasa, from 1st April.

Dr. J. H. H. Pirie succeeded Dr. P. H. Ross as Acting Bacteriologist from 1st November.

Dr. A. Mouat and Dr. B. W. Cherrett were transferred from the Medical Division to the Sanitation side from 1st April.

6.—LEAVE OF ABSENCE.

Name.	Appointment.	Period granted	
		From	To
A. D. Milne ...	Principal Medical Officer	18th March, 1913 ...	14th June, 1913.
J. A. Haran, C.M.G.	Deputy Principal Medical Officer	18th June, 1913 ...	25th December, 1913.
P. H. Ross ...	Bacteriologist ...	31st October, 1913	25th August, 1914.
F. L. Henderson	Medical Officer ...	21st April, 1913 ...	27th October, 1913.
J. O. Shirecore	" ...	16th September, 1913	16th June, 1914.
A. Robertson	" ...	28th February, 1913	1st October, 1913.
G. R. H. Chell	" ...	29th December, 1913	16th July, 1914.
T. F. Lumb	" ...	1st December, 1913	12th May, 1914.
C. J. Wilson	" ...	30th December, 1913	30th June, 1914.
R. Hamilton	" ...	3rd December, 1913	3rd June, 1914.
G. Gillespie	Dispenser ...	5th August, 1913 ...	21st January, 1914.
F. Knott	" ...	3rd December, 1913	3rd June, 1914.
T. Preston	Assistant Clerk to P.M.O.	24th March, 1913	1st October, 1913.

7.—RESUMPTION OF DUTY.

Name.	Appointment.	Date.
A. D. Milne...	Principal Medical Officer ...	14th June, 1913.
J. A. Haran, C.M.G.	Deputy Principal Medical Officer ...	25th December, 1913.
W. J. Radford ...	Senior Medical Officer ...	23rd January, 1913.
C. L. Chevallier ...	Medical Officer ...	23rd February, 1914.
B. W. Cherrett ...	Medical Officer of Health ...	26th May, 1914.
J. Pugh ...	Medical Officer ...	18th March, 1913.
A. Robertson ...	" ...	1st October, 1913.
F. L. Henderson ...	" ...	27th October, 1913.
T. Preston ...	Assistant Clerk to P.M.O. ...	1st October, 1913.
Miss E. R. Brown ...	Nursing Sister ...	14th June, 1913.

8.—STAFF POSTINGS THROUGHOUT THE YEAR.

THE COAST ZONE.

Senior Medical Officer, Mombasa.—Dr. L. D. Lowsley was appointed to Seyidie Province, with headquarters at Mombasa, from 11th November, 1913.

European Hospital, Mombasa.—Dr. W. Owen Prichard in charge from January until relieved by Dr. F. L. Henderson in October.

Civil Hospital, Mombasa.—Dr. F. L. Henderson was in charge from January to April, when he proceeded on leave and was relieved by Dr. J. Pugh.

Lamu Hospital and Dispensary.—Dr. R. Hamilton was in charge from January to October, when he proceeded on leave and was succeeded by Dr. G. Dunderdale.

Health Office, Mombasa.—Dr. R. Small was Medical Officer of Health, Mombasa, throughout the year.

THE MOUNTAINOUS ZONE.

The Senior Medical Officer, Nairobi.—Dr. W. J. Radford was Senior Medical Officer until appointed Chief Sanitation Officer from 1st April. He was succeeded by Dr. W. Owen Prichard on 10th September, 1913.

The European Hospital, Nairobi.—Dr. J. L. Gilks took over the duties of Resident Surgical Officer, in February, from Dr. A. Mouat, posted to Kisumu as Medical Officer of Health.

The Civil Hospital, Nairobi.—Dr. T. F. Lumb was in charge till February, when he was relieved by Dr. J. O. Shircore, who was invalided home in September. Dr. G. Dunderdale temporarily followed for one month, and Dr. H. H. V. Welch assumed charge in October.

The Lunatic Asylum, Nairobi.—Dr. H. A. Bodeker was in charge from January to May, and was succeeded by Dr. V. G. L. van Someren when the former proceeded on leave.

The Hospital and Dispensary, Nakuru.—Dr. V. G. L. van Someren was in charge from January to March, and was succeeded by Dr. L. D. Lowsley, who was again relieved in November on transfer to Mombasa by Dr. A. D. Williams.

The Dispensary, Eldoret (Uasin Gishu).—Dr. W. H. Heard performed the duties of District Surgeon on the Uasin Gishu Plateau throughout the year.

Health Office, Nairobi.—Dr. H. A. Bodeker, Medical Officer of Health till May, when Dr. B. W. Cherrett assumed the duties.

Dental Surgery.—Dr. V. G. L. van Someren started the Government Dental Surgery in March.

THE KENIA AND NYANZA PROVINCES.

The Civil Hospital, Kisumu.—Dr. A. D. J. Williams was relieved by Dr. W. Morrison temporarily in August, when the former was posted to Mombasa for plague duty. Dr. C. L. Chevallier took over charge in September from Dr. W. Morrison.

Health Office, Kisumu.—Dr. A. Mouat was appointed Medical Officer of Health, Kisumu, on 1st April.

The Civil Hospital and Dispensary, Fort Hall.—Dr. L. D. Lowsley proceeded on leave in February, and was relieved by Dr. T. F. Lumb. Dr. P. J. Nunan succeeded Dr. T. F. Lumb in October to enable him to proceed home on leave.

THE DESERT ZONE.

Marsabit Dispensary.—Dr. G. R. H. Chell from January to December, when he proceeded on leave and was followed by Dr. A. Robertson.

Kismayu Dispensary.—Dr. C. J. Wilson from January to November, when he was relieved by Dr. F. Collar in order to proceed on leave.

The Military Hospital, Serenli.—Dr. T. H. Massey from June till the end of year. Assistant Surgeon W. E. Cody performed the duties during the first half of the year.

SECTION II.—EXTRA DEPARTMENTAL.

9.—REGISTRATION OF MEDICAL PRACTITIONERS AND DENTISTS.

This Ordinance came into force on the 24th September, 1910, and between that time and the end of 1913 there have been placed on the Register the following.—

Registered Medical Practitioners	...	...	50
Licensed Medical Practitioners	...	...	6
Dentists	...	...	4
			—
			60
			—

34 of the Medical Practitioners were in Government service, and 26 were private practitioners.

During the year the following were admitted to the rolls:—

Shircore, John Owen, L.R.C.P. (Edin.), L.R.C.S. (Edin.), L.F.P.S. (Glasg.), M.B. (Univ. Edin.).

Massey, Thomas Hunter, Lic., Lic. Midwif. R.C.P. (Irel.), Lic., Lic. Midwif. R.C.S. (Irel.).

De Souza, Alexander Francis, L.R.C.S., L.R.C.P. (Edin.), L.F.P.S. (Glas.).

Forbes, John, M.B., Bac. Surg. (Univ. Aberd.).

White, James Hunter, M.B., Mast. Surg. (Univ. Edin.).

Dunderdale, Geoffrey, M.R.C.S. (Eng.), L.R.C.P. (Lond.), M.B., Bac. Surg. (Univ. Lond.).
 Nunan, Patrick Francis, M.B., Bac. Surg., M.D. (Univ. Dubl.).
 Thomson, James Hutcheon, M.B., Bac. Surg. (Univ. Aberd.).
 Pirie, James Hunter Harvey, M.B., Bac. Surg., M.D. (Univ. Edin.), M.R.C.S. (Edin.).
 Tudhope, William, M.B., Bac. Surg. (Univ. Glasg.).
 Collar, Frank, M.R.C.S. (Eng.), L.R.C.P. (Lond.).
 Welch, Harvey Henry Vincent, M.R.C.S. (Eng.), L.R.C.P. (Lond.).
 Russell, Edmund Neptune, M.R.C.S. (Eng.), L.R.C.P. (Lond.), M.B., Bac. Surg. (Univ. Camb.).
 Melhuish, John Dudley, L.D.S., R.C.S. (Eng.).
 Forte, James Clifton, under Sec. 6 (c) of Ordinance.
 Pocock, William Agard, M.B., B.C. (Camb.), M.R.C.S. (Eng.), L.R.C.P. (Lond.).
 Spence, Reginald Westmore, M.R.C.S. (Eng.), L.R.C.P. (Lond.).

The Board convened for the purposes of the Ordinance consisted of :—

Dr. W. E. Kelbe, Nairobi,
 Dr. W. Owen Prichard, S.M.O.,
 Dr. L. D. Lowsley, S.M.O.,
 Dr. W. J. Radford, C.S.O.,
 Dr. J. A. Haran, C.M.G., Deputy P.M.O.,

with the Principal Medical Officer as President and Registrar.

The Board held three meetings during the year.

10.—THE DRUGS AND POISONS ORDINANCE, 1909.

This Act controls the licensing of chemists and druggists and the sale of poisons throughout the Protectorate. Since its promulgation in 1910 and up to the end of 1913, eight names have been placed on the Register. Three of these were by examination.

The Examination Board constituted under the Act consisted of the following :—

Mr. L. A. Howse, Nairobi,
 „ B. A. Bull, Nairobi,
 „ V. H. Kirkham, Government Analyst,
 Dr. W. Owen Prichard, S.M.O.,
 „ L. D. Lowsley, S.M.O.,
 „ W. J. Radford, C.S.O.,
 „ J. A. Haran, C.M.G., Deputy P.M.O.,

with the Principal Medical Officer as President and Registrar.

The Board held two meetings during the year.

11.—ENTOMOLOGICAL RESEARCH.

The obligation to support the home Committee in the collecting of material in regard to biting flies, and equally as a matter of supreme interest to the whole country, was readily undertaken by this Protectorate in September, 1911, the Principal Medical Officer being the forwarding Secretary to the British Museum. Up to date 50 collecting outfits on the scale suggested by the Committee have been issued free to individuals who expressed their anxiety to aid in the collection of specimens. During this period only 29 persons have sent

in returns, some of them being of considerable interest. The response for 1913 has been disappointing in the extreme, collections being only received from the following :—

Dr. A. D. Milne (2 lots).
 Mr. F. G. Hamilton.
 „ S. L. Hinde.
 Capt. St. G. Booth.
 Mr. W. Kennedy.
 Capt. A. O. Luckman (3 lots).
 Dr. G. R. H. Chell.
 Mr. C. M. Dobbs.

During the year one Medical Officer—Dr. B. W. Cherrett—attended the course of instructions in Entomology at home.

The list of specimens identified during the year will be found in the various numbers of the Bulletin of the Entomological Research Committee : the papers submitted by the Government Bacteriologist in his Annual Laboratory Reports in the Annual Reports published by the Agricultural Department.

SECTION III.—EVENT OF INTEREST DURING THE YEAR.

12.—PROFESSOR SIMPSON'S VISIT.

The most notable event of the year was the decision of the Secretary of State to send out Professor W. J. Simpson, C.M.G., M.D., F.R.C.P. (Lond.), D.P.H. (Camb.), Professor of Hygiene at King's College, London, to examine into the sanitary conditions of the Dependency, to advise the Local Government, and to report on the form which the sanitary policy of the Administration should take. His arrival in Mombasa on the 14th June was coincident with my return from leave ; but the state of matters in that town with its epidemic of plague, its well-known insanitary conditions, and the peculiar temper of its polyglot inhabitants, necessitated the first few weeks of his residence in the country being devoted to the organising of a vigorous anti-plague campaign. This involved the immediate creation of a large special staff of doctors, inoculators, disinfecting and rat-catching and conservancy gangs. Captain D. S. Skelton, R.A.M.C., Health Officer at Zanzibar, whose services were generously placed at the disposal of this Protectorate by the Zanzibar Government, and to whose efforts and ability the ultimate success of the policy pursued was in no small measure due, was put in charge of operations.

Professor Simpson's sphere of investigations involved an exhaustive enquiry into the towns of Mombasa, Nairobi, Nakuru, and Kisumu, a safari into the Mumias district to investigate sites, and to the Shimba Hills for its waterworks, an inspection of the Magadi Railway and Soda Lake, and the interviewing (beside the Medical Officers locally concerned) of a very large number of persons with reference to the purpose in hand, on all of which he was accompanied by either the Principal Medical Officer or the Chief Sanitation Officer. In addition, during his six and a half months' stay in the country, time was found to visit, in the trip round the Victoria Nyanza, the towns of Shirati, Mukoma, Muanza, and Bukoba in the neighbouring colony of German East Africa, to make an extended tour through Uganda and to pay a short visit to the Protectorate of Zanzibar. Before his departure on the 29th of December, a commencement was made with the drafting of the much-needed Public Health Code. His report on the country has not yet been published.

II.—PUBLIC HEALTH.

(a.) GENERAL REMARKS.

(i.) GENERAL DISEASES.

THE PROTECTORATE.

Were it possible to eliminate the disastrous effects of the epidemic diseases which so seriously affected the Protectorate during the year 1913, it could be said that a better standard of health was maintained than has yet been recorded. The grand total of those who presented themselves for treatment was 108,520 as against 93,408 in 1912, and 85,958 in 1911. The increase is an index of the expansion of the country. It is attributable to the extension of medical activity, and to the augmentation of the European population, bringing in its train (together with the normal development to be expected in a new country) a yearly increasing number of natives under civilising influences.

The mortality rate has been undoubtedly affected by the severe epidemics which swept certain portions of the country. The admission rate would have been higher if science had possessed a remedy as simple and as efficacious as vaccination against small-pox, to satisfy the almost immediate demands of the A-Kikuyu against the terrible—and to them unknown—scourge of epidemic cerebro-spinal meningitis. It being useless to appeal to European science for help against this disease, innumerable cases were not reported, and the cases recorded do not indicate the true incidence or severity of the epidemic.

Of the diseases shown in the statistical tables the predominating ones affecting all the zones in almost equal proportions were diseases of the digestive, respiratory and locomotory organs and affections of the skin. Of the more preventable diseases malaria easily comes first, very few parts of the country escaping this infection. It is not surprising that dysentery prevails unduly, considering the conditions of the land and the habits of the native. The diagnosis of this trouble is too often unsatisfactory, being chiefly determined by the presence or absence of blood and mucus in an attack of diarrhoea. Very little has been done to determine the extent to which it is bacillary or amoebic in origin. Both in this and malaria there has been an increasing reliance placed on the use of hypodermic injections of emetin and quinine in place of less certain, older-fashioned methods of administration. If the established hold that enteric has on the country calls for no particular comment this year, at any rate it can be said that a commencement has been made with the inauguration of anti-typhoid inoculation. This should ultimately afford the means to everybody in the Protectorate of obtaining protection. More particular remarks on these and other diseases will be found under the appropriate headings.

THE COAST ZONE.

Anæmia was fairly common, generally ascribed to malaria; ankylostomiasis may also have contributed. Diabetes, noticed amongst the Indians, has not so far been recorded amongst the Africans. There were two cases of pemphigus as against 12 last year. The curious point about these cases was the extent of the body surface affected, and the invariable history given of a recent preceding vaccination. One case of exophthalmic goitre presented itself at Lamu.

THE MOUNTAINOUS ZONE.

The throat affection noticed in last year's report was not so prevalent this year. The general tenor of the reports from the various districts was that the general health—both European and native—has been more satisfactory than last year.

THE KENIA AND NYANZA PROVINCES.

During the wetter and colder months of the year rheumatic affections prevailed very largely in the neighbourhood of Mount Kenia. Scabies was common to both Provinces.

THE DESERT ZONE.

The returns from these Provinces are admittedly imperfect. Safari work involves long absences from the station during which the posting of records are necessarily in abeyance. There is enough material, however, to give a picture of the diseases of the country. Besides those noted in the remarks on general diseases at the head of this chapter, conjunctivitis and corneal ulcers were the commonest noted, understandable from glare, sand and flies.

(ii.) COMMUNICABLE DISEASES.

MOSQUITO- OR INSECT-BORNE.

THE COAST ZONE.

Malaria.—This was usually of the subtertian variety. At Mombasa it presented two distinct clinical types of severity with microscopical differences in the form of the ring parasites. For example, an up-country native from the Shimba Hills exhibited the symptoms of malarial fever in a very severe form, while cases of the ring type from the town suffered so slightly as to make it difficult to keep them in bed. A total of 6,185 cases was recorded with 22 deaths, as against 6,344 with 22 deaths in 1912, and 5,519 and 25 in 1911. The decrease is due, in some measure, to the spread of knowledge and to an extended use of quinine.

Blackwater fever.—In 1913 there were 11 cases with 3 deaths; in 1912, 3 cases and 2 deaths; and in 1911, 3 cases and 1 death. Of these numbers in 1913, 3 cases and 1 death were European; in 1912, 1 case; and in 1911, 3 cases and 1 death.

Trypanosomiasis.—One case was treated in the Civil Hospital, Mombasa—a derelict native brought in by the police of whom no history could be obtained.

Cordylobia anthropophaga.—One case in an European came under notice at Voi.

There is a large field for research in the study of elephantiasis on the coast, as cases are common, though rarely presenting themselves for treatment.

THE MOUNTAINOUS ZONE.

Malaria.—This, as usual, heads the list with a total of 3,712 admissions, distributed amongst the different stations as follows:—Nairobi, 1,419; Makindu, 915; Nakuru, 292; N'darugu, 209; Machakos, 156; Naivasha, 136; Maerich, 127; Ravine, 122; Baringo, 95; Nandi, 93; Kyambu, 72; Marakwet,

47; Eldoret, 19; Londiani, 10. The combined deaths from all these centres amounted to 54, giving a mortality rate to admissions of 1·45 per cent. There was an inappreciable decrease in the numbers treated, due to the character of the rains, the majority of the cases occurring in the last two quarters of the year. The type was very largely the subtertian. Machakos had the highest death rate, but undoubtedly a number of these cases were due to cerebro-spinal meningitis. The total admissions for malaria for the three years were as follows :—

1913	...	...	...	...	...	...	3,536
1912	...	...	...	...	...	...	3,647
1911	...	...	...	...	...	...	3,001

Blackwater fever.—There were 3 cases—2 Europeans and 1 native—and 1 death (European). In 1912 there were 2 cases—1 European and 1 African—and both proved fatal; in 1911 4 cases were recorded, 3 being Europeans and 1 native askari; the latter proved fatal.

THE KENIA AND NYANZA PROVINCES.

Malaria.—A total of 3,627 cases were recorded, as against 3,134 the previous year. There was a decrease in the numbers presenting themselves at Fort Hall, explicable in part by the upset caused by the outbreak of cerebro-spinal meningitis. Amongst the Kavirondo malaria was responsible for rather more than a fifth of all admissions. In Kisumu the poorer class of Indians suffered most. The conditions at Mumias showed an improvement over last year. The number of deaths attributed to malaria was 5, giving a ratio to total admissions of ·13 per cent. The greatest incidence of the disease occurred during the months of May to October at Kisumu, February and July to November at Mumias, July to September on the Nandi plateau, January, February, July and August at Fort Hall, and the same at Meru, and from May to December at Kitui.

Some chiefs in Kenia have taken to sleeping under mosquito nets. The number of admissions recorded for the last three years was as follows :—

1913	...	...	...	...	...	...	3,627
1912	...	...	...	...	...	...	3,181
1911	...	...	...	...	...	...	2,438

Blackwater fever.—There was one (European) admission in 1913, with recovery; in 1912 two cases were recorded amongst Goans, with one recovery and one death; and in 1911 there were three cases amongst Europeans, with recovery in each case.

Trypanosomiasis.—One imported case of sleeping sickness was discovered at Kisii, as this district is distant some 30 or 40 miles from the Lake shore. Missionaries have reported the existence of a few sufferers still in the neighbourhood of Karungu (one of the Lake ports), but notification of its occurrence is yearly getting rarer.

THE DESERT ZONE.

Here, as elsewhere, the predominating cause of sickness was malaria, of which 2,125 cases came under treatment, with no deaths. The disease was most prevalent in the Northern Frontier District during the months of April to June inclusive; in the heavily-infected Gosha district bordering the Juba in June, July and August, of course following the incidence of heavier rains than usual. The town of Kismayu contributed 445, though the prevailing mosquitoes there were the *Culex* and *Stegomyia*.

INFECTIOUS OR EPIDEMIC.

THE COAST ZONE.

Plague.—The 27 cases, with a mortality of 59·25 per cent., recorded last year swelled into 208, with a death-rate per cent. of 88·46, the vast majority being confined to the focus in Mombasa, with one from the Teita hills at Voi (100 miles away), and some 21 cases from various places situated within a twenty-mile radius of the port. The quarterly incidence of the admissions was as follows :—

	Cases.	Deaths.
1st Quarter	7	7
2nd Quarter	76	68
3rd Quarter	110	94
4th Quarter	15	15

It must be remembered that it was during the third quarter that vigorous measures were instituted by Professor Simpson to cope with the epidemic, with the result that the last case reported took place on December 7th, since when, up to the time of writing (April, 1914), no further case has come to light. It was a matter of satisfaction that no outbreak occurred in the Tanaland Province. The cooler months of the year produced the greatest incidence of plague, with the middle quarter as the acme. The type of plague was very largely bubonic, with a serious proportion of pneumonic cases. Captain Skelton's report (section 6) contains matter of much interest on the general measures pursued, the treatment of cases, and the reliability of inoculation.

Small-pox.—Concurrent with an indefinite distribution of cases of varicella, there were but few cases of this pest, all confined to the Seyidie Province. The numbers for the last three years are as follows :—

	1911.	1912.	1913.
Admissions	<i>Nil</i>	295	33
Deaths... ..	<i>Nil</i>	63	10

Cholera.—The epidemic in the island of Zanzibar, 120 miles south of Kilindini port, ended on the 23rd December, 1912, and the island was declared free from the epidemic on the 7th January, 1913. It is a matter of congratulation that no suspicion of a case occurred on the Protectorate mainland.

Dysentery.—On the coast this was of the amœbic type in nearly every case, the chief sufferers being, as noted in previous reports, the imported labourers from Kikuyu and Kavirondo. Predisposing factors in the initial diarrhœa, besides the water supplies, were doubtless carelessness in the cooking of new and unfamiliar articles of diet and fruits. This year there were 475 admissions, with 38 deaths; in 1912, 239, with 55 deaths; and in 1911, 368, with 60 fatalities.

Beri-beri.—Dr. Pugh points out that it is not improbable that this disease is more prevalent in a mild form than is generally imagined. Twenty-eight cases were admitted from a planter's shamba at Voi towards the end of the year; 19 of these improved, 1 died, and the remaining 8 were still under treatment. Here, again, the patients were all up-country folk. An interesting fact was that their diet scale did not include rice, being almost wholly mealie-meal.

Enteric.—The coast, generally speaking, is freer from this disease than elsewhere. In 1913 there were 4 cases (all Europeans) and no death; in 1912 3 cases and 3 deaths (Europeans); and in 1911 7 cases and 3 deaths, of which 4 cases and 1 death occurred in Europeans.

Cerebro-spinal meningitis.—The epidemic touched this area sporadically, without apparently getting a firm hold. Of the 13 cases, with 10 deaths, that

came to light, the majority were moribund, some of them being deposited within the hospital precincts during the night, without any indication as to origin.

Venereal diseases.—The great bulk of the cases came from Mombasa. Syphilis totalled 305 cases, as against 113 in 1912, and 215 in 1911. Gonorrhœa was 419 in 1913, 279 in 1912, and 246 in 1911.

THE MOUNTAINOUS ZONE.

There were outbreaks of varicella and mumps in the Nairobi Prison and at various stations, necessitating segregation measures.

Plague.—Plague made its reappearance in and about Nairobi. Its quarterly incidence in Nairobi is represented by 16 cases in the first quarter, 6 the second and 3 in the third quarter—total, 25 cases and 19 deaths. There was the usual mixture of types, the bubonic predominating.

	1911.	1912.	1913.
Admissions	39	17	25
Deaths... ..	22	11	19
Death-rate	56·41	64·71	76·00

Small-pox.—Only 63 cases were recorded during the year, of which 12 were fatal. Nineteen of them occurred at Eldoret during the closing months of the year.

Dysentery.—In the month of January a severe outbreak occurred amongst the labourers employed on the construction of the Eldoret—Londiani road. Investigations pointed to a contaminated camp water supply as the cause. There were 612 admissions last year, with 52 deaths; and in 1913, 777 cases, with 52 fatalities, giving a ratio of ·66 per cent. for 1913, as against ·85 for 1912. Nairobi, Nakuru and Makindu registered the greatest number of admissions; these were respectively 338, 120 and 63, with 24, 19 and 3 deaths.

Enteric.—Nairobi gave the largest return of sickness, partly on account of its more concentrated opportunities of infection, and partly because of the number of cases sent in for treatment.

	1911.	1912.	1913.
Admissions	17	23	21
Deaths... ..	2	2	1
Death-rate	11·76	8·68	4·76

Of these four were in Africans in 1913, three in 1912 and *nil* in 1911.

Cerebro-spinal meningitis.—Further remarks on this disease will be found under its heading in the similar section on the Kenia Province, but the full force of the epidemic was very apparent in Nairobi, with its civil hospital crowded pending the erection of special accommodation. Along with the A-Kikuyu, the Wa-Kamba suffered severely. The number of cases reported at the various hospitals and dispensaries was 288, with 152 deaths, a death-rate of 52·77 per cent. The rains were early and prolonged, and it was during these cooler months that the epidemic was more apparent. Of the total admissions nine were Europeans, with two deaths.

Leprosy.—One case in a King's African Rifles soldier belonging to the Nyasaland contingent came under notice.

Venereal diseases.—The same difficulty is experienced in this Protectorate as in other parts of the world with regard to the early reporting and detection of cases, and the maintenance of proper curative measures up to the moment of discharge. Nairobi, as may be imagined, was no mean disseminating centre in the spread of the disease. Syphilis totalled 471 cases and gonorrhœa 320. In 1912 there were 462 admissions for syphilis and 315 for gonorrhœa, whilst the numbers for 1911 were 497 and 294 respectively.

THE KENIA AND NYANZA PROVINCES.

Cerebro-spinal meningitis.—The visitation which broke out during the year was the most disastrous the Province of Kenia has experienced since its occupation by the white man. So severe was it that at one time it threatened to paralyse the internal economy of the whole Province: in any case it seriously upset the supply of labour. The mortality it occasioned will, undoubtedly, have an adverse effect on the exploitation of this market for many years to come. From May to the end of the last quarter of the year it spread out—regarding Nairobi as the focus—through the length and breadth of the Kikuyu country, simultaneously with its advance into the Ukamba Province. The infection did not reach the Nyanza Province till towards the later months in the year, when the anxiety regarding it had diminished in the districts extending out from Nairobi. The total number of cases which came under observation at the various dispensaries—57, with 38 deaths—conveys absolutely no indication of the real state of matters; from the testimony of medical officers, administrative officers, missionaries and other observers, it is probable that the normal sick-rate (whatever that may be) which prevailed amongst this large population was more than doubled. The district officers variously estimated the excess death-rate at from 3 per cent. to 10 per cent. The significance of the commencement of the appearance of the disease in the Kavirondo country is that here is the second great source of the Protectorate labour supply—a very large indigenous native population contiguous to an equally crowded country across the borders in the neighbouring colony of Uganda. Whatever may be taking place across the frontiers, already cases have been picked off the steamers and reported from Entebbe as coming from Kisumu.

The Chief Sanitation Officer in his report reviews the whole course of the epidemic with such additional details as he has been able to collate. For a description of the disease and the treatment adopted, reference should be made to the very interesting monograph contributed by Dr. P. H. Ross, Bacteriologist, and Dr. J. O. Shircore, in charge of the Civil Hospital, Nairobi, published in the "Transactions of the Society of Tropical Medicine and Hygiene," December, 1913, Volume VII., No. 2, pp. 83-95. To this Dr. J. L. Gilks has added his report of those cases of Europeans who were under his treatment (section 6).

Plague.—No case of plague was reported in the Kenia Province. At Kisumu the incidence was as follows:—

	1911.	1912.	1913.
Number	64	79	31
Case mortality	76·87	89·87	87·09

The following localities were infected:—Indian Bazaar (8), Swahili Location (1), Police Lines (1), Railway (8), Old Kisumu (3), Kavirondo Location (2), British East Africa Corporation (3), Nubian Location (1), Pier Porters' Lines (3) and Cattle Boma (1).

In October an opportunity was offered me of accompanying Professor Simpson round the lake in his survey of the plague conditions obtaining in German East Africa and English territories. As his report will be conclusive on the subject, it is not necessary for this report to record more than a grateful appreciation of the courtesy extended to us by the German and Uganda authorities.

Small-pox.—For the first time on record no case was known to have occurred in the Nyanza Province during the year. Desultory cases were met with in the Kenia Province, more particularly in the Meru district, where 51 cases were treated at the dispensary.

Dysentery.—428 cases were noted during the year, with 9 deaths, representing no unusual state of affairs.

Enteric.—Including three Europeans at Nyeri—a new focus—and one at Fort Hall, there were 15 admissions, with 3 deaths. No cases were recorded in the previous year.

Venereal.—The effects of gonorrhœa, not commonly seen, only resulted in some 162 cases presenting themselves for treatment. The total number of syphilitics entered on the register was 413, the great bulk coming from the outstations in the Nandi and Lumbwa districts. In 1912 syphilis totalled 453, gonorrhœa 180; in 1911 the numbers were 573 and 200 respectively.

DESERT ZONE.

Dysentery.—This existed very largely in Jubaland, with its dependence on the muddy waters of the river Juba and polluted wells. Kismayu, dependent on camel-loads of fresh water brought from the river some 15 miles distant, having to fall back upon very shallow brackish wells dug anywhere within a circumscribed area, will never be free until its local conditions are radically changed.

Syphilis.—36 cases were noted, two of which were primary infection. Gonorrhœa was scarce on the Abyssinian border, but was fairly common amongst the Bantu population of the river.

No cases of small-pox or enteric were recorded during the year. There were two cases of beri-beri at Yonti—all that remained of the severe epidemic at Serenli the previous year. Cerebro-spinal meningitis visited both Provinces—an isolated case at Moyale in a porter from Meru, and one at Kismayu which must have been imported by sea. Precautions were taken in regard to two or three cases of suspected plague, either derived from Mombasa or coming from the plague-infected areas in Italian Somaliland across the frontier.

HELMINTHIC.

THE COAST ZONE.

Ankylostomiasis.—18 cases were recorded at Mombasa during the year, with 4 deaths. As these numbers do not present anything like the frequency of the disease on the coast, it may not be out of place to republish—as it has never been printed—a Report by Dr. Leys, lately of this service, on the frequency of its occurrence in the town of Mombasa. This appeared in the Annual Report of 1906 as an appendix, and will be found under section 6 of this year's issue.

Bilharziasis.—Two cases came under treatment during the year.

THE MOUNTAINOUS ZONE.

Generally speaking, intestinal parasites are only brought to light in the *post-mortem* room. The evidence there tends to show that the native is not an uncommon host. There is no data to show to what extent the up-country African harbours the ankylostoma.

(b.) **EUROPEAN OFFICIALS.****GENERAL REMARKS.****THE COAST ZONE.**

The improvement noted in last year's report was maintained satisfactorily during 1913. Malaria was the principal cause of sickness, being still regrettably high, but not so high as amongst the unofficial class. One of the invalidings was landed at Mombasa very ill on first appointment, and was sent home almost immediately.

The principal diseases from which officials suffered were malaria and digestive affections.

Four officers were invalided during the year, and three died, the causes being as follows:—

Invaliding.—Abscess of liver (1), malaria (2), neurasthenia (1).

Deaths.—Malaria (2), abscess of liver (1).

THE MOUNTAINOUS ZONE.

Malaria was, as usual, the commonest disease, though the practice of irregular doses of quinine prevailed, and, in some instances, the use of nets. The general improvement noted elsewhere in the country was apparent. Five officers were invalided during the year and three died, the causes being as follows:—

Invaliding.—Enteric fever (1), tubercle (1), enlargement of liver and spleen (1), lesion, nervous system (1), debility and loss of memory (1).

Deaths.—Enteric (1), cirrhosis of liver (1), cerebro-spinal meningitis (1).

THE KENIA AND NYANZA PROVINCES.

In both Provinces the standard of health tends to improve year by year, attributable to better housing and gradually improving sanitary conditions. It is gratifying to be able to record that the spread of knowledge of the underlying principles of tropical hygiene and sanitation was also a factor to be taken into account. There was still, however, a regrettable tendency on the part of officers escaping from the monotony of station work to neglect, on safari, the most elementary precautions against malarial infection. Probably the most serious effects of prolonged residence is seen in the Lake basin—as elsewhere in the country—in its ill-defined effects on the nervous system, producing neurasthenia of varying degree of intensity.

Two officials were invalided for blackwater fever and nervous debility respectively. There were no deaths recorded amongst officials.

THE DESERT ZONE.

The general standard of health of officials in this quarter of the Protectorate has always been good, and 1913 was no exception. Out of 46 Europeans there was only one case of malaria recorded. Two unfortunate casualties occurred on the frontier amongst officers of the King's African Rifles—one in May, being fatally shot, the other in September, sustaining a compound fracture of the leg in a fight with Abyssinian raiders, being subsequently invalided home.

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST EUROPEAN OFFICIALS AT THE COAST ZONE.

	1911.	1912.	1913.
Total number of officials resident	82	108	250
Average number resident... ..	56	91	133
Total number on sick list... ..	56	123	134
Total number of days on sick list	701	766	797
Average daily number on sick list	1.9	2.09	2.18
Percentage of sick to average number resident	3.4	2.30	1.64
Average number of days on sick list to each patient	12.5	6.20	5.95
Average sick time to each resident	12.5	7.09	3.18
Total number invalided	1	2	4
Percentage of invaliding to total residents	2.4	1.85	1.60
Total deaths	3	—	3
Percentage of deaths to total residents	3.6	—	1.20
Percentage of deaths to average number resident	5.2	—	2.25
Number of cases of sickness contracted away from residence	—	—	1

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST EUROPEAN OFFICIALS IN THE MOUNTAINOUS
ZONE.

	1911.	1912.	1913.
Total number of officers resident	286	336	654
Average number resident... ..	260	272	433
Total number on sick list	217	239	295
Total number of days on sick list	1,140	2,052	2,570
Average daily number on sick list	3.12	5.61	7.04
Percentage of sick to average number resident	1.2	2.06	1.63
Average number of days on sick list to each patient	5.25	8.58	8.71
Average sick time to each resident	4.38	6.11	3.93
Total number invalided	—	5	5
Percentage of invaliding to total residents	—	1.49	.76
Total deaths	1	2	3
Percentage of deaths to total residents ... ..	.35	.59	.46
Percentage of deaths to average number resident ... ..	.38	.73	.69
Number of cases of sickness contracted away from residence	—	—	—

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST EUROPEAN OFFICIALS IN THE KENIA AND
NYANZA PROVINCES.

	1911.	1912.	1913.
Total number of officials resident	93	123	138
Average number resident... ..	68	60	84
Total number on sick list	93	87	71
Total number of days on sick list	859	587	614
Average daily number on sick list	2.35	1.60	1.68
Percentage of sick to average number resident	3.47	2.66	2.00
Average number of days on sick list to each patient	9.23	6.75	8.64
Average sick time to each resident	12.63	4.77	4.45
Total number invalided	3	1	2
Percentage of invalidings to total residents	3.22	.81	1.45
Total deaths	1	2	—
Percentage of deaths to total residents	1.07	1.62	—
Percentage of deaths to average number resident	1.47	3.33	—
Number of cases of sickness contracted away from residence	—	—	—

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST EUROPEAN OFFICIALS IN THE DESERT ZONE.

	1911.	1912.	1913.
Total number of officials resident	—	—	46
Average number resident... ..	—	—	32
Total number on sick list... ..	—	—	6
Total number of days on sick list	—	—	98
Average daily number on sick list	—	—	27
Percentage of sick to average number resident	—	—	84
Average number of days on sick list to each patient	—	—	16·33
Average sick time to each resident	—	—	3·06
Total number invalided	—	—	2
Percentage of invaliding to total residents	—	—	4·33
Total deaths	—	—	1
Percentage of deaths to total residents	—	—	2·17
Percentage of deaths to average number resident	—	—	3·12
Number of cases of sickness contracted away from residence	—	—	—

TABLE SHOWING THE SICK, INVALIDING AND DEATH
RATES AMONGST EUROPEAN OFFICIALS IN THE EAST
AFRICA PROTECTORATE.

	1911.	1912.	1913.
Total number of officials resident	470	567	1,088
Average number resident... ..	388	423	682
Total number on sick list	413	449	506
Total number of days on sick list	3,410	3,405	4,079
Average daily number on sick list	9	9·30	11·17
Percentage of sick to average number resident	2·32	2·19	1·64
Average number of days on sick list to each patient	8	7·58	8·06
Average sick time to each resident	7	6·01	3·74
Total number invalided	4	8	13
Percentage of invaliding to total residents	·85	1·41	1·19
Total deaths	4	4	7
Percentage of deaths to total residents	·85	·71	·64
Percentage of deaths to average number resident	1·03	·95	1·02
Number of cases of sickness contracted away from residence	—	—	1

(c.) **NATIVE OFFICIALS.**

THE COAST ZONE.

Beyond malaria there is no special factor influencing the health conditions to record. The figures given in the statistical table are only approximately accurate.

Two deaths occurred amongst the native officials at the coast, the causes being malaria and pneumonia.

Two were invalided—one for tubercle and the other for malaria with general debility.

THE MOUNTAINOUS ZONE.

The chief causes of illness were malaria, diseases of the digestive and respiratory systems and local injuries. There were 60 cases of dysentery

amongst native officials in Nairobi, with no fatal termination of any case. Six officers were invalided, and there were three deaths, the causes being as follows:—

Invaliding.—Gunshot wound (1), nervous debility (2), tubercle (2) and rheumatism (1).

Deaths.—Pneumonia (1), broncho-pneumonia (1) and general injuries (1).

THE KENIA AND NYANZA PROVINCES.

The general health was good in both Provinces, and the remarks regarding European officials may be equally applied to the native officials. There were no officers invalided, and but one death occurred from plague.

THE DESERT ZONE.

General health, on the whole, was good.

There were two cases of invaliding—malaria and neurasthenia—and no deaths.

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES AMONGST NATIVE OFFICIALS AT THE COAST ZONE.

	1911.	1912.	1913.
Total number of native officials resident...	—	—	600
Average number resident...	—	—	424
Total number on sick list...	—	—	785
Total number of days on sick list	—	—	4,183
Average daily number on sick list	—	—	11·46
Percentage of sick to average number resident...	—	—	2·70
Average number of days on sick list to each patient	—	—	5·33
Average sick time to each resident	—	—	6·97
Total number invalided	—	—	2
Percentage of invaliding to total residents	—	—	·33
Total deaths	—	—	2
Percentage of deaths to total residents	—	—	·33
Percentage of deaths to average number resident	—	—	·47
Number of cases of sickness contracted away from residence	—	—	Nil

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES AMONGST NATIVE OFFICIALS IN THE MOUNTAINOUS ZONE.

	1911.	1912.	1913.
Total number of native officials resident	—	—	881
Average number resident...	—	—	618
Total number on sick list...	—	—	1,784
Total number of days on sick list	—	—	14,253
Average daily number on sick list	—	—	39·05
Percentage of sick to average number resident	—	—	6·31
Average number of days on sick list to each patient	—	—	7·98
Average sick time to each resident	—	—	16·17
Total number invalided	—	—	6
Percentage of invaliding to total residents	—	—	·68
Total deaths	—	—	4
Percentage of deaths to total residents	—	—	·45
Percentage of deaths to average number resident	—	—	·64
Number of cases of sickness contracted away from residence	—	—	Nil

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST NATIVE OFFICIALS IN THE KENIA AND
NYANZA PROVINCES.

	1911.	1912.	1913.
Total number of native officials resident...	—	—	201
Average number resident...	—	—	139
Total number on sick list...	—	—	335
Total number of days on sick list...	—	—	1,485
Average daily number on sick list...	—	—	4.06
Percentage of sick to average number resident...	—	—	2.92
Average number of days on sick list to each patient...	—	—	4.43
Average sick time to each resident...	—	—	7.38
Total number invalided...	—	—	Nil
Percentage of invaliding to total residents...	—	—	Nil
Total deaths...	—	—	1
Percentage of deaths to total residents...	—	—	.49
Percentage of deaths to average number resident...	—	—	.71
Number of cases of sickness contracted away from residence...	—	—	Nil

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST NATIVE OFFICIALS IN THE DESERT ZONE.

	1911.	1912.	1913.
Total number of native officials resident...	—	—	46
Average number resident...	—	—	34
Total number on sick list...	—	—	18
Total number of days on sick list...	—	—	112
Average daily number on sick list...	—	—	.30
Percentage of sick to average number resident...	—	—	.88
Average number of days on sick list to each patient...	—	—	6.22
Average sick time to each resident...	—	—	2.43
Total number invalided...	—	—	2
Percentage of invaliding to total residents...	—	—	4.34
Total deaths...	—	—	Nil
Percentage of deaths to total residents...	—	—	Nil
Percentage of deaths to average number resident...	—	—	Nil
Number of cases of sickness contracted away from residence...	—	—	Nil

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES
AMONGST NATIVE OFFICIALS IN THE BRITISH EAST
AFRICA PROTECTORATE.

	1911.	1912.	1913.
Total number of native officials resident...	—	1,283	1,728
Average number resident...	—	1,202	1,215
Total number on sick list...	—	1,266	2,922
Total number of days on sick list...	—	7,809	20,033
Average daily number on sick list...	—	22.34	54.88
Percentage of sick to average number resident...	—	1.77	4.51
Average number of days on sick list to each patient...	—	6.18	6.85
Average sick time to each resident...	—	6.09	11.59
Total number invalided...	—	18	10
Percentage of invaliding to total residents...	—	1.40	.57
Total deaths...	—	1	7
Percentage of deaths to total residents...	—	.08	.40
Percentage of deaths to average number resident...	—	.08	.57
Number of cases of sickness contracted away from residence...	—	Nil	Nil

(d.) **GENERAL EUROPEAN POPULATION.****THE COAST ZONE.**

The information under this heading is so scanty and mostly confined to Mombasa that no deductions, further than those given in the 1912 Report, can be given. Generally speaking, the conditions which governed the health of the officials reacted equally on the general population.

The estimated population in the Coast zone was:—

1911	...	...	...	...	...	...	341
1912	...	...	...	...	...	...	352
1913	...	...	...	...	...	...	397

The number of births registered was 13, compared with 4 in 1912, and 8 in 1911.

The number of deaths registered was 8, as against 7 in 1912 and 9 in 1911.

The causes of death were:—Blackwater fever (1), abscess of liver (1), nephritis (1), pneumonia (1), heart disease (1), asphyxia (1), dysentery (1), broncho-pneumonia (1).

THE MOUNTAINOUS ZONE.

In default of any reliable statistics, the information obtained in Nairobi (and district, with its 2,000 odd inhabitants) regarding the health of Europeans, may be taken as affording no mean index of what actually obtained elsewhere in this area. Despite the fact that the number of private practitioners in the township was increased by two, thus absorbing many cases, a proportion of which would otherwise have possibly fallen into the hands of the Government Medical Officers, there was an increase in the amount of sickness recorded in the course of their outside practice. This was, doubtless, normal, and is explicable by the great influx of immigrants.

Possibly the most noticeable factor during the year was the large number of children's diseases, chiefly cases of intestinal trouble. The standard of bottle-feeding laid down in the accepted text-books at home requires considerable modification in this country; as, apart from climatic and other considerations, the quality of the cow's milk, from its richness and divergence from the standard in England, is entirely that of a tropical country. In this connection the Analyst's observations on milk (Laboratory Reports; Vol. III., Part 1, 1912) are full of interest. It is also worthy of remark that of the relatively small number of children in Nairobi, two cases of marked cretinism and one of congenital idiocy, three cases of cardiac disease—two rheumatic in origin, and one apparently of simple dilation—came under notice. Neurasthenia and gynaecological troubles were not infrequent amongst the women-folk. The Uasin Gishu plateau may be particularly singled out as having presented nothing of a markedly tropical or sub-tropical nature beyond dysentery, tropical abscess and snake-bite. Dr. Gilks recorded one case of "Pappataci fever" in a child aged five years, with a typical rash and enlargement of the glands. Numerous cases of an acute dermatitis occurred during the middle months of the year caused by a fly belonging to the *Staphylindia*. Its causation was proved experimentally.

The estimated European population was:—

1911	...	...	...	...	...	...	2,438
1912	...	...	...	...	...	...	3,475
1913	...	...	...	...	...	...	4,596

The number of births and deaths registered for the past three years were :—

			1911.	1912.	1913.
Births	...	...	72	68	84
Deaths	...	...	43	33	46

The ratio per 1,000 of population was :—

			1911.	1912.	1913.
Births	...	...	29.5	19.5	18.3
Deaths	...	...	17.6	9.4	10.0

The principal causes of death for the year were :—Malaria (4), injuries (7), pneumonia (3), dysentery (2), circulatory (4), enteric (1), cerebro-spinal meningitis (2), nephritis (1), blackwater fever (1), tubercle (1), cancer (1), infantile affections (6).

THE KENIA AND NYANZA PROVINCES.

What has been said regarding the health of the officials and of the country at large applies pretty generally to the white residents. Their health is very largely in their own hands, and is good or bad according to the conditions they make for themselves. The population is so scattered and ever-changing that any definite information regarding their health is most difficult to obtain, and is valueless for statistical purposes. Generally speaking the standard has been good, as, for one thing, they are mostly men in the prime of life.

As regards the total white population, the voluntary census of 1911 showed that there was a total of 343 Europeans inhabiting these regions. For 1913 it is calculated that this number had increased to 568.

In 1913 and 1912 no deaths were recorded, and only two were registered in 1911.

From returns supplied by the Registrar-General, the number of births registered during 1913 was 8. The number registered for 1912 was 14, and 11 for 1911.

THE DESERT ZONE.

With the exception of a few farms and enterprises on the lowest reaches of the Juba, this desert area is still one of the closed wastes of Africa. Such population as there was has enjoyed the same measure of health as the officials.

The total number of white people inhabiting these regions was estimated as 64. Three births and one death were registered in 1913, one birth and one death in 1912, and one birth and no deaths in 1911.

(c.) GENERAL NATIVE POPULATION.

THE COAST ZONE.

No census of the native population has, as yet, been attempted, but an approximate estimation of the number of inhabitants can be arrived at on the basis of the hut and poll-tax returns.

The estimated population in the Coast zone was 246,736.

Registration of births and deaths is only compulsory in the case of Europeans.

THE MOUNTAINOUS ZONE.

Estimated Population.—In the absence of compulsory registration this is calculated from the hut and poll-tax returns, and may be put down as 454,289 (figures obtained from the Provincial Commissioners of Provinces).

Births and Deaths.—Registration is only compulsory for Europeans.

THE KENIA AND NYANZA PROVINCES.

Estimated Population.—For the two Provinces it is computed that the number was 1,886,500. It is not possible in the absence of any census records to submit any vital statistics.

THE DESERT ZONE.

The estimated population is given as 12,000, but as no census has ever been taken, it is impossible to submit any vital statistics.

III.—SANITATION.

BY DR. W. J. RADFORD, CHIEF SANITATION OFFICER, E.A.P.

(a.) GENERAL REVIEW, &c.

(i.) ADMINISTRATION.

The Sanitation Division was created on the 1st April, 1913; provision having been made in the Estimates, the three Medical Officers of Health of the towns of Mombasa, Nairobi, and Kisumu, who had hitherto been shown as special appointments in the Administrative Division, were transferred to the Sanitation Division.

The personnel of the Sanitation Staff at the commencement of the year was as follows:—

- 1 Medical Officer of Health, £500-£600 and £50 duty pay.
- 2 " " " " £400-£500 and £40 " "

CLERICAL STAFF.

- 1 Clerk, Health Office, Mombasa, £84.
- 1 " Labour Camp, Kisumu, £80.

During the year the following appointments were made to the permanent staff:—

- Chief Sanitation Officer, £600-£700 and £60 duty pay.
- 4 European Sanitary Inspectors, £200-£250 each.
- 1 Nurse, £165 and £50 allowances.
- 1 Assistant Surgeon, £200.
- 3 Sub-Assistant Surgeons, £108 each.

Owing to the presence of epidemic diseases—plague, small-pox and cerebro-spinal meningitis—in five out of the six Provinces in the Protectorate, and the serious epidemic of plague at Mombasa, the staff at various times was very materially increased by Medical Officers lent by the Zanzibar Government, the appointment of others from England, and the temporary services of some of the permanent staff. Many changes incidental to the exigencies of the case were made, though at no time did any overlapping of responsibility occur.

The following list embraces the entire temporary appointments made during the year:—

From the permanent staff, East Africa Protectorate—

- Dr. L. D. Lowsley.
- Dr. A. D. J. B. Williams.

Appointed in England—

- Dr. W. Tudhope.
- Dr. E. N. Russell.
- Dr. Mackinnon.
- Dr. H. H. V. Welch.
- Dr. F. Collar.

Lent by the Zanzibar Government—

- Capt. D. S. Skelton, R.A.M.C.

Locally engaged—

- Dr. W. Morrison.
- Dr. A. M. Freitas.

(8) The inclusion in all subsequent leases from the Crown of clauses compelling an owner to connect his premises, plot, or area with any drainage scheme when completed, and other matters governing the sanitary principles to be observed, that will eventually be embodied in the Public Health Act, were approved.

(ii.) PREVENTIVE MEASURES.

MOSQUITO- AND INSECT-BORNE DISEASES.

MALARIA.

There are at present 34 stations within the Protectorate where medical aid can be afforded, and where statistics of observed disease are recorded. That malaria is prevalent in nearly all geographical areas is evident, and the number of the stations reporting malaria existing among the European and native communities is attached.

Zones.	Number of Medical Stations.	Reported Malarial Infection among Natives.	Reported Malarial Infection among Europeans.
Coast	5	5	5
Mountainous	14	14	11
Kenia and Nyanza	9	9	8
Desert	6	6	4
TOTAL	34	34	27

From the statistical tables available in various medical stations in the Protectorate, there appears to be a steady rise in the numbers of observed cases. The attached tables show the total number of recorded cases and deaths since 1911.

MALARIA, RECORDED CASES AND DEATHS.

Year.	Cases.	Deaths.
1911	10,714	76
1912	12,658	52
1913	15,656	81

Though this table shows an increase in the number of recorded cases, there is a distinct decrease in case incidence in localities where a general knowledge of the cause of this disease is being acquired. Anti-mosquito measures are being prosecuted, and where possible quinine prophylaxis is carried out. This last measure has been actively pursued in Mombasa at the Health Office, Native Civil Hospital and Jail, and in several outstations where detachments of the King's African Rifles and Police are stationed. The issue of quinine is free, and all medical stations have been circularized calling attention to the necessity for still further pressing this measure.

Mosquito destruction gangs are maintained at Mombasa, Nairobi and Kisumu, where active work is being carried out, and the work performed reflects the greatest credit on the executive staff, who systematically carried on their duties at the time when more active operations were in progress to combat the various epidemic diseases that occurred concurrently in the townships.

Dr. R. Small, Medical Officer of Health, Mombasa, directs special attention to roof guttering as being one of the main breeding-places in that town, and his action in dealing with this situation has been energetic and sustained. A tabulated statement of the work performed is attached.

Extract Sanitary Report, Mombasa—Malaria. Dr. S. Small, Medical Officer of Health.

ACTION TAKEN DURING 1913, FOR EAVES GUTTERING.

Notices served	131	—	—
„ complied with	—	115	—
„ left over, 1913	—	16	—
„ since completed (during 1914)	—	—	8
Prosecutions	—	—	6
	131	131	14

These figures represent the work of the latter part of the year, after the arrival of the two Sanitary Inspectors.

The relation between the rainfall and the malaria figure shows, as usual, a sharp rise following rain.

Dr. B. W. Cherrett, Medical Officer of Health, Nairobi, gives the following information in his annual report :—

MALARIA TABLE FOR THE LAST FIVE YEARS.

EUROPEAN HOSPITAL, NAIROBI.

Year.	Total Admissions.	Mortality.
1909	17	Nil
1910	18	—
1911	27	—
1912	37	—
1913	31	1

CIVIL HOSPITAL, NAIROBI.

(Goans, Asiatics and Africans.)

Year.	Total Indoor.	Admissions Outdoor.	Mortality Indoor and Outdoor.
1909	90	502	16
1910	76	825	21
1911	53	688	28
1912	209	590	30
1913	546	398	64

This disease contributed 11·8 per cent. of the total number of deaths. The following table shows the annual number of deaths for the last five years :—

1909.	1910.	1911.	1912.	1913.
16	21	28	30	64

The different races were affected as follows :—

<i>Europeans.</i>	<i>Eur Asians.</i>	<i>Goans.</i>	<i>Asiatics.</i>	<i>Africans.</i>	
1	1	4	20	38	= 64

As regards the number of people primarily infected in the township it is impossible to say, but in the Asiatic portion of the town, owing to the lack of drainage and dirty habits of the population, a most insanitary state of affairs prevails, and *Anopheline* and other mosquitoes breed freely, so a large number of people are probably infected in these portions of the town.

A large number of native labourers are infected on their way to and during their stay in Nairobi.

Thirty-one Europeans were admitted to the European Hospital, suffering from this disease, one died.

Dr. A. Mouat, Medical Officer of Health, Kisumu, gives the following information in his annual report:—

“A large number of cases of malaria came under treatment during the year, all of the subtertian variety.

“When the disease was most prevalent, it was reported that the Uganda Railway had on the sick list 30 per cent. of their employees. Fortunately in the latter part of the year there has been little rain, followed by a fall in the lake level, and partial drying of the large swamp at the head of the Kavirondo Gulf.

“Cases were most numerous at the Indian Bazaar, Loco Landies, and in temporary Landies recently put up; later the subordinates and their servants, who live at the more healthily situated areas of the town, became infected, after which a few cases occurred amongst the Europeans.”

Mosquito protection of houses has not yet received the attention it deserves, as the attached list shows:—

Mombasa	...	...	...	...	...	0
Nairobi	...	...	...	...	...	0
Kisumu, wholly protected	...	...	...	...	...	4
„ partially	...	...	...	...	...	5
„ with mosquito room	...	...	...	...	...	1

No hospital in the Protectorate has yet been rendered mosquito proof.

TRYPANOSOMIASIS.

The actual number of cases treated during the year was 6, of whom 3 died. These cases were observed accidentally in general practice at the following places:—

Place.				Cases.	Deaths.
Mombasa	...	...	...	1	1
Nakuru	...	...	...	3	1
Kisumu	...	...	...	1	1
Mumias	...	...	...	1	—
TOTAL				6	3

No special measures are actively employed to limit or control the disease in Kavirondo.

YELLOW FEVER.

No cases have been reported.

FILARIASIS.

Both Fort Hall and Kisumu report cases, but it is satisfactory to record that the number of observed cases is small.

EPIDEMIC DISEASES.

GENERAL.

The year 1913 will long be remembered as one in which the presence of epidemic disease has exerted an important influence in the development of the country. Not only has its presence affected the freest and unhampered intercourse between it and other countries, both on the seaboard and on the Victoria Nyanza, where the imposition of necessary measures has necessitated an increased expenditure to maintain trade; but its presence has also affected one of the chief assets of the country—the native labour supply, where an epidemic of unestimated virulence and mortality has occurred.

Never within the history of the Protectorate, and certainly the knowledge of the present generation, has occasion arisen to draw attention to the existence of epidemics of plague, cerebro-spinal meningitis and small-pox running concurrently with the presence of malaria, chicken-pox, measles and dysentery to the extent that has occurred.

To meet the exigencies of the case, with the exception of a few indifferently built and inadequately equipped huts at Nairobi and Kisumu, the sanitation division was unprepared in any way to make the special and sustained efforts that were necessary to combat such a combination of conditions, and I desire to express my unqualified thanks to all officials and private individuals for the zeal and loyalty they have displayed both in towns and in out-districts in successfully carrying out their duties under very trying circumstances.

The statistical returns show the numbers of recorded cases of infectious disease that have come under observation at the various hospitals and dispensaries in the Protectorate during 1913.

PLAGUE.

Plague was found to be epidemic in the districts of Mombasa and Kisumu, and sporadic at Nairobi, Machakos, N'darugu, Kyambu and Dagoretti.

During the year the total number of cases certified by the personnel of the Medical Department was:—

Locality.	Cases.	Deaths.	Percentage of Mortality.
Mombasa	208	184	88.46
Nairobi	25	19	76.00
Machakos	4	2	50.00
N'darugu	4	4	100.00
Kisumu*	31	27	87.09
TOTAL	272	236	86.76

but this by no means represents the extent and distribution of the disease.

The epidemic at Mombasa is carefully described in the special report written by Captain Skelton, included under head "VI.—Scientific" (pages 67 to 90).

* One European (Chief Engineer) died from plague on board a Lake Steamer in August, two days from Kisumu. This case is not included in the above return.

The types observed were both bubonic, septicæmic and pneumonic in the proportions here shown.

Type.	Mombasa.	Nairobi.	Kisumu.	Other localities.
Bubonic	154	23	21	8
Septicæmic	9	1	3	—
Pneumonic	45	1	7	—
TOTAL	208	25	31	8

And according to nationalities :—

	Europeans.		Asiatics.		Natives.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Mombasa	—	—	137	119	71	65	208	184
Nairobi	1	—	13	8	11	11	25	19
Kisumu	—	—	12	11	19	16	31	27
Other Places	—	—	2	1	6	5	8	6
TOTAL	1	—	164	139	107	97	272	236

During the year rat plague was reported to exist at Mombasa and some of the surrounding villages, Nairobi, Machakos, Kyambu, Dagoretti, Nakuru and Kisumu, and special work to compass their destruction was immediately undertaken, and I desire to acknowledge the help and assistance voluntarily afforded by some of the gentlemen resident in the Kyambu district in this direction.

The labour performed by the rat gangs in the three principal townships is shown in the annexed tables.

Township.	Rats caught.	No. of areas where infected rats were found.
Mombasa	1,656	Generally
Nairobi	2,882	8
Kisumu	10,183	12

Rat plague was found to exist in some places where happily there is every reason to believe the human escaped.

Shortly after the existence of plague was discovered at Mombasa, the work of the sanitary division was threatened with serious interference. Owing to a misunderstanding arising over the segregation of a purdah woman, a general strike was declared which seriously affected the work at the port. But it is satisfactory to record that differences were soon adjusted, and a thoroughly good feeling established, leading to the voluntary establishment of five segregation and plague camps by the various Indian communities, and a whole-hearted support generally given by them to assist the Government. But it is questionable if such material assistance can be relied on in the future.

Extreme measures were adopted, house-to-house visitation, fumigation, segregation of sick and contacts, inspection of all persons leaving and entering the island and, most important of all, a general inoculation of the community with Haffkine's prophylactic in 48,478 instances. This part of the work, at all centres in the Protectorate where it was carried out, has not

received the legal safeguard that is essential, and though some 61,974 (in Mombasa 48,478, Nairobi 576, and Kisumu 12,920) persons have been partially or in whole immunized, this work must immediately cease on threatened litigation being instituted by a few conscientious objectors.

The general distribution of this disease (plague), apart from other epidemic invasions in this country, is a matter that calls for immediate recognition; the prosperity of the country is shown, *inter alia*, by the rapid extension of Indian settlements and trading centres in all parts; and here as in other lands plague is certainly following the trade routes. While its gradual extension is observed, the means provided to combat it in respect of isolation camps and hospitals and general organisation to control the movements of persons from infected to clean areas, and *vice versa*, is totally inadequate.

One fact is pre-eminently established—that plague is following the trade routes, and that the Uganda Railway with its fleet of lake steamers is a direct agent, not only of introducing the disease by means of infected cargoes brought from places outside the Protectorate, but also of transmitting it from Kisumu to other lake ports.

Instances have occurred where plague-infected rats have been found in cotton and hides brought from the lake ports into Kisumu, and again after fumigation of the ship at that port, officers and crew have succumbed to the disease a day or so subsequent to the departure of the ship from Kisumu. Cargo brought into Kisumu by steamers is generally immediately placed on trucks and sent down the line to Mombasa for shipment overseas, and the discovery of infected rats in it has at times not been made prior to the despatch of such cargo, and indeed from the nature of things an investigation is not always possible. The history of the incidence of plague at Kisumu shows that the port itself is an endemic centre, and its periodical appearance within the township, both before and since European occupation, establishes the fact that a potential, if not actual, menace to the health of the whole community in East Africa exists at one of the terminals of the chief arteries of communication in the country—the Uganda Railway, and I regret to report that the practical and efficient means of dealing with such a condition are by no means on the basis and establishment that is requisite.

Ships are not provided with means of fumigation on board, neither can such a process be undertaken at the quarantine anchorage, before the vessel has had communication with the shore, from lack of equipment.

When the cargo is landed it may be stored in godowns that are not rat-proof, and the construction of piers and their basements has not been sufficiently directed to the exclusion of facilities for the harbouring and breeding of rats.

SMALL-POX.

Localised epidemics have occurred at the following places :—

District.	Cases.	Deaths.
Mombasa	33	10
Nairobi	43	12
Eldoret and Londiani ...	20	—
Kenia	70	8
TOTAL	166	30

Great activity has been displayed in carrying out systematic vaccination in districts where the disease threatened to assume grave proportions; and a

table is attached of the work done. It is urged that vaccination should be part of the routine treatment available at every medical station in the country; last year it was performed at 28 out of a total of 34 stations.

The lymph used was prepared at the Government Laboratory :—

Glycerinated, in tubes of 5 doses = 370,802
Desiccated, in ampules of 36 doses = 5,400

376,202

Table showing the number of cases of small-pox for the last four years, and number of vaccinations performed :—

	1913.	1912.	1911.	1910.
Cases of small-pox	166	323	159	21
Vaccinations	131,757	79,252	15,167	14,353

STATEMENT SHOWING THE PLACES AND NUMBER OF
VACCINATIONS PERFORMED AT EACH DURING THE
YEAR 1913.

STATIONS.	VACCINATIONS.			
	Number.	Failed.	Perfect.	Unknown.
Malindi	1,344	10	762	572
Mombasa	8,169	—	6	8,163
Voi	229	23	180	26
Kilindini	—	—	—	—
Lamu	52	16	22	14
Shimba Hills	1	—	—	1
Eldoret	71	9	62	—
Machakos	113	59	54	—
Nairobi Police and Prison	581	168	397	16
Naivasha	211	36	128	47
Londiani	308	—	—	308
Kyambu	3,293	—	—	3,293
Baringo	670	—	670	—
Nairobi, M.O.H.	15,264	—	—	15,264
N'darugu Prison Camp	198	—	—	198
Nandi	302	—	—	302
Kisii	229	20	127	82
Embu	5,508	—	4,950	558
Fort Hall	46,060	—	32,315	13,745
Nyeri	9,478	286	9,040	152
Mumias	162	8	34	120
Kisumu	24,439	—	—	24,439
Meru	13,843	—	—	13,843
Kericho	140	—	—	140
Marsabit	37	—	20	17
Yante	547	12	535	—
Gobwen	480	110	370	—
Kismayu	28	5	11	12
TOTAL	131,757	762	49,683	81,312

DYSENTERY.

The records show that 1,814 cases with 102 deaths were treated in the Government Hospitals and Dispensaries.

Mombasa, Nairobi and Kisumu account for nearly half the total number of cases coming under observation.

	Mombasa.		Nairobi.		Kisumu.		Other Localities.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Europeans	4	1	9	1	—	—	18	—
Other Nationalities	293	25	343	24	243	5	904	46
TOTAL	297	26	352	25	243	5	922	46

The condition was observed in 33 out of a total of 34 medical stations in the Protectorate. It would appear that the bacillary type is accountable for the majority of cases. Medical Officers in charge of stations have drawn attention to the most encouraging results following the exhibition of emetin. The causes can generally be assigned to polluted water supplies and fly infection.

ENTERIC FEVER.

The reported cases are as follows :—

	Mombasa.		Nairobi.		Other Localities.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Europeans	4	—	15	1	6	—
Other Nationalities	4	—	—	—	4	—
TOTAL	8	—	15	1	10	—

The extent to which this disease is distributed among the various native tribes is unknown. Arrangements are being made to provide facilities for inoculation, both preventive and curative, in the near future.

CEREBRO-SPINAL MENINGITIS.

On the 4th of May the Medical Officer in charge of the Native Civil Hospital, Nairobi, reported that a case of cerebro-spinal meningitis had been admitted into hospital, the patient coming from the railway quarters; within a few days others were found in an hotel, Police Lines, and bazaar. Towards the end of the month reports were received from Kyambu (7 miles from Nairobi due E.), Dagoretti (7 miles from Nairobi due W.), Kikuyu (14 miles from Nairobi due N.), that an unusual sick- and death-rate had been observed. Investigation showed that cerebro-spinal meningitis was rife in these districts.

Commence-
ment of
Epidemic.

Geographical
distribution.

In June, July and August the disease had spread with great virulence through Ukamba, Naivasha and Kenia, while reports from this time to the end of the year showed that Seyidie and Nyanza Provinces, as well as stations on the railway line and outlying places such as Machakos and Kitui, had been invaded.

From the date of the first reported case in Nairobi (May, 1913) to the end of the year the invasion of the provinces followed this order:—

1. Ukamba Province	} <i>Vide Map.</i>
2. Kenia "	
3. Naivasha "	
4. Seyidie "	
5. Nyanza "	
6. Tanaland "	

From the available statistics of case incidence and deaths supplied, it might be inferred that the epidemic was not of a serious nature; this in reality is not so. It is the most widely distributed and fatal epidemic that has ever been recorded in the history of the Protectorate, unfortunately affecting those districts from whence the labour supply of the country is principally derived; and though its effect on the birth-rate is a matter of conjecture only, the recorded fact that its virulence was noticed chiefly among young adults and children suggests that its presence will exert some unfavourable influence on the future labour supply.

The published returns are those obtained from the Medical Staff and Medical Practitioners only, and refer to observed cases.

The extent and severity of the outbreak, which occurred concurrently with that of plague, in various parts of the Protectorate, taxed the capacity of the Medical Staff to the utmost, and precluded the possibility of either checking its spread in any locality, with the exception of Nairobi township, or of rendering that aid and assistance which the occasion demanded.

Little could be done beyond segregating the sick and dying in out-stations, and sending Medical Officers and members of the subordinate staff through the out-districts to investigate and report. For this purpose six of the personnel of the department were sent into districts within the Nyanza, Kenia and Ukamba Provinces; and their reports are supplemented by those of the Medical Missionary Staff, whose co-operation and assistance was loyally and whole-heartedly given, as well as those of the Administrative Officers, who were asked to help in any way possible, and who employed every means at their disposal to help the natives.

Case
incidence.

Excluding townships and out-stations, no record could possibly be kept of the total number of cases that occurred, as the virulence of the epidemic was noticed principally in the Native Reserves and in places where information was difficult to obtain; but the following extracts from reports clearly show that the magnitude of the epidemic has not been underestimated.

Extract of Reports to 1st January, 1914:—

DISTRICT COMMISSIONER, DAGORETTI.

"Out of a total count of three locations in this sub-district of 10,615 natives, from inquiries made I find that there have been 360 deaths directly attributed to cerebro-spinal meningitis, or rather over 3 per cent. of the population and the mortality for the district at nearly 1,700 persons."

DR. ARTHUR, SCOTCH MISSION.

"Kikuyu, Limoru, Dagoretti, Kabete, 50 per cent. deaths. Has been considerable mortality. Hundreds of cases in this Province, and in Kenia it is worse."

DISTRICT COMMISSIONER, MACHAKOS.

"Many deaths and sickness, symptoms of which appear to be cerebro-spinal meningitis, and unusual mortality."

ASSISTANT DISTRICT COMMISSIONER, KYAMBU.

"Unable to get labour for my roads, the reason being that the men have returned to their villages to bury their wives and children. In my opinion hundreds have died."

KENIA PROVINCE, MEDICAL OFFICER, FORT HALL.

"It is quite impossible to estimate the number of cases with the death-roll. As a rough estimate I should say there have been 15,000, with a very large percentage of deaths."

DISTRICT COMMISSIONER, NYERI.

"The following total gives the population and the number of deaths among chiefs who have been able to furnish figures:—

Approximate population.	Deaths from Meningitis.	Average.
61,900	1,442	1 in 48

DR. PHILIP, CHURCH OF SCOTLAND MISSION.

"Thousands have died."

DISTRICT COMMISSIONER, FORT HALL.

"Within the last four months, however, the sickness has broken out with great violence, originating from Kibarabaras country and its old starting place, Njiris, and gradually spreading to the eastward. The number of deaths that have occurred it is utterly impossible to estimate. I can only give the Kikuyu estimate of percentage of deaths of those attacked, which is—about 50 per cent. of the men attacked have died, about 75 per cent. of the women attacked have died, and hardly a child who has once contracted the disease has lived. I have heard of six children dying from one family in three days. To summarise my information, it appears that the epidemic has left the north-western and western parts of the district, and is now more or less confined to the eastern half, where it apparently continues to rage with unabated force. A Compounder in a recent tour of inspection authorised by the Medical Officer, Fort Hall, from the Thika along the Native Reserve to Waithaiga and its vicinity, brought back the following statistics:—Total deaths, 545, which gives a very fair proportionate idea of what the ravages and virulence of the disease must have been throughout the district."

The greatest virulence and highest death-rates occurred in the highlands in Ukamba, Kenia, Naivasha and North Kavirondo, *i.e.*, at an elevation of between 3,500 to 7,000 feet; and while the coast belt remained practically untouched, it is of great interest to record the fact that the number of cases was greatest during the cold weather, *viz.*, May, June, July and August, and case incidence gradually declined as the hot weather set in. This period also coincides with that of comparatively dry weather.

Influence of
Season.

Tables showing the rainfall and temperature for places where such observations have been taken are given in Table V.

The total number of deaths recorded by the Medical Staff was :—

Ukamba Province	202
Kenia „	594
Naivasha „	25
Tanaland and Seyidie Province... ..	10 Coast belt.
Nyanza Province	297
	<hr/>
	1,128
	<hr/>

MEANS ADOPTED TO COPE WITH THE EPIDEMIC.

HOSPITALS AND SEGREGATION CAMPS.

UKAMBA PROVINCE.

Nairobi.—(1) A ward in the existing Quarantine Hospital reserved; Medical Officer of Health in charge.

(2) Out-boarding establishment of European School closed, and opened as a fully-equipped hospital. Resident Surgical Officer, European Hospital, in charge. Temporary Matron, Nursing Sister MacMillan; Temporary Nurse, Miss Monson.

(3) A ward reserved in the Native Civil Hospital; Medical Officer, Native Civil Hospital, in charge.

(4) A ward reserved in the European Hospital; Resident Surgical Officer in charge.

Machakos.—Huts erected in quarantine area. Sub-Assistant Surgeon in charge.

Kitui.—Huts erected in quarantine area. Sub-Assistant Surgeon in charge.

Kyambu.—Huts and tents erected in quarantine area. Sub-Assistant Surgeon in charge.

Dagoretti.—Huts erected. Patients visited by Medical Staff and Missionary Doctors.

Kikuyu and Escarpment.—Huts erected and segregation established where possible. This area was visited by the Medical Staff, Drs. van Someren, Radford and Cherrett, and Sub-Assistant Surgeons from Nairobi and Kyambu.

Kenia Province.—Quarantine stations established at Fort Hall, Meru and Nyeri, and the entire Medical Staff were engaged in patrolling the district.

Nyanza Province.—The Quarantine Camp at Kisumu was utilised, where the Medical Officer of Health and subordinate staff were in charge. Areas in North Kavirondo were patrolled by the Medical Officer of Health and Assistant Medical Officer of Health, and a Medical Officer temporarily engaged.

Segregation camps were also established by the chiefs in many places, who maintained a system of quarantine in the Nzoia district; this work was voluntarily undertaken by them.

Seyidie Province.—Patients and contacts were removed to a temporary segregation within that used for plague cases, and were treated by the Special Plague Officer.

Quarantine camps were established at Gazi and Malindi; at the latter place the Assistant Surgeon was placed in charge.

Tanaland Province.—A quarantine camp was established on an island close to the town of Lamu under the care of the Medical Officer.

Every effort was made by the Staff to eliminate errors in diagnosis, and instructions were issued that where practicable lumbar puncture should be performed and a bacteriological examination made. At Nairobi the work in connection with examination of fluids and cultures was admirably performed by the Bacteriologist, Dr. P. H. Ross. Diagnosis and treatment.

A paper written by Drs. J. O. Shircore and P. H. Ross on cerebro-spinal meningitis was published in the "Transactions of the Society of Tropical Medicine and Hygiene," Vol. VII., No. 2. A report on eight cases amongst Europeans by Dr. J. L. Gilks is given in Section 6.

The symptoms of the disease therein described and the methods of treatment adopted are those that were generally observed in all parts of the country; but, with the exception of Nairobi, Mombasa and Kisumu, a bacteriological examination could not be undertaken, and the diagnosis was based on clinical observation and the appearance of the spinal fluid drawn off by lumbar puncture.

Publicity was given to the existence of the disease by notification in the Press, circularising all Administrative and Medical Officers and a section of the public and missionaries, and a circular issued is attached as an appendix.

HELMINTHIC DISEASES.

Ankylostomiasis.—This disease is reported to have come under observation at all the coast centres, where its wide distribution along the Coast Belt has long been recognised. It is of interest to observe that one case has been reported at Nyeri in the Kenia Province—an individual who had returned to his home from the coast. The possibility of infection being thus carried into the Highlands is a matter that should receive attention, as it is from the Kenia and Kavirondo Provinces that labourers are chiefly recruited.

Tæniasis.—The presence of this infection has been recognised in all parts of the country, but from the recorded cases it is not a high one.

Bilharzia.—From the returns it appears that this condition is limited to the Coast Belt; cases are reported to have come under observation at Mombasa and Kismayu. } spurs

Guinea-worm.—I am glad to say that no case has been reported.

(iii.) GENERAL MEASURES.

SEWAGE DISPOSAL.

In no township within the Protectorate has any water-borne sewage scheme been installed, but in a few isolated instances septic tanks have been added to residences; with these exceptions, night soil is generally disposed of by dumping into the sea, trenching, reception into cess pools, or distribution on the ground.

At Mombasa this material from the European Quarters is collected in iron tank trollies and dumped near the light house at the mouth of the harbour, in consequence, at certain periods during the N.E. monsoon the foreshore is littered with undesirable material deposited there by the current. At the dumping ground no provision is made for washing out the soiled tank trollies, and at no place in the island is this most necessary operation put into practice.

The duplicate bucket system is not installed.

In the Native and Indian towns, latrine pits can be found inside almost every house or hut, especially in the old Arab houses, where the retention of

such a feature is practically universal; needless to say none of these pits or funnels leading to them are provided with traps or ventilating shafts. As it is often the case that these cess pits are in close relation with the wells which are bored in coral rag, the danger to the community by their retention is obvious.

Nairobi, Kisumu, Machakos, Nakuru, and some other towns have adopted the trenching system; it is necessary to emphasize the importance of maintaining proper supervision, and in the selection of suitable ground for the purpose. At Kisumu systematic endeavours are being made to utilise this ground for the cultivation of crops.

Nairobi sewage disposal calls for more than a passing reference. The drains that have been constructed under the Bransby-Williams scheme initiated in 1907 were intended to take flood water, surface drainage, and effluents of nearly all descriptions, with the exception of water-borne sewage; but since the time the scheme was evolved Nairobi has developed in a manner that precludes the possibility of their extended use for other than the purposes mentioned; land on both sides of the Nairobi River for its entire length to the junction with the Athi has been alienated as farms, depending on the river for practically their sole water supply; and to throw the sewage of the township untreated in any way into it, can only be regarded as a measure that would exert an inimical effect on the public health, and indeed involve the Government in possible litigation.

It is urged that due consideration be given to a water-borne scheme of sewage disposal to serve the densely inhabited areas of the town totally independent of any existing drains; the sewage to be led from collecting depôts to a sewage farm on the outskirts of the township, and the effluent after appropriate treatment discharged into the Nairobi River.

In townships where cess pools are not installed, a bucket system is in operation, but in no instance does any township within the Protectorate possess any effective organisation by which a duplicate bucket system can be carried into effect, or where proper scientific means exist for sterilizing the soiled buckets.

Special attention is directed to the absence of means afforded in the Protectorate Hospitals for the disposal of enteric stools; in some instances this material is placed in receptacles generally used by the entire establishment, and special precautions are not, in all cases, adopted to prevent fly infection. The existing latrine arrangements at the European Hospital, Nairobi, are not constructed or maintained in a manner that in any way can be regarded as sanitary, or fulfilling even ordinary requirements; their use is common to both sexes, the adoption of the open bucket system, absence of means for treating enteric stools and for scalding bed pans, the retention of night soil for 24 hours on the premises, the total absence of drainage for the boys' latrines, are all matters requiring immediate attention, and that previous reports have failed to remedy.

With the exception of the towns of Mombasa, Nairobi, Nakuru, and Kisumu, systematic methods in dealing with night soil removal are conspicuous by their absence, and the condition of some is deplorable in consequence.

The difficulty and expense of sanitating some of the stations in this country is great. In many of these residences are extremely scattered, the slope of the hill considerable, so that anything like a comprehensive system of sewers is out of the question, both on the ground of expense, and on account of engineering difficulties. A very material improvement, however, can be made in the sanitation of bazaars, more crowded areas, and isolated units such as gaols and hospitals, by putting in skeleton sewers, dumping depôts and connected public latrines; the sewer terminating in a small septic tank situated

below the area or building, and discharging the effluent into streams; these may be regarded as the main lines on which the disposal of sewage, and disposing of night soil may reasonably be expected to produce an improvement in the general sanitation of towns and communities residing under tropical conditions. The objections to a continuance of a hand removal system are manifold. By far the most important is the fact that faecal matter, dirty buckets and receptacles are left exposed for many hours at a time open to the air, and accessible to flies; the very best method of reducing this pest being a rapid and satisfactory disposal of all mal-odorous rubbish. The system depends on the satisfactory work performed by a class of persons daily becoming more difficult to obtain and supervise; while the expense incurred by the maintenance of a large staff, equipment and plant is out of all proportion to the amount of work performed, and cannot be considered economical from a financial point of view.

SCAVENGING.

The responsibility for the removal of house refuse and general scavenging in the towns of Mombasa, Nakuru, Kisumu, and some of the smaller townships is vested in the Administration, and in the case of Nairobi in the Municipal Committee, a body of officials and representatives from the general public nominated by His Excellency the Governor.

In no case can it be said that the work is satisfactorily performed. Attention has already been drawn to the necessity that existed during the plague epidemic at Mombasa, for the Health Authorities to temporarily assume control in this direction, and extend this necessary service, facilities for doing so being afforded by a special grant of money for that purpose. At Nairobi the Municipal Committee is fully alive to the fact that the means at their disposal, both in respect of plant and personnel, are too deficient to successfully carry out their responsibilities; and it is hoped that efforts will be made to place this Department on a satisfactory basis.

The law, as it at present stands, necessitates that specific sanction should be given by a Town Clerk, Superintendent of Conservancy or District Officer before any action for breaches of Township Regulations can be taken to Court, the responsibility of the Medical Officers of Health and Sanitary Inspectors being restricted to giving advice as to what should be done. This dual control, both as regards effective work and its actual performance, has resulted in many misunderstandings, and has frequently prejudiced those decisions of the Courts in favour of granting relief to a delinquent, who, had there been no loop hole for escape such as the existing procedure now permits, would certainly have been convicted.

Though it may be admitted that complaints against local authorities in sanitary matters are often made without much discrimination, and Health Officers are given too little credit for what they accomplish, there can be no question that dual authority and divided responsibility adversely affect the results desired. It is desirable that a revision of the present regulations be made regarding matters of sanitation, so that the sanitation of towns and districts may be accomplished by the authority of one department of the Government, instead of by several departments and public bodies as is now the case.

The passing of a new Public Health Act, the essentials of which have received Professor Simpson's careful consideration, will be a means towards that end.

WATER SUPPLY.

There are certain matters in connection with the existing or proposed water supplies for the various townships that call for comment; principles that should be adopted and carried into effect, in order that an assurance may be given to the public that the supply is uncontaminated.

It must be accepted as a postulate that all African rivers are polluted, and if their waters are distributed among a community without first receiving appropriate filtration and treatment, the public health is jeopardised.

Safeguarding the source should be the first consideration, and at Nairobi this cannot be regarded as satisfactory, in any way, the Health Department should need no support whatever from the Laboratory Division to condemn a water supply to which polluting matters can gain access. Further, the bacteriological and general analyses establish beyond question that the supply is polluted, and to-day contains the essential bacteriological elements for distributing disease. The fact that the epidemic of enteric in Nairobi in 1911 was traced to an infected water supply should not be forgotten, the conditions prevailing at the source differing very little from that from which the present supply is derived. Another point that calls for immediate remedy is the provision that should be made for coating the inside of all the distributing zinc pipes with Angus Smith solution, as the solvent action of the water on the zinc is very great.

Similar examinations of the proposed supplies for the townships of Nakuru and Kisumu establish the fact that water derived from the proposed sources if delivered in an untreated manner to the general public will be a source of danger to, rather than a means of preserving, the public health.

Safeguarding the sources, filtration and storage of waters, and in some cases their chemical treatment, are essentials that must be considered, and the cost for their inclusion should be estimated in all cases where supplies of this nature are contemplated.

Systematic bacteriological and analytical examinations of waters derived from actual and proposed sources have been made by the Bacteriologist and Analyst throughout the year; and the unanimous conclusions arrived at but confirm the opinions expressed.

DRAINAGE.

With the exception of Nairobi township, where the Bransby-Williams scheme is now well in hand, and every effort is being made to hasten its completion, no town possesses a drainage scheme of a kind that can be regarded as affording the protection to the public health that is essential. At Mombasa and in the scattered residential districts, thanks to the absorbent nature of the ground, the need for such has hardly arisen; but in the densely overcrowded areas the necessity for its inclusion is urgent. This need will be accentuated when the new water supply is distributed by means of stand pipes, and the existing wells closed.

A large amount of work performed by the mosquito destruction gangs is caused by the absence of adequate provision for the removal of waste water. The object lesson at Nakuru is instructive; here the chief mosquito breeding *foci* can be located in an earth drain receiving the overflow from the railway tanks and shops.

Hitherto, in order to satisfy the urgent demand that has arisen to supply house accommodation for all classes of the rapidly increasing population, sanitation in the direction of appropriate surface drainage has not received the attention it deserves; this is especially noticeable in the more crowded areas in Nairobi near the River Road and adjoining properties, where development is rapidly being pushed in a manner practically regardless of sanitary requirements; the serving of this area by the main surface drainage scheme is a matter calling for immediate attention; and though much must be done by the respective owners, it is but reasonable to expect that the portion of the general drainage scheme which the Government has declared its intention to construct shall be proceeded with without delay. This is rendered necessary not only on the grounds that it is an integral part of the general scheme, but also because it receives some of the effluent from a very congested

area, which from the nature of things is now retained on plot areas or discharged on to the main roads.

Special attention is directed to the necessity of putting in an adequate system of plot drainage for the following in Nairobi:—Government House, the Prison and Police Depôt, Markets, Indian Bazaar, European Hospital, European School, River Road, as well as in places and Government buildings generally in the Protectorate.

BUSH CLEARING.

Special attention is directed to the reports of work done by the Sanitary Divisions in the three principal towns as shown in Table IV.

The work represents not only bush cutting, but the more important "root stubbing"—it being realised that cutting bush *per se*, performed twice yearly, entails an unnecessary amount of labour and unjustifiable expenditure—and the efforts in this direction are most encouraging. The alterations in the general appearance of certain areas in Mombasa, Nairobi and Kisumu, due to steady, sustained efforts, are most surprising and beneficial in every way.

Dr. R. Small, Medical Officer of Health, Mombasa, states that owing to shortage of labour and the calls for an increased number of hands in dealing with specifically anti-plague measures, this work was hindered during the first part of the year.

By a piece of good fortune, however, the labour at his disposal was increased towards the end of the year, and a most thorough clearing was rendered possible.

The southern part of the island is now clear of bush, with the exception of a part the ownership of which is disputed, and it was necessary to await the decision of the courts before completing this useful work.

It being impossible to expend Government funds on clearing ground which was not certainly Government property, and as the ownership is doubtful, it would be impossible to recover the cost.

Dr. B. W. Cherrett, Medical Officer of Health, Nairobi, states that the whole of the township during the year has been cleared of bush and rank vegetation by convicts lent by the District Commissioner. The number at his disposal varied between 20 and 40.

Acreage cleared by convicts, 1,229 acres.

The Railway have cleared their own zone. This clearing of bush has been a great improvement, as in the past this bush has been the latrine for natives, dumping ground for rubbish and a harbour for mosquitoes, besides being an eye-sore. The convicts have also been employed in filling up depressions and borrow pits, and in the draining of swamps.

At Kisumu an area of nearly four square miles has been cleared and stumped.

The following shows the work done under this heading at the three principal towns as reported by the Medical Officers of Health:—

CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE— MOMBASA.

	1911.	1912.	1913.
Number of acres of weeds, grass and vegetation cut and removed.	Approx. 150 acres.	Approx. 150 acres.	Approx. 1,000 acres.
Average frequency of clearance of rank vegetation on same area.	6 months.	6 months.	6 months.

CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE—
NAIROBI.

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed.	—	70,000	5,481,340
Average frequency of clearance of rank vegetation on same area.	Twice a year.	Monthly.	When necessary.

CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE—
KISUMU.

	1911.	1912.	1913.
Number of square miles of weeds, grass and vegetation cut and removed.	—	—	2 square miles.
Average frequency of clearance of rank vegetation on same area.	—	—	Twice yearly.

Outside the three townships mentioned little, if any, effort has been made to undertake systematic work of this nature. Special attention is being directed to bush cutting in some of the known sleeping sickness areas on the Kavirondo Gulf, this step being rendered necessary by the fuel-cutting operations for the Uganda Railway. No person from a clean district will be permitted to be employed in these regions, the operations being conducted by the resident community. Special rules to be observed in these localities have been drawn up and are about to be enforced.

HOUSING.

A general review of the conditions under which the Native and Asiatic communities reside within the principal towns of the Protectorate establishes the fact that a great contributory cause in the permanence of disease is overcrowding. In the past it may have been impossible to reserve sufficient ground for housing the various communities in locations erected and maintained on sanitary lines. In consequence the increased prosperity and general development of the country has necessitated the inclusion of thousands of individuals, each unit of whom who is employed must be regarded as an economic necessity, for whom housing accommodation has not been erected on a scale commensurate with their requirements in any particular.

The demand for accommodation, therefore, has in every instance and locality exceeded that available, and overcrowding has become an essential condition of life. The Asiatic, especially in centres such as Mombasa, the Bazaars at Nairobi, Kisumu, Nakuru and other towns, and in localities such as River Road, Nairobi, has met the difficulty by an ingenious system of sub-leasing, by which a few square feet of space within the dwelling are let to tenants—a proceeding that comes within the protection of the law, and has hitherto circumvented any attempts that legislation, in respect of Lodging-house Rules, was intended to remedy.

The system provides abundant compensation for the investor in house property, while the unfortunate sub-tenant alone suffers, who, by force of circumstances, is compelled to pay an exorbitant rental for insanitary and undesirable accommodation.

The attached tables demonstrate the system that generally obtains to-day in Nairobi.

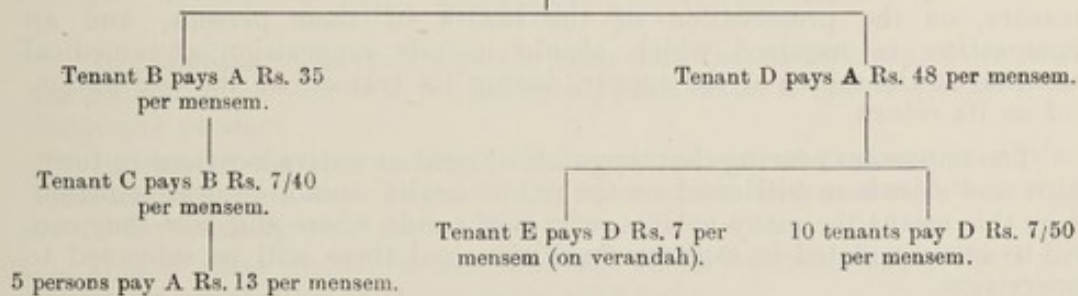
ABSTRACT FROM RETURN SUBMITTED BY MEDICAL OFFICER OF HEALTH, NAIROBI, 17TH DECEMBER, 1913.

Original plot No. 7 of No. 747 Nairobi.

100 feet x 30 feet.

Rental paid by owner A to Government, Rs. 48 per annum.

Subdivided into two portions.

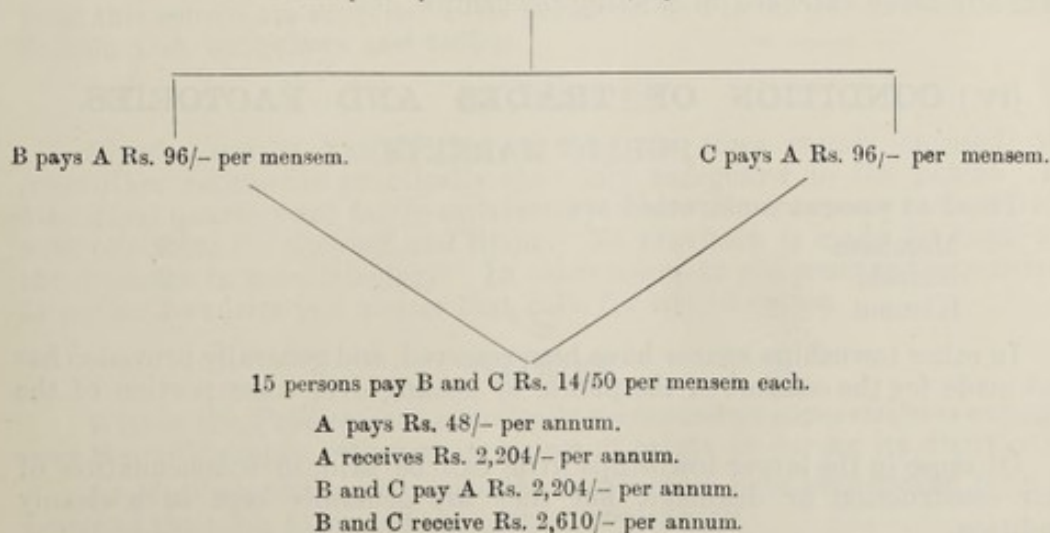


Original cost of buildings about Rs. 1,500, total number of persons residing on plot 25.

Original owner A pays ...	Rs. 48/-	per annum rent.
" " A receives ...	Rs. 1776/-	" " "
Sub-tenants B and D pay ...	Rs. 996/-	" " "
" " B and D receive	Rs. 984/-	" " "

River Road 100 feet x 75 feet plot area.

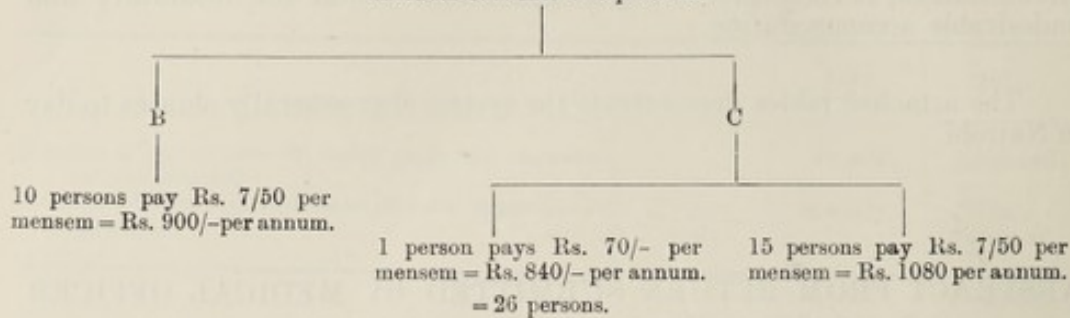
Rental paid by owner A. Rs. 48/- per annum.



Plot 20, No. 734.

100 feet x 30 feet.

A subdivides into two portions.



At Kisumu a camp has been established for the retention of labourers for a few days, coming from the Kavirondo Province, where medical examination, vaccination and inoculation are performed prior to their despatch to other parts of the Protectorate. This represents the only attempt made to exercise supervision over the Native Labour Supply.

The extension of this procedure to other parts of the country is most essential, as the transfer of labour from infected into clear districts, and vice versa, is daily taking place. The prosperity of the country depends, in a great measure, on the preservation of the health of these persons, and an organisation is required which should include supervision and medical attention at the source of the supply, during its transit, at its destination, and on its return.

The important bearing that the establishment of native locations in townships and elsewhere will exert on the public health cannot be overestimated, as by this means the many natives, who now reside where and how they can, will be accommodated in sanitary dwellings, and these will be subjected to supervision.

Acquisition of suitable land for this purpose in Mombasa, and the adjustment of preliminaries for the utilisation of such as are available in other places, represent the means that have been adopted in the realisation of a scheme that is considered to be one of the most important measures in the country.

The Health Board appointed to act under the preliminary Public Health Ordinance No. 10 of October, 1913 has appreciated the importance of defining zones for the segregation of races, business and residential areas, and open spaces in any town-planning scheme considered by it, and these principles are gradually being extended to existing townships.

(iv.) CONDITION OF TRADES AND FACTORIES. PUBLIC MARKETS.

Those at present constructed are :—

Mombasa	...	...	...	...	...	...	...	2
Nairobi	...	...	...	...	...	...	...	2
Kisumu	...	...	...	...	...	...	...	1

In other townships spaces have been reserved, and generally provision has been made for the comfort of the public by roofing over some portion of the space.

Of those in the larger townships little can be said in commendation of their construction or drainage, but they are generally kept in a cleanly condition.

SLAUGHTER-HOUSES.

At Nairobi the control of the slaughter-house is vested in the Municipality, who have appointed a meat inspector. In all other parts of the country supervision is exercised by the Administration, and inspection of meat is performed by the Veterinary Department or the Sub-Assistant Surgeons of the Medical Department.

Paved and drained slaughter-houses exist at the following places :—

Mombasa	...	...	...	...	...	...	2
Nairobi	...	...	...	...	...	...	1
Kisumu	...	...	...	...	...	...	2

Owing to a landslip the building at Mombasa has undergone considerable alteration.

At Nairobi the return of beasts slaughtered was :—

	Slaughtered.	Condemned.
Oxen	1,519	83
Sheep and goats...	34,886	170
Pigs	131	1

Frequent inspections of meat intended for sale were made at Kisumu, where a considerable quantity was destroyed on account of "measles" and "fluke."

SODA WATER FACTORIES.

In Mombasa these remain in the same condition as before, and the public has no guarantee that it is not being supplied with a highly polluted and dangerous product.

In view of the approaching licensing period a strict examination of these premises was made, and the conditions upon which licences would be granted in the forthcoming year made clear.

One of these conditions was that each factory should supply itself with a bacteria-proof filter of an approved type.

Up to the present none have been installed, but several have been ordered from home.

In view of the fact that several cases of enteric undoubtedly acquired here have occurred, these conditions will be stringently enforced.

At Nairobi water is laid on to the factories. Forty-two analyses showed ten contaminations with lead or copper. One of the premises was closed down twice and another on one occasion, and they were kept closed until they were able to produce a sample free from contamination.

The Railway Department possess an up-to-date plant, and aerated waters from this source are supplied to its personnel and to the general public at the Station Dak bungalows and buffets.

LAUNDRIES.

Piped water at Nairobi derived from the town supply is used; this precaution represents practically the only safeguard to the public. The Municipal quarters are fairly satisfactory, where 20 persons are each provided with one room for sleeping and living. No provision is made for boys, and the drainage is unsatisfactory. In other towns in the country the provision of public laundries is a matter that calls for consideration.

DAIRIES.

Within the Protectorate practically no control or supervision is exercised over the milk supply, either at its source of origin or during its distribution.

At Mombasa during the year the cow-keepers have been moved from the centre of the town to sites in the plantations around.

If the methods of dairying in vogue have not improved, the defects are less evident, and the removal from congested streets and alley-ways to spacious gardens at least offers those concerned the opportunity of carrying on their business in a less objectionable manner than heretofore, and vastly improves the condition of the quarters from which they were removed.

Though the bottles used for the distribution of the milk are but partly cleansed with, in most cases, foully polluted well-water, and often stoppered with a twist of paper, no cases of sickness directly attributable to the shortcomings of the milk-sellers or the contamination of the milk supply have come to the knowledge of the Health Office. This apparently satisfactory state of affairs is the product of two factors, viz., the very sound practice of Europeans of thoroughly sterilising their milk immediately on arrival by boiling, and the fact that many slight alimentary derangements pass unreported or are attributed to "climate" or "cold on the stomach," etc.

A disease which probably is communicated by means of milk adulterated with polluted water, or conveyed in bottles rinsed in the same, is dysentery.

At Nairobi 88 samples have been sent by the Police, Sanitary Staff and private persons to the Government Analyst, and the percentages of adulterations reached the high figure of 34 per cent. The adulteration has invariably been added water, varying from 12 per cent. up to 70 per cent. Twelve prosecutions with seven convictions have resulted. This high percentage of adulteration indicates a very serious condition in the milk supply of the town.

Elsewhere the conditions under which the milk is sold can only be described as affording no safeguard to the public.

BAKERIES.

Nairobi possesses six bakeries, licensed premises, two under European and four under Goan supervision. In all cases the premises are kept clean, while the lighting and water supplies are satisfactory. Elsewhere in the country the bakeries are generally the property of Asiatics.

SHIPPING.

Bills of Health issued at one port hold good for Kilindini, including Mombasa, Lamu and Kismayu.

The numbers issued during the year were :—

Port.	1911.		1912.		1913.	
	Steamers.	Dhows.	Steamers.	Dhows.	Steamers.	Dhows.
Kilindini... ..	381	213	383	110	427	146
Lamu	46	—	18	—	22	—
Kismayu	74	30	45	2	69	4

SHIPPING ON VICTORIA NYANZA.

1912.		1913.	
Steamers.	Dhows.	Steamers.	Dhows.
178	213	268	246

The following table shows the number of steamers and sailing ships and dhows that have received pratique at Mombasa and Kilindini, with the numbers of persons on board :—

Year.	Number of Vessels.	Number of Dhows.	Total number of Persons.
1911	381	213	77,737
1912	383	110	81,213
1913	427	146	81,993

Hitherto practically no restriction has been placed on Asiatics and others landing with their goods and chattels in the country, but during the months plague was epidemic at Mombasa every such person was medically inspected, inoculated and his baggage fumigated. The necessity for the continuance of this measure is shown by the numbers of persons landing in the country at Mombasa, though not necessarily remaining there.

Year.	Europeans.	Africans.	Asiatics.	Total.
1911	3,156	2,393	5,442	10,991
1912	3,156	1,990	6,113	11,259
1913	3,875	2,233	9,190	15,298

Revenue derived from Bills of Health at the Coast ports in 1913, and the number of vessels and dhows to whom they were issued :—

Port.	Amount.	Number of Steamers.	Number of Dhows.
	Rs. Cts.		
Kismayu	547-50	69	4
Lamu	172-50	22	—
Mombasa	3,510-00	427	146
TOTAL	4,230-00	518	150

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

Police.—Lectures on Sanitation by the Medical Officer in charge.

School Teaching.—Lectures and demonstrations on Elementary Sanitation by Teaching Staff.

Lectures on Sanitation by the Medical Officer in charge, European Hospital, Mombasa.

Press Notices and Circulars regarding the precautions to be observed against plague, cerebro-spinal meningitis, enteric fever and malaria have been freely circulated among the general community.

Handbills.—20,000 printed in five languages regarding plague.

(c.) RECOMMENDATIONS FOR FUTURE WORK.

It is not considered desirable to submit any recommendations, as such will be fully dealt with by Professor Simpson, C.M.G., in his report on the sanitation of the Protectorate.

IV.—METEOROLOGY.

There is no Bureau of Meteorology in the Protectorate, and the Department which makes itself responsible for collating such statistical information as is available is the Agricultural. Its Tables are based on returns furnished it by the Permanent Way Inspectors on the Railway, from District Commissioners' offices, and from a large number of farmers and settlers throughout the country. There is a total of 136 centres at which the rainfall is noted; 26 of these, in addition, record temperatures. The accuracy of these returns cannot be accepted unhesitatingly. Only at the Laboratory, Nairobi, are hygrometrical observations taken; nowhere are solar temperatures or notes as to the force and direction of the wind recorded.

As regards the rainfall for the year, the following extracts from representative points in the different zones, given in Table V., will give the comparison with the previous years. Generally speaking, the volume that fell was considerably less than in the two previous years; still it may be said that if below the average there was sufficient to ensure fair average crops practically everywhere and occasion no distress.

TABLES SHOWING MEAN ANNUAL RAINFALL AT VARIOUS
POINTS IN THE DIFFERENT AREAS FOR THE THREE YEARS.

COAST AREA.

	1913.	1912.	1911.
Malindi...	46.74	24.22	38.07
Mombasa	42.88	37.58	41.59
Mazeras	43.35	35.86	59.35
Mackinnon Road	24.72	23.29	21.23
Voi	22.27	30.73	16.20
Taveta	28.31	25.39	29.14

MOUNTAINOUS AREA.

Masongaleni	20.11	39.52	59.35
Makindu	17.72	29.72	20.57
Kiu	42.77	29.72	23.43
Athi River	30.01	39.21	30.52
Nairobi Laboratory	30.71	54.21	41.29
Kabete (near Nairobi)	34.24	55.85	42.16
Naivasha	26.57	33.90	29.04
Nakuru	35.03	40.93	28.74
Molo	52.98	62.35	46.62
Eldama Ravine	40.12	47.89	37.39

NYANZA AND KENIA PROVINCES.

Lumbwa	52.10	50.60	36.07
Mohoroni	39.80	91.65	92.25
Kisumu	43.15	46.28	36.28
Mumias	61.53	73.49	56.21
Karungu	—	37.86	—
Kericho	64.85	71.38	64.30
Nandi	66.77	69.13	57.12
Fort Hall	44.33	60.52	48.08
Nyeri	43.12	37.54	33.63
West Kenia	48.91	54.34	35.92

DESERT AREA.

	1913.	1912.	1911.
Kismayu	13.71	8.97	10.47
Gosha Alexandra	29.47	25.33	19.72

Temperature and rainfall tables for Mombasa, Nairobi, Kisumu and Fort Hall are inserted in Table V. of the Returns.

V.—HOSPITALS, DISPENSARIES AND INSTITUTIONS.

1.—EUROPEAN HOSPITALS AT NAIROBI AND MOMBASA.

At Nairobi the Nursing Staff consisted of one matron and three—subsequently increased to five—nursing sisters, while Mombasa had in all three sisters, the total increase of staff for the year being two nursing sisters. In addition to this, it was necessary during the year to engage outside help on two occasions on account of the number of serious cases mostly enteric, in hospital, which required special nurses. One maniacal case (alcoholic) was transferred to the Lunatic Asylum. The longest residence of any one patient in Nairobi Hospital was 144 days, in Mombasa 46 days, due respectively to tuberculosis and fracture.

TABLE SHOWING ADMISSIONS, DEATH-RATE, NUMBER OF BEDS, ETC., AT THE TWO HOSPITALS.

	1913.	1912.	1911.
Total number of beds*	29	29	29
Daily average occupied	16	11·5	8
Total number of admissions	347	276	230
Total number of days residence	5,946	4,368	3,718
Average residence to each patient	17·13	15·82	16·16
Discharged—Cured	273	227	173
Improved	55	38	43
Died... ..	14	11	14
Date-rate per cent.	4·03	3·99	6·09

* 7 at Mombasa, 22 at Nairobi.

Of the admissions 194 were Officials and 53 Non-officials, giving a percentage of 56 for the former and 44 for the latter.

The prevailing diseases which came under treatment during the year were :—

Malaria.—101 cases (39 of which were Officials), as against 92 last year, an admission rate of 40·52 compared with 33·33 per cent. for 1912. There were three deaths, giving a death-rate for this year of 2·97, as against 1·08 per cent. of admissions in 1912. The great bulk of the cases came, as might be expected, from Mombasa, and were admitted during the second quarter of the year, the type being mostly subtertian.

Blackwater fever.—Four cases were admitted during the year, two at each hospital, with also one death at each. The Nairobi cases were both imported; neither were Officials. Of the two cases at Mombasa, one was an Official and one a missionary. This disease is the subject of a special report.

Enteric.—Eighteen cases were treated during the year, as against 23 last year. Of these one died at Nairobi Hospital. The admission rate was 5·18 compared with 8·33 per cent. for the previous year, and the death-rates respectively were 4·34 per cent. and 17·39 per cent. The occurrence of the disease was pretty evenly distributed throughout the year, and its character

much the same as recorded in previous reports. Nairobi contributed by far the largest number of cases. Six Officials were admitted during the year, and the only death recorded was an Official.

Dysentery.—In 1912 there were 13 cases, in 1911, ten cases; this year there was a decrease, seven only being admitted. Of these one died at Mombasa. Two of these depended on the infection by the amoeba, one was bacillary in origin, and the rest undetermined. Two of the cases were Officials.

Epidemic Cerebro-spinal Meningitis.—During the epidemic seven cases were admitted to the Nairobi Hospital during the middle months of the year. There was one death. Later on four of these cases were transferred to a temporary isolation hospital which had been improvised. One of the cases treated was an Official, and the death which occurred in hospital was a Non-official. One death occurred out of hospital in a member of the European Police Force in Nairobi.

Respiratory Diseases.—These accounted for seven admissions, mostly in Nairobi, as against 13 last year. There was one death from broncho-pneumonia in Mombasa Hospital.

Operations.—Thirty-two major operations were performed during the year, all with the exception of two at Nairobi. These included:—Removal of the appendix, 5; resection of rib for empyema, 2; deep abscess of neck, of knee, of liver, 2; psoas of appendix, pelvic cellulitis with abscess, 7; perforation of typhoid ulcer, drainage of gall-bladder, fistula in ano, Whitehead's operation for hæmorrhoids, reposition of retroverted uterus, ditto and prolapse of ovaries, ovariectomy, gall-stones, polypus recti, etc. That, with the one exception of the perforation of the typhoid ulcer, these varied cases were successful, and were discharged cured, is a testimony to the efficiency of the hospital under the Resident Surgical Officer and Nursing staff.

Diseases which caused deaths:—

Officials:—

Malaria ...	...	...	...	...	2
Abscess of liver	...	...	...	...	1
Enteric fever	...	...	...	...	1
Cirrhosis of liver	...	...	...	...	1

General European population:—

Cerebro-spinal meningitis	...	...	...	...	1
Dysentery	...	...	...	...	2
Malaria	...	...	...	...	1
Blackwater fever	...	...	...	...	2
Broncho-pneumonia	...	...	...	...	1
Pneumonia	...	...	...	...	1
Valvular disease of heart	...	...	...	...	1

As a result of representations by the Chief Sanitation Officer, the sum of £200 was spent in improving the internal arrangements of the Nairobi Hospital, thereby considerably improving the conditions of the earth-closets, providing an additional bath-room, a mortuary, and utilising three of the rooms in the administrative block as additional wards. The main drain was extended, but in default of a scheme for the drainage and care of the eleven acres of compound in which the hospital stands, it will be necessary to render mosquito-proof the whole hospital. The increase in the nursing staff has so congested the nurses' quarters that they have overflowed into one of the wards. It is satisfactory to know that this matter is receiving serious attention.

The Mombasa Hospital remains in the same condition as noted in the 1911 Report. The conversion of the old building into an administrative block, and the erection of new wards is a necessity.

2.—THE CIVIL HOSPITALS AND DISPENSARIES.

The figures recorded in the statistical tables at the end show that the work at the various centres has steadily increased. A summary of the cases treated is as follows :—

	1911.		1912.		1913.	
	In.	Out.	In.	Out.	In.	Out.
Admissions	5,548	80,262	15,233	77,837	11,012	95,778
Deaths	592	—	522	—	764	—
Death-rate per 1,000 ...	106.70	—	34.26	—	69.37	—

There are a total of 41 native hospitals and dispensaries scattered throughout the country at the various stations. Only two of them may be considered as really hospitals—those at Mombasa and Kisumu, built of stone, with administrative blocks and separate ward units. The buildings at Nairobi, Makindu and Nakuru are old converted railway construction hospitals, hopelessly insanitary and out-of-date. At the out-stations the general type is a bungalow of galvanized iron and wood, with a small dispensary and a ward of 4-8 beds under the charge of a Sub-Assistant Surgeon. The majority of these meet the requirements of the district or station, being all that the finances of the country can afford. Seventeen of the stations with a Sub-Assistant Surgeon or Hospital Compounder in charge possess no beds—only a dispensary. The value of these hospitals is greatly militated against, as pointed out in the previous year, by the impossibility of obtaining from the resources of the country any reliable trained nursing staff, and the hopeless expense of considering the engagement of such from other countries.

3.—LUNATIC ASYLUM.

The total numbers which have been under treatment at the Asylum for the last three years are :—

	1911.		1912.		1913.	
	No.	Deaths.	No.	Deaths.	No.	Deaths.
Males	60	11	68	22	62	14
Females	Nil	Nil	4	Nil	6	2
TOTAL	60	11	72	22	68	16

Of these the following were Europeans :—

	1911.	1912.	1913.
Males	5	1	5

Delirium tremens and delusional insanity were the cause of two of the admissions, while of the three cases detained under ten days' remand for observation, two were occasioned by excessive bouts of alcohol.

Of the general admissions there were six cases of idiocy, with two deaths, one due to advanced tubercle of the lungs, and the other to paralysis. There were 17 cases of mania, with three deaths consequent on the extreme violence of the paroxysms. Three cases were discharged as cured, the same number as in the 27 cases of dementia which occurred. The nine deaths which resulted in this condition were generally caused by exhaustion. One death

due to tuberculous adenitis occurred amongst the seven cases of delusional insanity. Six of the observation cases were discharged at the end of the ten days.

The admissions to the Asylum were, so far as the history of each case could be elicited, mainly due to obvious syphilis, congenital or acquired, and to drink. In one instance the insanity was caused by malarial infection, which rapidly yielded to appropriate treatment.

There was no epidemic disease during the year.

The mortality rate showed a considerable improvement over that of last year, but still remains very high. While much remains to be done to improve and extend the structural arrangements of the buildings, the undue mortality cannot be attributed to that cause, nor to any fault in the management of the institution, which I consider reflects credit on the superintending staff, and their supervision of a raw, untrained staff of native boys. The majority of patients are in a very bad way when they arrive, and are prone to succumb to intercurrent conditions. The rate for the last three years has been 235.5 per mille for 1913, 305.5 for 1912, 183.3 for 1911.

Restraint had to be resorted to on 16 occasions; eight times in the case of one European.

Escapes.—One case of mania, a Masai, escaped during the year, and was not re-captured.

4.—GOVERNMENT DENTAL SURGERY.

The necessity of taking some steps for the care and preservation of Officials' teeth had been before the Administration ever since 1909, as it had long been recognised that the effects of this particular climate on teeth were intensely and rapidly destructive. However complete was the scheme of medical attendance in force for Officials, it was realized that unless there was, as an integral part of it, some similar provision for dental hygiene, one of the most important branches of defence against the effects of the tropics on health was omitted. It was not until this year, however, that owing to the possession by one of the medical staff—Dr. V. G. L. van Someren—of the requisite dental qualifications, it was possible to make a provisional attempt to remedy the deficiency. Accordingly a Dental Surgery was opened in March, and was carried on by the fortunate circumstance of Dr. van Someren being in possession of the necessary outfit, the Medical Store not being in a position to equip him with instruments and accessories. Owing to a variety of causes which it is unnecessary to specify here, the routine of the work can only be said to have been constituted for the last six months of the year.

From July to December, during a working period of 140 days, a total of 170 Government Officials (including wives, families and households) obtained dental attendance, requiring, exclusive of free advice, a total of 386 appointments. This does not represent the possibilities of the office, for its institution was not gazetted, and, further, the time for dental work was broken into by the obligation to perform certain purely medical duties which have since been removed.

The main conditions which came under review were:—

Dental caries, 317 cases; Dento-alveolar abscess, 60; Pulpitis, 30; Pyorrhœa, 21; and Erosion 20. The number of cases of the first-mentioned disease shows the important part played by it on the general health of the official. Pyorrhœa, mild, or advanced, is also extremely prevalent, and the association of this condition with articular rheumatism was evident in several

instances. So also were cases of general septic toxæmia, characterised by intense headache and gastric symptoms which were not amenable to ordinary medical treatment. The statistical tables of the work done will be found on page 124.

5.—GAOLS.

There are two main convict establishments. One is the mediæval Fort at Mombasa, with a daily average lock up of 245 prisoners, the other is at Nairobi. This is in a new building erected in 1911, on lines which will admit of suitable additions being made; attached to the Nairobi Prison is a field Prison Boma, situated some 22 miles out of Nairobi on the Fort Hall Road. These men live under canvas. The daily average lock up for this prison was 300, and for Nairobi 447. On the whole, the general health of the prisoners was good during the year. The principal causes of admissions to hospital were malaria, respiratory and digestive diseases, and local injuries. The mortality from pneumonia was unduly high for Nairobi—54 per cent. of admissions—due in large measure to the more inclement climate during the rainy season. The overcrowding mentioned in last year's Report still continued.

TABLE SHOWING SICK AND DEATH RATES AMONGST PRISONERS AT THE MOMBASA, NAIROBI AND N'DARUGU BOMA GAOLS FOR 1913.

	Mombasa.	Nairobi.	N'daruga.
Number of prisoners on 1st January, 1913...	243	384	301
Number admitted during 1913	716	2,373	561
Average daily number in gaol	245	447	300
Total number placed on sick list during year	379	330	163
Total number of days on sick list	3,771	2,980	1,231
Average number daily sick	10.33	8.16	5
Total number of deaths	7	50	4
Percentage of deaths to average daily strength	2.85	11.18	1.33

The causes of death were as follows :—

Malaria	7
Dysentery	4
Tuberculosis	6
Broncho-pneumonia	3
Pneumonia	27
Pleurisy	5
Bronchitis	1
Cerebro-spinal meningitis	2
Diarrhoea	1
Ascites	1
Cirrhosis of liver	1
Jaundice	1
Peritonitis	1
Melancholia	1

6.—THE GOVERNMENT LABORATORY, NAIROBI.

(i.) BACTERIOLOGICAL.

As usual the large number of routine examinations conducted interfered considerably with the time for original work. The account of the investigations made in connection with the outbreak of Cerebro-spinal meningitis will be found in Drs. Ross and Shircore's paper "Transactions of the Society of Tropical Medicine and Hygiene," December, 1913, while further details of the general work of the Laboratory are given in Vol. IV. of the Laboratory Reports for 1913, Parts I. and II.

SUMMARY OF EXAMINATIONS.

<i>Blood</i> :—Negative	...	...	...	...	300
Differential leucocyte counts	..	..	..	..	789
Large mononuclear increases	...	...	...	...	289
" mononuclears showing pigment	...	...	...	...	42
<i>Malaria</i> :—Benign tertian	...	...	...	...	12
Quartan	...	...	...	...	5
Subtertian	..	..	..	..	174
<i>Spirochaeta hominis</i>	...	...	...	...	7
<i>Treponema pallida</i>	...	...	...	...	4
<i>Bacillus leprae</i>	...	...	...	...	1
<i>Microfilaria perstans</i>	...	...	...	...	1
<i>Meningococci</i> :—Cerebro-spinal fluid	...	positive	...	...	147
" "	...	negative	...	...	62
Nasal secretions	...	...	...	...	2
Blood	...	...	...	...	3
<i>Plague</i> :—Human	...	positive	...	...	29
"	...	negative	...	...	25
Rats	...	positive	...	...	34
"	...	negative	...	...	3,084
"	...	decomposed	...	...	16
<i>Estimation of Haemoglobin</i>	...	positive	...	...	2
<i>Wassermann reaction</i>	...	positive	...	...	11
" "	...	negative	...	...	10
" "	...	doubtful	...	...	2
<i>Widal reaction</i>	...	positive	...	...	33
"	...	negative	...	...	75
<i>Undulant fever</i>	...	negative	...	...	3
<i>Faeces</i> :— <i>Amoebæ</i>	...	positive	...	...	18
"	...	negative	...	...	42
Ova	...	...	...	...	13
<i>Sputa</i> :—Tubercle bacilli	...	...	...	...	13
Pneumococci	...	...	...	...	28
Negative	...	...	...	...	44
<i>Urines</i> :—Chemical	...	...	...	...	70
Microscopical	...	...	...	...	13
Spermatozoa	...	...	...	...	3
Tubercle bacilli	...	...	...	...	2
Bacillus coli	...	...	...	...	1
Gonococci	...	positive	...	...	28
"	...	negative	...	...	46
<i>Water</i> :—Bacteriological	...	...	...	...	4
<i>Various</i>...	...	...	...	...	23
<i>Tissue sections</i>	...	...	...	...	7
<i>Veterinary examinations</i>	...	...	...	...	64
Total	...	...	...	...	5,581

PREPARATION OF VACCINES.

Autogenous	8
Calf-lymph :—Glycerinated, in tubes of 5 doses ...	370,802
Desiccated, in ampoules of 36 doses	5,400

Last year the number of examinations was 3,510 (including some 800 veterinary ones). This increase of over 2,000 is one expression of what epidemic work entails, not only in routine duties, but also in the manufacture of vaccine, necessitating the issue of more than a quarter of a million insertions more than last year.

(ii.) ANALYTICAL LABORATORY.

The volume of work carried out at this Laboratory has more than trebled during the year, and the increasing value of this Institution to the Protectorate cannot be too highly emphasized.

The following is a brief summary of the varied investigations carried out during the year :—

SAMPLES ANALYSED.

	1913.	1912.
Milk	1,583	356
Water :—Sanitary	107	
For poisonous metals ...	97	
Mineral constituents ...	9	
	213	85
Food	30	27
Soil :—Fertility	27	
Capacity to retain arsenic	44	
	71	31
Minerals	38	23
Toxicological cases	24	13
Blood and seminal stains ...	8	4
Arsenical cattle dips	57	—
Miscellaneous	31	9
	<u>2,055</u>	<u>548</u>

VI.—SCIENTIFIC.

REPORT ON THE EPIDEMIC OF PLAGUE IN MOMBASA, BY CAPT. D. S. SKELTON R.A.M.C.

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REPORT ON THE OUTBREAK OF PLAGUE IN MOMBASA, FOR THE YEAR SEPTEMBER, 1912—1913.

1.—REVIEW.

The total number of cases registered as due to Plague between 1st January, 1913, and 31st August, 1913, was 176 and one doubtful case, to which must be added 27 cases which were notified between 8th September, 1912, the date of the first case, and 31st December, making in all 204 cases. An analysis of these cases shows the following varieties of the disease and the result.

TABLE I.

Month.	Bubonic.	Septicæmic.	Pneumonic.	Doubtful.	Total.	Deaths.
1912.						
September	2	3	—	—	5	4
October	—	11	1	—	12	12
November... ..	—	—	—	—	—	—
December... ..	5	—	4	1	10	9
1913.						
January	—	—	—	—	—	—
February	6	—	—	—	6	6
March	1	—	—	—	1	1
April	16	—	3	—	19	19
May	13	—	1	—	14	11
June	39	1	3	—	43	38
July	37	—	14	—	51	41
August	35	—	7	—	42	36
Total	154	15	33	1	203	177

2.—COURSE OF THE EPIDEMIC.

Table II. shows in chart form the monthly rise and fall during the year September, 1912—September, 1913, week by week.

Assuming for the moment that plague actually began for the first time in September, 1912, it may be said that the epidemic began in a normal manner; that is to say, with three cases of septicæmic out of a total of five for the first month. It will be seen that, between September and March, 34 cases occurred, of which 14 were septicæmic and 5 pneumonic—that is a combined percentage of 55·8, compared with a ratio of 21·3 per cent. for the whole epidemic up to the end of August. It is almost unnecessary to go into the possible reasons for this high ratio of the more virulent forms of the disease in its earliest stage, but the following factors may have some influence.

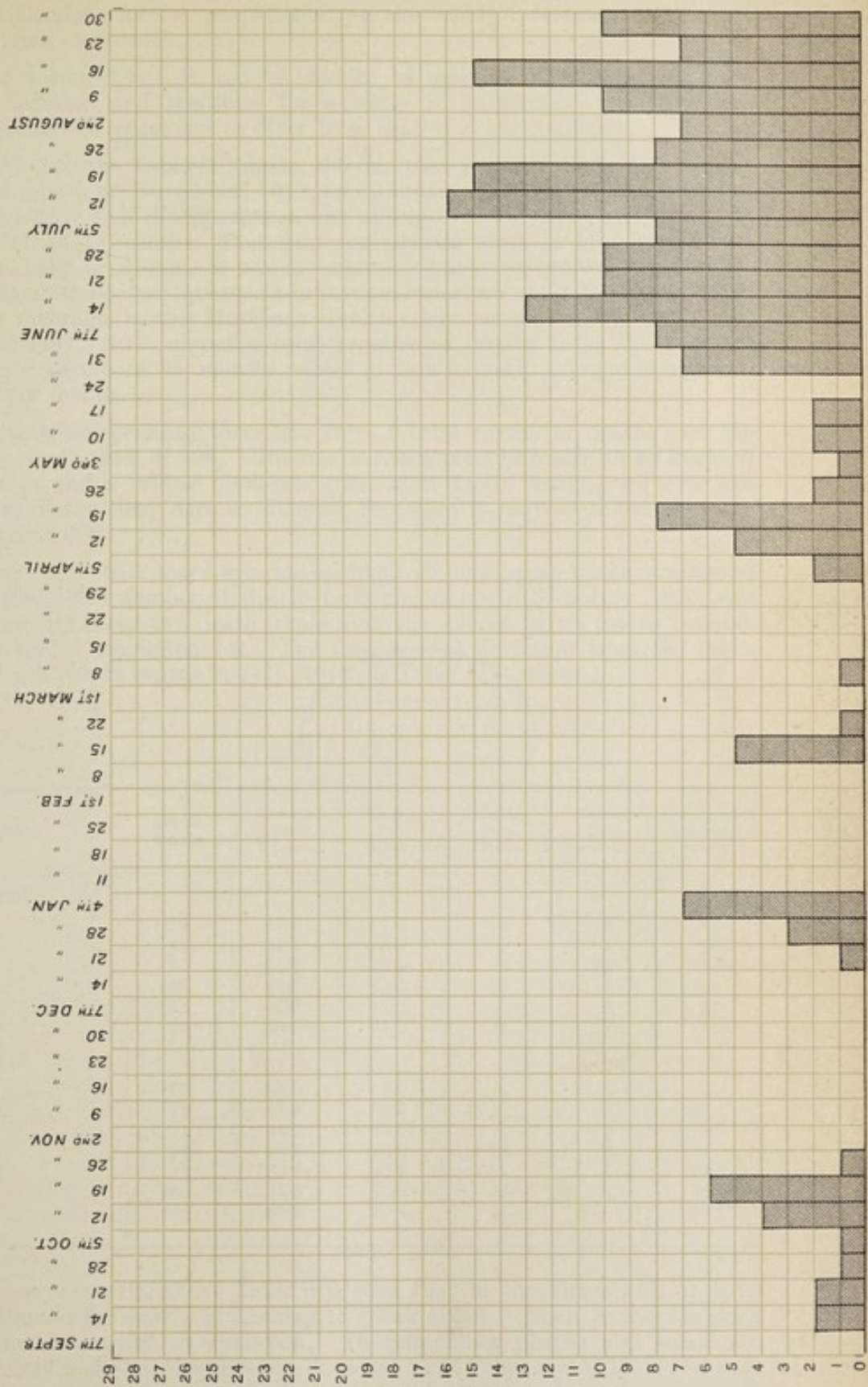
In the first place, in Mombasa the colder weather is disappearing about September, and this, of course, affects first the fleas, and secondly the rats. Rats are said to breed four times a year, although, so far as I know, the seasons have not been worked out so far as Mombasa is concerned.

Cold weather influences the flea population, inasmuch as it is stated that fleas do not breed in hot weather. It can be seen that, in what is usually the hottest month of the year, there was but one case of plague (*vide* Table III.). So that with a scanty rat population and fewer fleas, plague

TABLE II
CHART SHOWING THE WEEKLY INCIDENCE
OF PLAGUE IN MOMBASA.
 September 1912 — September 1913.

1912.

1913.





OF BRUCE IN MEXICO
CHART SHOWING THE MEXICAN INCIDENT

must be dependent for its propagation on the highly infectious varieties of pneumonic and septicaemic.

In the second place, it may be said to be more or less characteristic for plague to appear and continue for a while in its virulent form, and the Mombasa outbreak seems not to differ from that of other countries.

Reverting to the Table (I.) again, the fact that plague entirely disappeared during the month of November, 1912, and January, 1913, raises the question (1) as to whether this disappearance was absolute or relative; and this leads to the point as to whether (2) plague actually did start in Mombasa about September, 1912, or whether it was in existence, but unrecognised, prior to this date. Taking these two questions in inverse order, an analysis of the death returns as recorded in the Mombasa Health Office since January, 1906, until the end of July, 1913, shows a total number of deaths from all causes of 5,092 over a period of 91 months, which gives a monthly average of approximately 55 per month.

Now, roughly speaking, there has been a total excess of deaths over the mean since April, 1912, of 396. But an allowance must be made for an increase of population and a falling birth-rate (the latter factor holds good over the greater part of the East African littoral), therefore it may be taken that the excess is about 300.

During 1912-1913 there was an epidemic of small-pox, which accounted for 76 deaths. The number of deaths from plague up to 31st July, 1913, was 141. Deducting these two death totals from the excess figure leaves roughly 80 deaths to be accounted for. The first serious deviation from the mean monthly death return begins in July, 1912, as Table III. shows.

TABLE III.

Month.	No. of Deaths.	Average for 8 years.	Excess over Mean.	Deaths from Plague.	Deaths from Small-pox.	Unaccounted for excess figure.
1912.						
July	79	67.6	11.4	—	2	9.4
August	64	54.1	9.9	—	7	2.0
September	75	51.1	23.9	4	19	—
October	61	47.7	13.3	12	13	—
November	52	41.0	11.0	—	9	2
December	95	56.5	38.5	9	11	18
1913.						
January	62	53.0	9.0	—	2	7
February	73	47.5	25.5	6	4	15
March	71	49.5	21.5	1	5	15.5
April	79	52.5	26.5	19	3	4.5
May	112	68.7	43.3	11	—	22.3
June	150	77.5	72.5	38	1	33.5
July	148	67.6	80.4	41	—	39.4

However, from the above Table it is seen that in the latter half of 1912 the unaccounted for excess is nothing to speak about. Such excess as does occur might be ascribed to small-pox. In September plague and small-pox almost exactly make up the excess. It is not until February, 1913, is reached, that the unaccounted for excess figure becomes worthy of notice. I am inclined to think that (any way in May, June and July) there may have been more deaths from plague than appear in the registers, whilst, on the whole, I agree with the view that plague began in Mombasa somewhere about September, 1912.

It further appears quite likely, after an examination of the Tables I have prepared, that plague did practically disappear in November, and possibly also in January. However, the large increase in the number of deaths unaccounted for in May, June and July does require some explanation other than that they were all due to plague.

In view of the care that the Health Officers have taken in the investigation of all deaths in the town with special regard to plague, the possibility of such a large margin of error occurring is almost precluded.

It may be possible the explanation lies in the fact that these cases were cerebro-spinal meningitis, which was certainly epidemic in other parts of the Protectorate during this period. The diagnosis of this disease after death presents very great difficulties, unless a bacteriologist can devote his whole time to clearing up the mystery. Such an officer has not been available in Mombasa.

3.—INFLUENCE OF TEMPERATURE ON THE COURSE OF THE EPIDEMIC.

The experience in Mombasa coincides with that of other tropical towns as regards the incidence of plague in its relation to temperature.

This can be seen by reference to Table IV., where the average monthly maximum shade temperature is shown in red and the incidence of plague in black. In general, as the red line falls the black line rises.

The explanation of this rise and fall has been the occasion for a good deal of conjecture and indeed still remains a subject for discussion, but the explanation offered in paragraph 3 will be sufficient for the purpose of this report.

In Bombay there is usually a decline in the epidemic figure when the mean temperature is above 82° F. Mean temperatures above 85° F. are as a rule unsuitable for epidemic prevalence.* I have shown the mean maximum temperature in my Table, because I think this is more important than the mean between maximum and minimum. In Mombasa, especially, the variation month by month of mean temperatures is very slight, and the result would not be so striking if shown graphically on a chart.

4.—ORIGIN OF THE OUTBREAK.

The origin of the epidemic is described by Dr. Small in his report for 1912. It need only be recalled here that following a number of deaths among the rats in the Public Works Department landies near the railway station there came at least two cases of plague among people living in the premises.

Where these infected rats came from has not, so far as I know, been discovered. It may be presumed that the original rat may have come down by train in merchandise from Kisumu or Nairobi. I am informed that rats have actually been seen to emerge from grain vans on the railway.

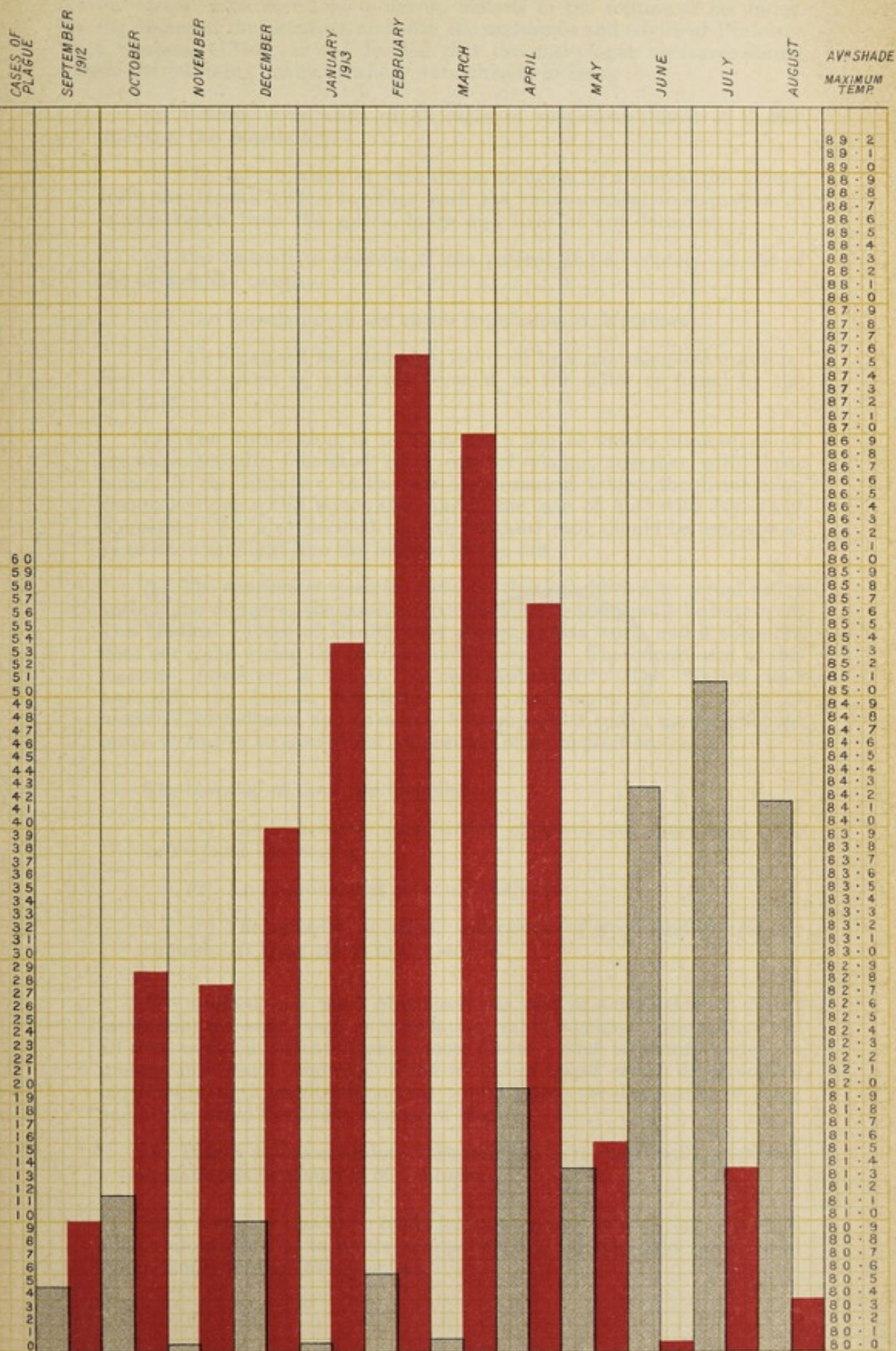
5.—THE PLAGUE POSITION IN AUGUST, 1913.

Having received orders from the Principal Medical Officer, British East Africa, to proceed to Mombasa for plague duty, I reported myself to Dr. Small, the Medical Officer of Health, on August 7th. In order to relieve the pressure of work on the Medical Officer of Health it was decided that I should be in

* *Simpson. A Treatise on Plague.*

MONTHLY INCIDENCE OF PLAGUE IN RELATION TO TEMPERATURE IN MOMBASA.

Temp. °F
Plague





charge of anti-plague measures in the town, so that he (the Medical Officer of Health) should have more time to devote himself to the routine of his duties. Having discussed the situation, and with the assistance and advice of Professor W. J. Simpson, C.M.G., it was decided that the anti-plague measures should include the following, many of which were already in being :—

(a) Prompt notification of all cases of suspicious illness or deaths amongst the population.

(b) The investigation of such illness or death by a responsible official from the Health Office, together with the microscopical examination of smears taken from the spleen, lungs and liver of any deceased.

(c) The immediate removal of the patient and all contacts to one of the community camps.

(d) The inoculation of the entire population of Mombasa.

(e) An organised rat campaign, followed by a microscopical examination of the spleen of every rat brought to the office or found by the rat gang.

(f) The disinfection, in as thorough a way as means allowed, of all premises actually inhabited by a case of plague, together with those houses in the vicinity. In the case of permanent houses the disinfection was to be done with Clayton Gas, and in the case of huts with Jeyes and Kerosine. We also decided that the makuti roof should be removed so as to allow sunlight into the interior of the hut.

(g) The conclusion was also come to, that in addition to actual active anti-plague measures the sanitary condition of the town must be improved. The Medical Officer of Health took charge of this work, and it therefore does not come within the province of this report. The importance of this measure, however, is not to be under-estimated. The Native, and especially the Indian, population has to be taught the rudiments of municipal cleanliness, and no matter how unpopular such a measure should prove, it had to be carried out, opposition or no opposition.

The cleaning of the town included :—

(1) The systematic examination of alleys and lanes, and their subsequent scavenging.

(2) An improvement in house drainage.

(3) The removal of ruins, collections of wood and stores and rubbish left lying about in the streets.

We realised that until Mombasa was put in a condition of decent sanitation, measures such as inoculation, rat campaigns, disinfection and all that, were but palliative and almost futile. Such measures, under the present insanitary condition of the township might easily be prolonged indefinitely, until, finally, Mombasa would attain the distinction of being one of the world's endemic centres of plague.

(h) Finally it was considered necessary to have, practically speaking, a systematic sanitary survey of the town.

Such a survey was to be made house-to-house, *on a special form*, with added information as to wages, occupation and the rent paid by the head of the family renting the premises.

6.—GENERAL ORGANISATION OF PLAGUE WORK.

The organisation of staff and labour for these many duties took a considerable time, and efforts were hampered to a large degree by a scarcity of labour. Dr. Small very generously handed over to the Plague Officer a large proportion of his staff, who in ordinary circumstances would have been employed on sanitary work. Thanks to this, a certain amount of work could be begun almost at once.

In the first instance, for plague purposes, the town was divided into four main districts, and a Sub-Assistant Surgeon put in charge of each. His orders were to attend to any case of plague that was reported in his district, and to arrange as to the removal of contacts and the closure of the house.

As soon as the patient or corpse had been removed, the disinfecting gang appeared on the scene, and washed out the premises with disinfectants.

The house was then locked and sealed by the police, and permission was withheld for anyone to live in the house during the next week or ten days.

House-to-house visits in the neighbourhood were made by the Sub-Assistant Surgeon, who had orders to inoculate every one not in possession of a certificate to the effect that he had recently been inoculated. If by any chance there was a refusal to undergo inoculation on the part of the near neighbour, he or she was looked upon as a contact, and in these circumstances was removed to the contact camp.

In view of the shortage of trained assistants in plague work, the Government of Zanzibar had placed such of its resources as could be spared at the disposal of the East Africa Protectorate. As the outcome of this, on 14th August an engineer and a portable Clayton gas machine arrived, together with a competent rat dissector and laboratory assistant.

7.—PLAGUE STAFF.

A.—Rat Work.

Medical Officer in Charge	...	Dr. J. H. Thompson.
Poisoner and Dissector	...	A. I. Raval.
Interpreter	...	Usman Abdullah.
12 rat catchers.		

B.—Disinfecting Work.

(a) Clayton Gas Engineer	...	P. Castro.
12 Gang-men.		
(b) Medical Officer in Charge	...	Asst. Surgeon R. Holmes.
6 Gang-men.		
(c) Disinfecting Station.		
Medical Officer in Charge	...	Dr. J. H. Thompson.
Clerk and Interpreter	...	C. F. de Souza.
Engineer in Charge	...	Goolam Hoosein.

C.—Inoculation Work.

(a) Customs Ferry	...	Sub-Asst. Surgeon Chablani.
(b) Kilindini	...	" " Z. Singh.
(c) Likoni	...	" " J. Singh.
(d) Kisoni	...	" " Dula Ram.
(e) Office Males	...	A. I. Raval.
" " "	...	Malam Dawa.
" Females	...	Miss Tomlinson.
" " "	...	Miss de Chavis.
" Clerk	...	Abedi.

D.—Sanitary Survey.

District No. 1	Dr. P. F. Nunan.
Interpreter	...	...	Andrew.
District No. 2	...	...	Dr. A. M. Freitas.
Interpreter	Suleman Juma.

E.—Clerical.

Clerk to Plague Officer	...	Sub-Asst. Surgeon Chuher Khan.
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F.—Camps.

Medical Officer in Charge	...	Asst. Surgeon Nyss.
Compounder	...	Metha.

G.—Out-stations.

Medical Officer in Charge	...	Sub-Asst. Surgeon Bhatt.
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H.—Assistant to Plague Officer Murari Lal.

Plague Officer	...	Capt. D. S. Skelton, R.A.M.C.
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8.—DISINFECTION WORK.

It is no part of my duty to comment on the fact that, previous to 14th August, the Department was working without a Clayton machine.

Anything like satisfactory disinfection from the point of view of plague without a Clayton is my opinion practically useless. This attitude is not merely a point of view, but is supported by actual evidence of the uselessness of just spraying disfectant on floors and walls with the idea of hoping to kill fleas and such like.

The machine having arrived, it was decided to Claytonise systematically every house that could be done, beginning at the Piggot Markets.

This area is a densely populated one. In general the houses are of stone with galvanised iron roofing. Practically every house is a shop of some sort, the majority being interested in the sale of food-stuffs. On the ground floor grain, flour, rice, etc., is stored, whilst the family lives as a rule on the upper story, although in some cases they live actually in the shop itself.

The inner rooms are devoid of light or ventilation. If the grain sacks are taken out, rat holes are everywhere evident. Such houses as are not shops are chawls or lodging houses, where every sanitary rule is broken. In some of the chawls the ground floor level is below that of the street. These houses also are infested with rats, and not infrequently are in a semi-ruinous condition. It was on such that the Clayton machine gang set to work, street by street and block by block. The inhabitants offered no opposition, and in many cases the applications received for houses to be disinfected were more numerous than the single machine could deal with.

It may be mentioned here, that after Claytonisation a guinea-pig was put into any house suspected of being infected and left there for 4 days. In no case has the experimental guinea-pig died from plague.

The disinfection of the native makuti-roofed hut walls made of wattle and daub presented a difficulty. I eventually adopted the plan I had used in Zanzibar during an epidemic of cholera. I ordered the roof to be taken off any hut in which a case of plague occurred, and that all clothing, clothes and such-like should be burnt on the spot. A careful list of articles destroyed was kept, and compensation was paid. The makuti was carefully stacked near the hut so that it could be used again. Meantime the walls and floors were washed down with Jeyes and Kerosine mixed; a householder was not allowed to put back his roof for a week or 10 days, during which time the sun's action was allowed full play.

A list of houses in which more than one case of plague has occurred is attached, together with a note showing how the premises have been treated. There has been no recurrence of plague in any disinfected house since the arrival of the Clayton machine.

Unfortunately, there has been no opportunity for testing scientifically the efficacy of the Claytonising process by leaving a culture of *Bacillus pestis* in any house under treatment. However, the Clayton process is now such a recognised measure of disinfection that, provided the work is done conscientiously by a competent engineer, such a test is hardly necessary.

TABLE V.

List of houses where occurred more than one plague case :—

S. No.	No. of House and Section of Town.	No. of Cases.	Dates of Cases occurred.	Remarks.
			1913.	
1	60, Ndia Kuu ...	2	13th February ...	Claytonised.
			14th February ...	
2	22, Commercial Street	5	3rd April ...	Claytonised.
			3rd April ...	
			11th April ...	
			12th April ...	
3	35, Commercial Street	3	12th April ...	Claytonised.
			14th April ...	
			16th April ...	
4	5, Mlangopapa ...	2	25th July ...	Disinfected.
			31st May ...	
5	4, A. Noorbhoy Street	3	31st May ...	De-roofed and disinfected.
			13th June ...	
			13th June ...	
6	566, Mjimpia ...	2	4th July ...	Disinfected.
			11th July ...	
7	569, Mjimpia ...	2	20th July ...	Unfit for habitation. Uninhabited.
			24th July ...	
8	599, Mjimpia ...	2	20th August ...	Disinfected.
			10th June ...	
9	26, Longolokuinana ...	3	10th June ...	De-roofed 23rd August, 1913. Unfit for habitation.
			25th July ...	
			27th July ...	
10	28, Kilindini Road ...	2	22nd August ...	Claytonised and white-washed.
			7th August ...	
11	33, Mzizima Road ...	2	9th August ...	Disinfected.
			12th June ...	
12	34, Mkenyageni ...	3	12th June ...	Disinfected but not Claytonised.
			17th April ...	
			19th April ...	
13	5, Membeni ...	2	20th April ...	Do.
			17th April ...	
14	324a, Membeni ...	2	24th April ...	Do.
			3rd May ...	
15	1065, Membeni ...	2	30th May ...	Do.
			29th May ...	
16	833, Makadara ...	2	4th June ...	Do.
			11th April ...	
17	117, Kilindini Road ...	3	4th June ...	Claytonised.
			21st August ...	
			27th August ...	
			27th August ...	contacts

9.—RAT DESTRUCTION.

It is laid down in all text books that rat examination and rat destruction are the two important measures in combating an epidemic of plague. Yet, when it comes to putting the measures into practice, it is found to be extraordinarily difficult, in the first place to find any rats, and in the second to catch them. The reason for this is that the general population has in mind the idea that if rats, especially infected rats, are found on his premises, he will be

quarantined, or his house will be disinfected, or both. The consequence is that he will not purchase or accept a trap. I have been reduced to telling shop-owners that if they did not show me their rat traps I would have all their belongings put out in the street in order to search for rat holes. They then accept a trap, grudgingly; but if by any chance a rat was found in it in the morning they would certainly take the precaution of letting the beast go. The Swahili either hangs the traps up or stuffs up the entrance with a cloth, in order that next morning he may show an empty trap, and say, "There are no rats here."

Eventually the heads of the communities were asked to meet at the Health Office, and the position was explained to them. They all promised to help and in turn to explain to their fellow townsmen the position of affairs. The effect has been small. The largest number of rats brought to the Health Office in 24 hours has been between 50 and 60, and this in spite of a reward of 6 cents per rat living or dead.

During the early part of August the rat brigade was under charge of Mr. Raval, whose experience of rat work in Zanzibar qualified him for that work. Twelve rat catchers with baited traps were sent out to sections of the town in the evenings. The traps were well baited and scented with aniseed to get rid of the human "bouquet." An auction was held daily at 11 a.m. in the Piggott Market, when the 6-cent reward was loudly proclaimed. In the evening rat poison of various sorts was put down in selected quarters. Such rats as were brought in were labelled, then dissected, and the spleen coloured by Czizinski's method, a stain which when properly used gives beautiful results.

The daily record of rats caught and examined in August is as follows:—

TABLE VI.

August 1, 2, 3, 4, 5, 6, 7, 8, 9, 10th	...	...	...	Nil
11th	...	...	...	5
12th	...	...	...	12
13th	...	...	...	7
14th	..	...	...	22
15th	...	...	...	27
16th	...	...	...	22
17th	...	...	...	7
18th	...	...	...	23
19th	...	...	...	14
20th	...	...	...	17
21st	...	...	...	50
22nd	...	...	...	30
23rd	...	...	...	24
24th	...	...	...	6
25th	...	...	...	23
26th	...	...	...	28
27th	...	...	...	21
28th	...	...	...	31
29th	...	...	...	24
30th	...	...	...	17
31st	...	...	...	3

of this number only three were found to be plague infected.

On the arrival of more Medical Officers from England, Dr. Thompson was put in charge of the rat work and the rat gangs. A large consignment of Liverpool virus arrived, and this was put down freely in those parts of the town where cases were cropping up.

Experiment showed, however, that the virus had lost its virulence on the journey from England. Some tubes were therefore forwarded to Dr. P. H. Ross,

in order that it might be reactivated. There is no doubt whatever that if a really virulent strain of this bacillus can be obtained for tropical use, it should be of the greatest benefit. The use of the arsenic and phosphorus poison is very limited among an unintelligent population, for one accident with a child or even a goat would do more harm than can be put right in twelve months. The Liverpool virus can be put down broadcast, whereas the greatest care must be exercised in the case of "Ratine" or "Common Sense."

10. INOCULATION WORK.

One of the great objects in plague work in Mombasa has been to get as many as possible of the population inoculated with Haffkine's vaccine.

It was realised that with the town in the insanitary condition in which it was, some considerable time must elapse before any evident improvement in the general condition took place, meanwhile, to have a solid block of population more or less immune any way for a time was the best measure. Every possible effort therefore was made by the plague staff to bring this about. Sub-Assistant Surgeons made house-to-house visits in their districts, a Medical Officer visited the market daily, whilst the lady inoculator was at the disposal of natives whose ladies were "Purdah." Fortunately very little opposition was met with; Ramadan interfered to a certain degree, but not very much, the idea where this excuse was urged being that the slight fever following the inoculation produced thirst which rendered the keeping of Ramadan more difficult.

By the end of August nearly 24,000 persons out of a population of say 30,000 had been inoculated, and it became difficult to find any one in the town who had escaped the activities of the plague staff.

This accomplished, the Chief Sanitation Officer considered that the trains and ferries should be picketed with inoculators. This led to the inoculation of a large proportion of the population in what may be called the suburbs. In addition to this, an inoculator was despatched to Jamvu. He worked his way up to Rabai, and inoculated all persons he could find in that district. The figures for the outlying districts have not been included in the totals, naturally, and reinoculation figures are kept in a separate return. Table VII. shows the weekly inoculation figures in chart form.

11. PLAGUE IN OUT-STATIONS.

The following reports by members of the plague staff deal with the small and fortunately localised outbreaks of plague in villages in proximity to Mombasa.

REPORT OF SUB-ASSISTANT SURGEON BHATT ON SICKNESS AT KWAJOMVU, INVESTIGATIONS AT TSANGAZINI, AND INOCULATIONS AT MARYIA-KANI AND AT RABAI.

I left Mombasa on the 9th instant by 6.40 a.m. train and went to Kwajomvu as ordered by you. Owing to rainfall I reached there at 10 a.m. and took charge of the medical and camp equipment, patients and contacts there.

In the afternoon I went into the town with inoculation equipment and asked the headman to get as many persons for inoculation as possible. The askari also accompanied him, but that day I could not get even a single person for inoculation. Next day that is on the 10th I began disinfecting houses which took me three days. On the 13th I went to the surrounding places and got

TABLE VII

CHART SHOWING WEEKLY INCIDENCE OF PLAGUE COMPARED WITH THE INOCULATED POPULATION.

Plague Cases.....■
Inoculated Persons.....■

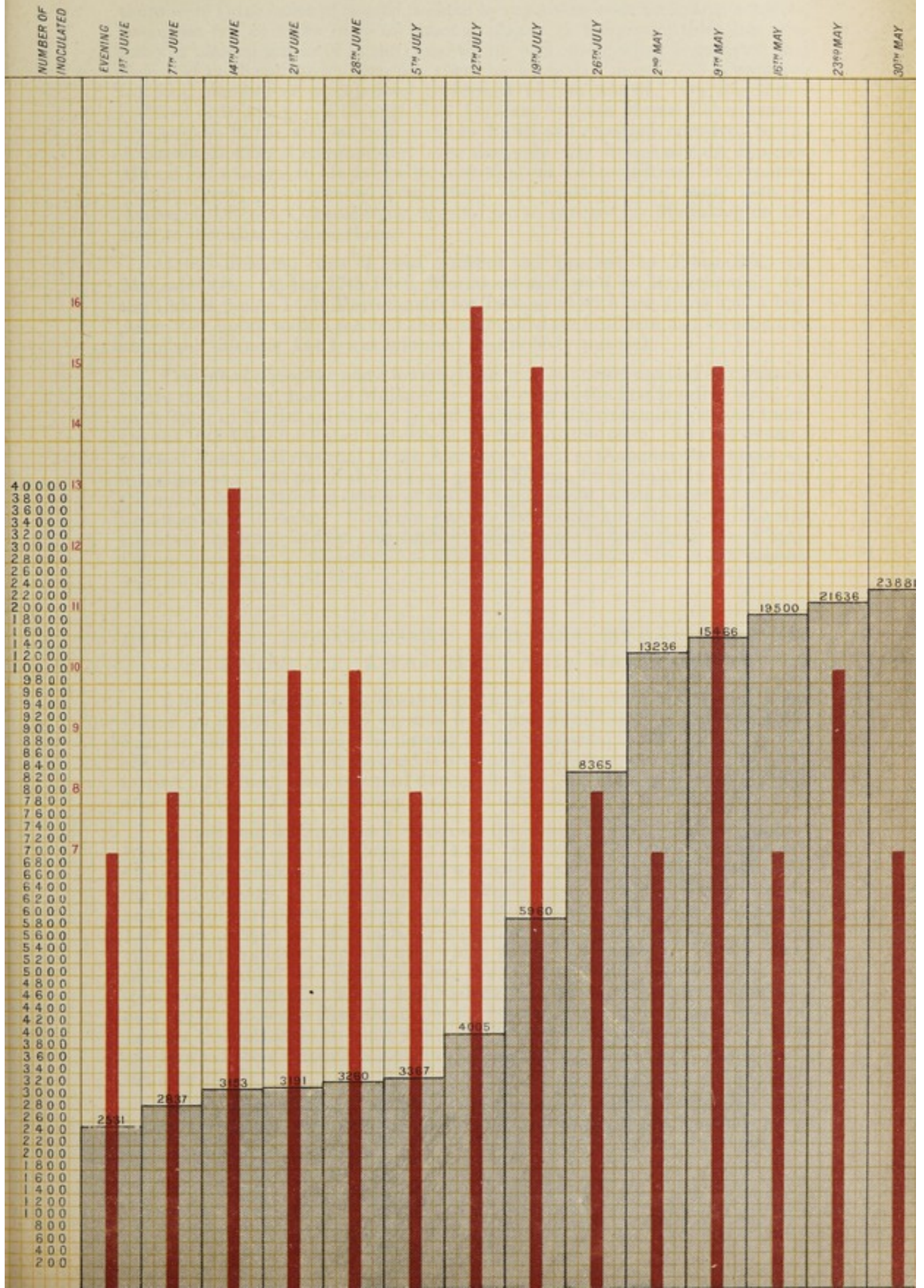


CHART SHOWING WEEKLY INCIDENCE OF
PLAGUE COMPARED WITH THE
INCULCATED POPULATION

From 1894 to 1900
Bombay District



some persons for inoculation. Then I went to meet the local trains at Kwajomvu as per your order and inoculated persons there.

On the 14th I continued inoculation at Kwajomvu station. When I went there were three cases of plague isolated by my predecessor and three contacts, two cases out of three died of bubonic plague in the groin; third one, also bubonic plague, was kept in the camp till he was cured, when I departed and then told the headman to keep him there for three day more. At Kwajomvu the total number of inoculations performed by me was 94. On the 15th I received orders from you through Sub-Assistant Surgeon Murari Lal to remove my camp to Rabai, and we both went to Rabai and reported ourselves to the Assistant District Commissioner. On that very day Sub-Assistant Surgeon Murari Lal was sent to Mariakani for investigation, and no sickness was reported by him there. I continued inoculations and could not find many men, so Assistant District Commissioner ordered me to proceed to Mariakani on the 16th to inoculate persons there.

After finishing this I was ordered to proceed to Tsangazini, via Majiachumvi. On the 17th I left Mariakani and went to Majiachumvi. On the 18th at 6 a.m. I left Majiachumvi for Tsangazini with one guide and a boy. After four hours walk I reached there and called the headman and investigated about the sickness, but I was informed that nobody was sick.

I searched about the place for nearly an hour but could not find any sickness there, then I went back to Majiachumvi and caught the first possible train. I came back to Mariakani same day and inoculated the remaining persons there. On the 19th I left for Rabai and caught the first possible train. In the evening I reached Rabai and reported to the Assistant District Commissioner about my investigations. On the 20th I did not get many men for inoculation and I wired the matter to the Medical Officer of Health, being asked by the Assistant District Commissioner to do so. I did not receive any reply to this till on Monday morning, the 22nd instant (September) when I got a wire from the Plague Officer to return to Mombasa on the first opportunity. The total persons inoculated by me were 361.

REPORT OF SUB-ASSISTANT SURGEON MURARI LAL ON SICKNESS AT KWAJOMVU AND MARYIA-KANI.

I left for Kwajomvu by the morning local on the 15th, and arrived in the village at 9 a.m. All the houses had been disinfected by Sub-Assistant Surgeon Bhatt, and there was nobody in the quarantine camp; the only sick old woman who had been isolated is all right and fit to be discharged in a day or two. No fresh cases reported during the last few days, and no fresh death after the 11th. Each and every person of that village has been inoculated.

As per your instructions I removed the camp of Sub-Assistant Surgeon Bhatt to Rabai, arriving there at 11.30. On interview with the Assistant District Commissioner I was ordered to proceed to Maryia-Kani station with the head old man, to investigate the sickness there as was reported by the headman of that place. I came down to Mazeras and caught mixed train at 1.30, and arrived at Maryia-Kani station at 2.15 and then walked to the village, and examined the sick men which were 12 in number. Eleven out of them complained of slight ailments like cough, cold, stomach-ache, etc. (temperature normal), but one had malaria due to constipation (temperature 99.4 only). It seems that these people had been ordered by the Assistant District Commissioner to come down to Rabai for inoculation, but they have put forward their inability to come to Rabai through illness, etc., which is not the case at all.

In my opinion there is no infectious disease at Maryia-Kani. All these people are willing to get inoculated, but at Maryia-Kani station, and not at

Rabai, as ordered by the Assistant District Commissioner. I have sent the result of my investigation to Assistant District Commissioner, Rabai, and have requested him to arrange with Sub-Assistant Surgeon Bhatt to get the people of Maryia Kani inoculated at their village only.

The Assistant District Commissioner, Rabai, had collected men from another village for inoculation, and Mr. Bhatt started inoculation there at 2 p.m.

REPORT OF ASSISTANT SURGEON A. N. NYSS, ON THE SICKNESS AT TSANGAZANI, A VILLAGE TWENTY MILES DISTANCE FROM RABAI.

Arriving at Rabai at 1.30 p.m. on 11th September, 1913, I made inquiries as to where the village was in which a number of deaths had recently occurred, and found that it was at Tsangazani, a village twenty miles from Rabai.

An askari was sent out to this village by the District Commissioner, Rabai, on 10th September, 1913, and his report was as follows:—That the last case of illness at the village was three days prior to his arrival at the village, the patient only living for twenty-four hours from the outset of the illness. This patient had buboes in the axilla and groin, and finally buboes also appeared on the neck.

I made a visit to the village at 7 a.m. on 12th September, 1913, where, on inquiries from the chief of the tribe, I found out that eight deaths had occurred in the village in one week, the last case being four days prior to my visit. The duration of the illness of each of these persons was not longer than thirty-six hours, and all had very marked buboes in the axillæ and groins.

None of the patients have been inoculated. On inquiring if any of the patients had been to Mombasa recently the chief stated that none of them had left the village for the last three months, although some of the other people of the tribe had been in Mombasa a few days before, but all these had been inoculated, numbering fourteen persons in all.

The first case of plague occurred in a man who had come to the village from Katoni on foot. This man lived for three days in the village, developed symptoms of plague and died in twenty-four hours. The eight deaths were among the men only. They were of different families, and lived in different huts. Of these four men died in the open and four men in their huts. I saw these four huts, had them vacated and closed, and told the chief not to have them opened for fifteen days.

On requesting the chief to have himself and all his tribe inoculated he gladly consented, and I inoculated 143 men, women and children, which comprised the entire population of the village, and also of two other villages, about two miles distant from the infected one.

There were no cases of sickness in the village since the last death about four days before my visit.

REPORT ON THE OUTBREAK AT THE LABOUR CAMP, MTESA, BY THE PLAGUE OFFICER.

(1) On 25th September, 1913, I received information from the Deputy Principal Medical Officer that there had been an outbreak of disease among the labourers at the water works camp at Mtesa, which required investigation. I accordingly arranged to go out there the next day.

(2) I was met by Mr. Hamp, the Assistant Resident Engineer, who gave me the following history:—

Case I.—On September 20th, one of the labourers was taken ill with cough and a high temperature. There was a history of 24 hours illness only. He died at midnight on the 21st.

Case II.—A second man was removed to the hospital at Mobasa Gap. He was thought to be suffering from cerebro-spinal meningitis. He died on the evening of the 22nd after 48 hours illness. These men shared the same hut and worked in the same gang.

Case III.—This was seen on the 22nd September. He complained of headache, and had high temperature. He died on the 23rd. He worked in the same gang as I. and II.

Case IV.—This man died on the 25th September, with a large bubo in the right groin.

His case gave the required clue to the nature of the outbreak. From this it appears justifiable to infer, that Case I. was pneumonic and Cases II. and III. septicæmic.

Case V.—This man I saw myself. He had the physical signs of pneumonia, but had the general appearance, I may say the almost characteristic appearance, of pneumonic plague. His sputum showed no *Bacillus pestis*. He died the evening I saw him, and I have no doubt in my mind that, despite the microscopical examination, he died of plague.

There were two other cases in a separate camp under observation for meningitis. However, neither presented to me any symptom justifying any suspicion of this disease. I took blood films, and both showed a malarial infection. As there is no reason to suppose that the blood from a Kavirondo would not show parasites, I directed that they should still be kept under observation apart from their fellows.

(3) As to the movement of the batch of labourers in which the cases have occurred, the majority had arrived from Kisumu some five months previously. On the 21st September 35 new men arrived from Kisumu, and on the 23rd another batch of 160 came in.

(4) *Origin.*—From inquiries I made, I came to the conclusion, that the disease was in all probability brought into camp from the Mazeras or Chagamwe districts. My reasons for this opinion are as follows:—There is little or no direct communication between the labourers and Mombasa. The messengers, who came into town from the camp, are Wadigo, and they have nothing to do with the Kavirondo. It has been the custom on the part of the Resident Engineer to give leave to a certain number of men to go on Sundays into Mazeras, and as many as 50 or 60 take advantage of the privilege.

Now Case No. I. was taken ill on the 20th September. It may be presumed he acquired the infection somewhere between the 14th and 17th. We have definite information that there was plague at Kwajomvu about 14th September. Kwajomvu is the next station to Chagamwe, and there is nothing to have prevented him in walking over in that direction, instead of going to Mazeras.

In short, although no information can be obtained as to the recent movements of the deceased, yet (1) we do know that he did not come into Mombasa, and (2) that he had the opportunity of going to any of the villages near to the line, some of which were plague-infected. Further, September 14th is a Sunday, and is a day which coincides with his leave opportunity, and also the date about when he acquired the disease from which he died.

(5) *Preventive Measures*.—Mr. Hamp, the Resident Engineer, in the absence of Mr. Linnell, as soon as he suspected the nature of the disease took very prompt measures for the isolation of the sick, of suspected cases, and of immediate contacts, and at the same time he ordered all labour to be confined to camp till further orders. The general measures in fact were so excellent, that on my arrival to inquire into the matters there was little left to be done.

I take this opportunity of bringing to your notice the very excellent work of this young officer, and desire that you will be so good as to bring his name before the Director of Public Works.

On my arrival Mr. Hamp collected all his men together, and every single man was inoculated or reinoculated unless his certificate was very recent.

Sites were chosen and work begun on :—

- (1) A plague hospital;
- (2) An observation camp for cases of suspicious illness;
- (3) A contact camp.

All these were zarebaed and put under guard. Each camp had its own attendant rigidly isolated.

Mr. Hamp agreed to select a site for a camp in which all labourers, whose tour of work had expired, might be quarantined for seven days before going to their homes.

A camp three miles away was arranged for the reception of any new batch of labour which might come up.

All leave was stopped, and when the men were off work, as on Sundays, a roll was called every two hours.

Eight men, Wadigo, were selected as messengers for communicating with Mombasa, and these men were segregated.

In addition to special measures, the ordinary routine disinfection procedure was of course adopted.

On 27th September Dr. Tompson and Sub-Assistant Surgeon Bhatt were ordered to proceed to Mtesa on plague duty.

On 28th September I again visited the camp and found that Mr. Hamp had carried out all my recommendations as to the sub-camps.

I requested the Sub-Assistant Surgeon in charge of the Mombasa Gap camp hospital to remain at Mtesa, leaving a Compounder in charge at the former place, and to remove such of his hospital equipments as he needed over to Mtesa.

I am in hopes that such arrangements as have been made will prove adequate to stop the epidemic, and I think that the present staff will be found sufficient to deal with the outbreak.

NOTE.—The total cases at Mtesa amounted to nine.

12.—PLAGUE IN ITS RELATION TO CONTACTS.

Since the outbreak 1,005 persons, being contacts, have been segregated. Out of this number 9 have developed the disease within the prescribed period, of whom 8 died.

They are distributed as follows :—

Year.		Contacts.		Cases of Plague.		Died.
1912	...	162	...	1	...	1
1913	...	843	...	8	...	7
		<hr/>		<hr/>		<hr/>
		1,005		9		8

The details of these 9 cases are instructive.

No.	Nature of Original Case.	Date of Isolation.	Date of onset of Disease.	Date of Death.
1	Septicemic ...	1912. 19th November ...	1912. 24th November ...	1912. 24th November.
2	Bubonic ...	1913. 18th April ...	1913. 19th April ...	1913. 23rd April.
3	Pneumonic ...	12th July ...	15th July ...	17th July.
4	Bubonic ...	7th August ...	9th August ...	10th August.
5	Bubonic ...	21st August ...	25th August ...	29th August.
6	Bubonic ...	21st August ...	25th August ...	Recovered.
7	Pneumonic and Bubonic	15th September ...	16th September ...	19th September.
8	Pneumonic ...	17th September ...	18th September ...	21st September.
9	Pneumonic ...	17th September ...	19th September ...	23rd September.

From this it is seen that the average date of onset is three days from the date of isolation. It is, therefore, justifiable to say that the infection was not acquired in camp, but was brought in by the contact himself.

13.—PLAGUE AMONGST INOCULATED PERSONS.

A series of 224 consecutive cases has been examined and among them cases of plague after inoculation have occurred in 20 persons, that is 8·9 per cent. of the total in the series.

Of these :—

In Case 1 the disease was reported 6 days after inoculation.

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6	11	14	22	7	28	5	10	41	5	12	16	16	9	16	30	90	90	44

These cases may be placed in one of the following categories :—

(1) When the patient was inoculated whilst he was undoubtedly incubating the disease.

(2) Cases where the patient had not time to obtain any very great degree of immunity after inoculation.

(3) Cases where inoculation did not protect.

(4) Cases where inoculation probably saved the patient's life.

In the *First class* are included :—

Cases Nos. 1, 2, 8 and 11—that is, the patient was incubating the disease at the time when inoculation was performed.

In the *Second class*, Cases Nos. 6, 9 and 15, even if the patient was not actually incubating the disease, there was no time to acquire any very great degree of immunity.

In the *Third class*, Cases Nos. 3, 4, 12, 13, 14 and 16, the immunity should have been about at its highest point at the time the disease was acquired.

Nos. 7 and 20 should have fared better.

Nos. 10, 17, 18 and 19 were probably losing their immunity.

In the *Fourth class*, Nos. 5, 9 and 13 recovered, and probably owe their lives to having been inoculated. Of the twenty cases whose histories are quoted in detail below, all except Nos. 8, 15, 18, 19 and 20 suffered from bubonic plague. These had pneumonic, and had practically no chance.

From the twenty cases then four should be deducted—that is, those who were incubating the disease—whilst possibly the three cases in the second category should come out too. That leaves thirteen cases to be considered in which inoculation did not protect. That is 5·8 per cent. of the total series of cases, or, if the second category cases be included, 7·1 per cent.

The details of the cases shortly are as follows :—

(1.) *Case No. 44.*—Mayamezi, age 40, female. Bubonic. Inoculated on 29th May, 1913. Reported ill 4th June. Said to have been taken ill on June 2nd. *Died* on 4th June. Was a contact of case 34, a bubonic case.

(2.) *Case No. 46.*—Mayamezi, age 35, female. Bubonic. Inoculated 29th May, 1913. Admitted to camp 4th June, 1913. Said to have been taken ill on June 2nd. *Died* on 6th June. Was a contact of Case 44.

Both these cases were probably incubating the disease at the time of inoculation.

(3.) *Case No. 49.*—Swahili, age 45, male. Bubonic. Inoculated 29th May. Reported ill 9th June, 1913. *Died* 9th June. This is a border-line case. No great degree of immunity could have been arrived at between 29th May and, say, 4th or 5th June, about when it may be presumed the disease was acquired.

(4.) *Case No. 58.*—Swahili, age 35, male. Inoculated on 29th May. Reported sick on 12th June. *Died* on the 12th. A border-line case like the preceding one.

(5.) *Case No. 134.*—Indian Memon, age 18, servant, male. Bubonic. Inoculated on 7th July, 1913. Reported ill on 29th July, and admitted to hospital. *Recovered*, and discharged on 20th August. The inoculation did not protect against the disease being acquired, but probably saved his life once he had got it.

(6.) *Case No. 140.*—Khoja, age 24, female. Bubonic. Inoculated on 28th July, 1913. *Died* on 4th August. An undoubted case of inoculation during the period of incubation.

(7.) *Case No. 150.*—Indian Sawa Mussulman, age 40, male, a blacksmith. Bubonic. Inoculated on 12th July, 1913. Reported ill on 9th August. *Died* on the 10th. Here inoculation did not protect at all.

(8.) *Case No. 157.*—Memon, age 14, female. Pneumonic. Inoculated on 8th August, 1913. Reported ill on 13th August. *Died* on the 16th. Contact with Case 145.

(9.) *Case No. 163.*—Indian Khoja, age 12, male, a milk seller. Bubonic. Inoculated 11th August. Reported ill 21st August. *Recovered*. Possibly inoculation saved his life.

(10.) *Case No. 164.*—Swahili, age 36, male, meat seller. Bubonic. Inoculated 11th July. Reported ill 21st August. *Died* 21st August. Here immunity did not protect.

(11.) *Case No. 165.*—Washihiri, age 39, male, a water carrier. Bubonic. Inoculated on 17th August. Reported ill on 22nd August. *Died* on 22nd August. Inoculation during incubation.

(12.) *Case No. 167.*—Taita, age 25, female, labourer. Bubonic. Inoculated on 17th August. Became ill on 19th August, 1913. Reported sick on 23rd August. *Died* on 25th August. No time for any great degree of immunity.

(13.) *Case No. 172.*—Khoja, age 13, female. Bubonic. Inoculated on 11th August. Reported sick on the 27th. Contact with Case 163. *Recovered*. Inoculation probably saved her life.

(14.) *Case No. 173.*—Khoja, age 35, male, a milk seller. Bubonic. Inoculated on 11th August. A contact of Case 163, taken ill in camp on 27th August. *Died* on 29th August. Refused a second inoculation. Inoculation should have protected him, but did not.

(15.) *Case No. 178.*—Washihiri, age 30, male, labourer. Pneumonic. Inoculated on 23rd August. Reported ill on 1st September. *Died* on same day. No time to acquire any degree of immunity.

(16.) *Case No. 186.*—Akikuyu, age 26, male. Bubonic. Inoculated 1st September. Fell sick 16th September, 1913. *Died* 18th September. Inoculation did not protect him at all.

(17.) *Case No. 191.*—Hindu, age 35, male. Bubonic. Inoculated 22nd August. Fell sick 19th September, 1913. *Died* 23rd September. Inoculation did not protect him.

(18.) *Case No. 195.*—Hindu Cutchi, age 45, male. Pneumonic. Inoculated in July. Fell sick 13th October. *Died* 15th October. The immunity was passing off.

(19.) *Case No. 196.*—Indian Mohamedan, age 40. Pneumonic. Inoculated in July. Fell sick on 16th October. *Died* 17th October. The immunity was passing off.

(20.) *Case No. 197.*—Hindu, age 30 years. Pneumonic. Inoculated (1) 30th July, (2) 6th September. Fell sick 14th October. *Died* 18th October. A very disappointing result.

With reference to Table VIII. the figures on the inoculated side are, for the purposes of statistics, too small to be of much value.

At the same time, it is clearly shown that the incidence of plague among inoculated persons only amounted to 3 in every 10,000 persons, whilst on the other side the incidence among those who had not been inoculated amounted to 34 per 10,000.

The case mortality figures also, unfortunately for the purposes of statistics, are too small to make a comparison; but still, including those cases among the inoculated who were actually incubating the disease at the time of the operation, there is a drop; and even if our inoculation work has saved but seven lives in every hundred plague cases, it has done something in the battle.

Finally, in connection with inoculation, I think Mombasa must hold an almost unique position among plague-stricken towns, in that practically speaking, the *entire* population has been inoculated. At the beginning of the epidemic, the population of the town is estimated to have been about 30,000. As the epidemic grew, a large number of people left the town, consequently, deducting these, and adding to the figure the number of children under eight years of age, there remain but few who have avoided inoculation.

TABLE VIII.

Table showing in summary form incidence among the inoculated and the uninoculated population.

INOCULATED.						UNINOCULATED.				
Month.	Popula- tion.	Attacks.	Deaths.	Incidence per 1,000.	Case mortality per cent.	Popula- tion.	Attacks.	Deaths.	Incidence per 1,000.	Case mortality per cent.
1912.										
September ...	—	}	}	}	}	30,000	5	4	0.1	80
October ...	100					29,900	12	12	0.3	100
November ...	400					29,600	—	—	—	—
December ...	600					29,400	10	9	0.3	90
1913.		Nil	Nil	Nil	Nil					
January ...	1,000	}	}	}	}	29,000	—	—	—	—
February ...	1,400					28,600	6	6	0.2	100
March ...	1,600					28,400	1	1	0.3	100
April ...	1,800					28,200	19	19	0.6	100
May ...	2,500					27,500	14	11	0.5	78
June ...	4,000					26,000	39	34	1.1	84
July ...	8,300	3	2	0.3	66	23,700	48	39	2.0	81
August ...	23,800	8	6	0.3	75	6,200	34	30	5.4	88
TOTAL...	—	15	12	—	80	—	188	165	—	87

14.—ADDENDUM.

A FURTHER REPORT ON PLAGUE FOR THE MONTHS OF
SEPTEMBER AND OCTOBER, 1913.

(1.) During September the case incidence fell from 42, the figure for August, to 17; and in October it came down to 6.

The actual virulence of each individual case, instead of getting less, appears to have been more intense, inasmuch as the case mortality was 100 per cent. instead of 87 per cent., which is the crude mortality rate for the first year. It may be, however, that cases of *Pestis ambulans* have been occurring of which we know nothing.

The varieties and distribution of the 23 cases referred to above are as follows:—

	1913.	Bubonic.	Septicæmic.	Pneumonic.	Total.	Deaths.
September		6	4	7	17	17
October ...		1	—	5	6	6

(2.) The localities in which these 23 cases occurred is shown as under:—

1. Commercial Street	...	...	on 1st September.
2. Mwembeni	...	...	" 1st "
3. Kilifi	...	...	" 3rd "
4. Mjimpia...	...	...	" 7th "
5. Mwembeni	...	...	" 7th "
6. Kilindini Railway Quarters	...	...	" 7th "
7. Mjimpia...	...	...	" 8th "
8. Mwembeni	...	...	" 9th "
9. "	...	...	" 10th "
10. Kilindini Railway Quarters	...	...	" 17th "
11. Mwembeni	...	...	" 17th "
12. "	...	...	" 17th "
13. Kilindini Railway Quarters	...	...	" 18th "
14. "	...	...	" 19th "
15. Ndia Kuu	...	...	" 20th "
16. Kilindini Railway Quarters	...	...	" 20th "
17. "	...	...	" 23rd "
18. "	...	...	" 10th October.
19. "	...	...	" 15th "
20. "	...	...	" 17th "
21. Commercial Street	...	...	" 18th "
22. Kilindini Railway Quarters	...	...	" 22nd "
23. "	...	...	" 30th "

Now this is a Case Distribution which requires some explanation. The Kilindini Railway area forms a little township by itself. It is situated about a mile and a half from the town proper. Outside the railway railings on the town side is a small suburb of Mombasa, called the Kilindini Bazaar; otherwise the railway area is entirely cut off from the main town by intervening shambas.

The railway quarters themselves consist of buildings, ancient and modern. The old buildings were erected in the early days of the railway history, and by this time have reached a state of decay and dilapidation, which is sufficient to cause their condemnation at sight. They consist of two kinds of buildings, (a) those of galvanized iron (with a wooden lining), supported on wooden pillars, and (b) those also of iron, with no sort of lining or flooring at all. Those with the wooden lining are, as might be expected, rat infested, and the other sort are alive with fleas of all descriptions, as men and animals all live together in them.

Besides these iron buildings, there exists a Swahili village of railway workers who live in the mud huts with thatched roof.

The modern buildings are model dwellings and beyond criticism.

In the course of routine rat examination since the campaign against rodents came into being, it was noticed that infected rats were being found, first, mostly near Mombasa harbour, then westward near the Salim Road, then across the Salim Road in Mwembeni, until finally the infection was found in the Kilindini area. It looks as if some migration of rats from the town into the country was

in progress. Infected rats were found in Kilindini on 16th, 24th, 25th and 30th September and 17th October, and in Mwembeni on 15th August, 3rd and 13th September, and not since.

We thus had warning of the danger. We made every effort to catch rats or poison them; we gave the inhabitants of the houses traps and "bait" and we warned them. But the whole area was in such an insanitary state generally that little good could come of it, as no rat will go into a trap, when, without the slightest trouble, it can get any amount of food outside.

On the 29th September I called the attention of the Principal Medical Officer and the Chief Sanitation Officer to the fact that there was a high percentage of infected rats in Kilindini; on the 30th September I asked for permission to demolish the landies. I said in my telegram: "It was asking for trouble to do anything short of demolition."

On October 16th I warned the Chief Sanitation Officer, and recommended getting the railway employees out of their houses.

On the 17th October there was a strike among the locomotive men as they objected to being sent to the quarantine camp. A special camp was therefore put up for these men in Kilindini, and this formed the nucleus of the present large canvas town.

The authorities at Nairobi were by this time thoroughly aware of the danger. The difficulty, however, was to get enough tents in which the people could be housed.

However, towards the end of October a large camp had been pitched, and the danger zone was practically speaking evacuated. Great care was exercised in the pitching of the camp, as it was realised that a dirty camp is worse almost than dirty permanent quarters.

Dr. Thompson was put in sanitary charge, and I think it may be recorded here that his knowledge of camp hygiene, derived from his having served as an officer of the Royal Army Medical Corps (Territorials), stood him in great use. I may add that I have seldom seen a large camp of natives of all sorts of castes and races kept in such a cleanly sanitary condition.

I consider that Dr. Thompson is deserving of credit for having brought about this desirable state of affairs, and for seeing that it was maintained. Writing this report, as I do, at the conclusion of my work as Plague Officer in Mombasa, I can only hope now the dirty, insanitary, and dangerous dwellings in the railway area have been evacuated and shortly will be demolished, giving way to modern rat-proof dwellings, that the epidemic will be stopped in that district.

Altogether, since the disease began in Mombasa, 17 cases of plague have occurred among the railway employees living in the railway area; that is to say, there is a case incidence of approximately 10 per thousand. Compare this incidence with that of the general inoculated population (all railway employees have been inoculated at least once and the majority twice), which in August, 1913, was 0.3 per 1,000. It is seen therefore that if one lives in the railway area the chances of getting plague are about 30 times as great as if one lived in the town. I refrain from further criticism, as the railway authorities, both here and at headquarters, actually did all they could to help us when the position was brought home to them.

As to the remainder of the September and October cases, Mwembeni had 6 cases, and the stone part of the town 5.

Case 21, which occurred on the 18th October, was a source of disappointment.

The unfortunate victim had been inoculated twice, his house was quite a good one, it had been fumigated only a week before he died, and no other case was known to have existed near his house since 13th August.

DISINFECTION WORK.

The Clayton Gas Machine, unless called away to disinfect a plague house, has been at work systematically treating the poorer class of stone houses in the town.

This work has been carried out house-by-house and street-by-street, with a view to destroying rats and vermin.

The number of buildings Claytonised up to 31st October was 115. As many of these buildings and large blocks each contain many rooms, the number of premises disinfected will amount to about 1,000.

INOCULATION.

This work has been vigorously continued.

It was considered advisable to persuade people to be reinoculated in order to obtain additional immunity. A large number of the inhabitants responded.

The weekly figures for September and October are as follows:—

Week ending.		Primary Inoculation.	Reinoculated.
6th September	...	1,606	Nil
13th "	...	1,681	198
20th "	...	1,382	386
27th "	...	935	1,099
4th October	...	1,240	915
11th "	...	768	2,986
18th "	...	665	1,810
25th "	...	479	849
1st November	...	346	459

The total number of inoculations at 12 noon on 1st November stood thus:—

Primary inoculations	...	...	32,744
Reinoculations	...	...	8,702
			<u>41,446</u>

The vaccine used is Haffkine's prophylactic. So far as I know, not one single untoward result has followed. Considering that in many instances the operation has been carried out in not too favourable circumstances and under conditions, which, if one had the choice, one would not select as highly desirable, this result reflects credit on the inoculation staff for their care in trying to obtain asepsis.

RAT DESTRUCTION.

This section of anti-plague work has afforded the most disappointing results in the whole organisation.

In the first place, the inhabitants, whether due to an active or passive apathy I do not know, practically refused to co-operate with the department in rat catching. How far Hindu and Arab susceptibilities are offended by rat destruction I cannot gauge. The heads of the various communities were invited to attend at the Health Office, and there the reasons for rat catching were carefully explained to them by Professor Simpson. No appreciable result followed, and the general run of the population continued as apathetic as ever.

In the next place, our experiments showed that not only the Liverpool virus, but Danysz's also had lost its virulence, whilst for some extraordinary

reasons caged rats fed on two of the best-known patent rat poisons not only survived but flourished.

It became necessary, therefore, that some reliable poison should be obtained, and I was obliged to fall back on white arsenic. This I mixed with ghee and spread on bread. I found that rats which nibbled at this died within three hours. This mixture, therefore, was put down in selected places under the supervision of Dr. Tudhope, who was in charge of the rat brigade and the rat work. Notices were published that a dangerous poison was being put down all over Mombasa, and all persons were warned not to let valuable animals stray. So far the total casualty list apart from rats amounts to three chickens; that is, so far as we know.

The number of rats caught, dissected and examined microscopically is as follows:—

Months.	M. Decumanus.	M. Alexandrinus	M. Rattus.	Total.	Infected.
August	234	115	65	414	3
September	333	166	31	530	9
October	209	101	10	320	4
TOTAL	776	382	106	1,264	16

That is a percentage of infection of 1·2. The infection was found to be present in:—

M. Alexandrinus	5
M. Decumanus	10
M. Rattus	1
	—
	16
	—

STAFF.

During the period under notice the following changes took place. Arrivals:—

Name.	Date.	Duty.
Sub-Assist. Surgeon D. S. Tipnis	18th September	Rat Work
Dr. W. H. Tudhope	2nd October	Rat Work
Dr. E. N. Russell	29th October	General Duty

Dr. P. F. Nunan was ordered to Nairobi on 24th October, his work on the Sanitary Survey being practically finished.

Sub-Assistant Surgeon Dula Ram was ordered to Nairobi in September.

15.—TREATMENT OF PLAGUE.

Now that the etiology of the disease is becoming so well understood, plague officers are devoting themselves to improving the methods of treatment.

When all is said and done, symptomatic treatment more often than not does little else but make the patient more comfortable before death. In the treatment of a disease like plague it is understood that drug treatment can be of but small use; what must be aimed at is the elimination of the bacillus from the host and the neutralisation of the toxin. Naturally, therefore, we look to Sera, to the ready-made anti-body, that is to say, for our remedy.

Trials, and extensive trials, have been made of the following sera—Yersin and Lustig's, Cruz's and Galleoti's alkaline nucleo-proteid solution—with varying success. Todd records 17 recoveries out of 40 cases treated with 20–400 c.c. of anti-plague serum, whereas previously he lost all his patients.

Other workers, again, have employed vaccine therapy, using either Haffkine's or Pfeiffer's vaccines, Terni and Bandi's peritonal exudate or Strong's attenuated living vaccine.

In Mombasa, during my period of duty, no serum of any description was available. Assistant Surgeon Nyss, who was in charge of the Plague Camps, therefore decided to fall back on vaccines, and he used Haffkine's prophylactic, injecting 1 c.c. subcutaneously on the admission of the case. In no case was there any indication to repeat the injection, as the patient either died or the disease took on a favourable course.

The result this officer obtained compels, I think, some attention, as the following tables show.

Table IX. deals with a series of 80 cases which were not treated by vaccine therapy, out of which 18 recovered and 68 died, a mortality figure that is of 77·5 per cent.

Out of the 68 cases, however, which died, some correction in the mortality figure must be made on account of 14 of them having been previously inoculated. In Table VIII., where the relative protection afforded by inoculation is shown, it is seen that the case mortality among the inoculated is 80 per cent. and among the uninoculated 87 per cent. I propose, therefore, to deduct the difference in order to get a correlated or corrected result, and to call the final case mortality figure among those not treated by vaccine therapy 70·5 per cent.

Table X. next deals with a series of cases which were treated with Haffkine's vaccine. In this series there are 17 cases, of which 10 recovered and 7 died. The uncorrected case mortality is therefore 41·1 per cent. In this series eight had been inoculated previously. I find it impossible to make any correlation here, though I have no doubt that mathematically there is a way of doing it. Even if the three cases which appear in the series with a previous inoculation to their record be eliminated altogether, the case mortality among the remainder is 64·3 per cent. Without, then, bringing to bear on the subject any of the higher mathematics of statistics, it is seen that in the two series of cases treated:—

(a) symptomatically, the mortality was 70·5 per cent.

(b) by vaccine therapy „ „ 41·1 „ „

It may be added that in each case under observation in the (b) series the presence of *Bacillus pestis* was demonstrated bacteriologically.

The temperature charts and a short note on some of the cases in (b) series are attached.

TABLE IX.
CASES TREATED SYMPTOMATICALLY.

Caste of Native.	Total Number of Cases.	No. of Admissions into all Camps.		Number of Recoveries.	Number of Deaths.	Type of Disease.			Percentage.		Number of Patients Inoculated.	Number of Patients not Inoculated.
		Males.	Females.			Bubonic.	Pneumonic.	Combined.	Deaths.	Recoveries.		
Indians	55	36	19	13	42	48	6	1	76	24	10	45
Africans	23	16	7	4	19	10	8	5	83	17	4	19
Arabs ...	2	2	—	1	1	2	—	—	50	50	—	2

TABLE X.

CASES TREATED BY VACCINE THERAPY.

Caste of Native.	No. of Cases treated with Vaccine.		No. of Recoveries.	No. of Deaths.	Type of Disease.			No. of Cases previously inoculated.	No. of Cases not inoculated.
	Males.	Females			Bubonic.	Pneumonic.	Combined.		
Indians ...	9	1	6	4	9	1	—	7	3
Africans ...	7	—	4	3	—	5	2	1	6
Arabs ...	—	—	—	—	—	—	—	—	—

16.—FINANCE.

ABSTRACT OF SPECIAL "EPIDEMIC" VOTE ACCOUNT.

Month.	Cash Transactions.		Charges Dr. to other Govt. Departments.		Personal Emoluments.		Compensation Claims.		Foodstuff, Posho, etc.		Monthly Total.		Grand Total.	
	Rs.	cts.	Rs.	cts.	Rs.	cts.	Rs.	cts.	Rs.	cts.	Rs.	cts.	Rs.	cts.
July ...	899	20	—	—	305	21	—	—	—	—	1204	41	1204	41
August ...	10929	25	12	27	1159	22	5	00	128	89	12234	63	13439	04
September	1963	25	—	—	5855	86	27	00	272	68	8118	79	21557	83
October ...	887	71	2856	52	3005	48	10	00	817	67	7578	38	29136	21

NOTES ON EIGHT CASES OF EPIDEMIC CEREBRO-SPINAL
MENINGITIS OCCURRING AMONG EUROPEANS IN NAIROBI.
By DR. J. L. GILKS.

During the epidemic of cerebro-spinal meningitis which occurred among the natives in and near Nairobi from May, 1913, till the end of the year, there came under my notice eight cases among Europeans, with one death. The symptoms and signs were, except in two cases, very obscure, and the cases formed a very interesting series.

The diagnosis, unfortunately, was only confirmed bacteriologically in four cases. Three cases occurred at one hotel from which native cases had been removed.

Symptoms.—In every case headache was the chief symptom complained of, and this was situated in the occipital region and also over and behind the eyes and in the neck. Every case but one had some stiffness of the neck. Eye symptoms occurred in three cases, the complaint being in one case of a temporary blindness, in another of seeing flashes of light, and in the third that, after shutting his eyes, he still saw objects he had previously been looking at. Two cases complained of seminal emissions before admission to hospital. Pharyngitis had been present in two cases. The knee jerks were brisk in five cases, but the other reflexes did not appear to be altered, and there was never any contraction of the hamstrings. Eye reactions were always normal. The temperature was intermittent or remittent, and did not seem to have any relation to the severity of the attack. It was noticed that the 2 p.m. temperature was usually the highest. Epileptiform seizures occurred in one case. In four of the cases there have been after effects which have lasted up to the present.

These have been :—

Impairment of vision is two cases.

Affection of memory in two cases.

Rheumatic pains in limbs and joints in two cases.

The blood count showed nothing definite, and varied very much with the different cases. Whenever a diagnosis of cerebro-spinal meningitis was arrived at clinically, lumbar puncture was performed, and in every case cerebro-spinal fluid escaped under pressure. This fluid was perfectly clear in every case but one, and on microscopical examination, after centrifuging, only showed meningococci in two cases, one being the case with turbidity.

In five cases 5 c.c. of blood was incubated with broth, and in one case a plentiful growth of meningococci took place after ten days. Treatment was in every case by intramuscular injections of soamin, which was usually administered in 5-grain doses on each of the first two days after commencement, followed by 3-grain on the fourth day, and, if necessary, on account of an irregular temperature, occasional further doses were given.

No bad effects from the soamin occurred. Sera were not tried, as it was conclusively shown in native cases that their effect was more in the direction of aggravating than in curing the disease. This might possibly be due to the climatic influences to which the sera must be exposed on their journey from England to East Africa.

Lumbar puncture always gave great relief to the headache, and was a valuable asset in the treatment of the case in addition to its diagnostic value.

The following are the details of the cases :—

(I.) Male, age 42, admitted in a desperately ill condition as a case of pneumonia on 4th June. No history obtainable, but he had been up for medical examination two days before as to his fitness for Government service, and had been rejected for albuminuria and signs of phthisis at the right apex. T. 92.2°, P. 140, R. 40. Delirium present with sign of pneumonia at the apex of the right lower lobe. The following day stiffness and retraction of the neck developed, and lumbar puncture gave a turbid fluid under pressure and swarming with gram negative intracellular diplococci. The condition got worse, and proptosis and paresis of the right side developed, and death occurred on 8th June.

(II.) Female, age 34, admitted on 19th July with a history of 11 days' illness beginning with headache, shivering and slight diarrhoea, which lasted for a day only, and pain in the back of the neck developed. The headache continued, and she had been in bed for six days with a high temperature ranging between 101° and 103°. The pulse had been slow, and examination of blood for malaria and typhoid had both been negative. She had some cough for three days. On admission T. 101°, P. 80, R. 24. The only physical signs were the presence of a few crepitations over the base of the right lung. No positive diagnosis was arrived at. The Widal reaction was again negative. Treatment was purely symptomatic, and the temperature gradually steadied down and she was discharged on 7th August. It was noted that rapid wasting had occurred, and she rapidly became very weak. The next day she was re-admitted with a temperature of 101.4°, P. 112, R. 22. The cough had returned, she had vomited once, and her nose had bled badly. Blood examination was again negative. The physical signs were as before and there was no affection of the reflexes. On the 10th August the result of lumbar puncture on the next two cases induced me to carry out the same procedure here; fluid under pressure was withdrawn. The fluid was quite clear and microscopically negative. Intramuscular injections of soamin were given, and the condition improved somewhat. On the 25th August the site of a quinine injection, given a month before for diagnostic purposes, became inflamed, and shortly after an abscess developed and a large slough came away. Improvement was more rapid after this, and she was discharged well on 15th September and has had no after effects.

(III.) Male, age 26, admitted on 5th August complaining of pain over the eyes and back of neck and shoulders, and had had a high temperature for 4 days. On admission T. 102°, P. 100, R. 20. The physical signs were nil. No stiffness of neck. Reflexes normal. No malaria in blood and Widal reaction negative. The temperature remained high, and on one occasion reached 104.8°. On the 9th August he complained of seeing "flames and lights" when the eyes were closed, and he was noted as wasting rapidly. On the 10th August lumbar puncture was performed, and a large amount of a perfectly clear fluid escaped under pressure. The cerebro-spinal fluid was negative for meningococci, but a specimen of blood incubated with broth gave a profuse growth of the diplococcus after ten days. With soamin injections the

temperature dropped considerably, but remained irregular for a long time, and he was not fit for discharge till 29th September. After discharge from hospital he developed rheumatic pains in the limbs and joints, necessitating leaving the country.

(IV.) Male, age 26, admitted on 6th August complaining of pain and stiffness of the neck and acute pain in the eyes of three days' duration. He also complained after shutting his eyes that the image of objects he had been looking at did not disappear. For some time he had had nocturnal emissions. On admission T. 100.4°, P. 108, R. 28; knee jerks very brisk. A blood slide showed 18 per cent. of large mononuclear cells, but no other change. He was treated with soamin injections before a lumbar puncture was done on the 10th August, when perfectly clear fluid under pressure was withdrawn. The fluid showed no diplococci. He improved rapidly in himself, but for ten days he was unable to read, and since discharge he complains of his eyes being weaker than before. He wasted rapidly, and was very feeble when he first got up and before discharge on the 10th September.

(V.) Male, age 33, first seen on 18th August, when he was complaining of intense pain over the eyes with stiffness and pain in the neck of three days' duration. He had been in close contact with cerebro-spinal cases at Magadi and had helped the Medical Officer to perform lumbar puncture on these cases. Temp. 102.6°, P. 100, R. 28. He had numerous signs of bronchitis over both lungs; knee jerks reduplicated; neck very stiff; lumbar puncture gave a copious clear fluid under pressure, which showed a few meningococci after centrifuging. He was put on soamin injections, recovered rapidly and has had no after effects.

(VI.) Male, age 38, a medical man who had been in constant contact for weeks with cases of cerebro-spinal meningitis, admitted in a delirious condition on 27th August. He had been unwell for some time, and the day previous had had fever and pain over the eyes, and I had examined some nasal discharge which was present, finding gram negative diplococci. An injection of soamin had been given before admission. T. 100°, P. 100, R. 20; knee jerks accentuated. The following two mornings he had epileptiform convulsions, and his speech centre was badly affected. The cerebro-spinal fluid was drawn off under pressure, and was negative as regards the finding of meningococci. He improved rapidly, but was troubled for some days with weakness of the sphincters, and also suffered from some loss of sensation in the legs. He was invalided home on 11th September, and complained for some time after of mental irritability, with some loss of memory, and pain in the back.

(VII.) Male, age 33, admitted on 24th August in a delirious condition. His friends stated that he had been taken ill while travelling and complained of headache and a stiff neck. There was also a history of spasms of the extremities, and once he had complained of loss of sight. T. 102.6°, P. 84, R. 24. There was stiffness of the neck. No accentuation of knee jerks. A lumbar puncture gave a perfectly clear fluid under pressure, which was negative for meningococci. Under injections of soamin he improved for a time, but afterwards got worse, and a fortnight after admission to hospital malaria parasites were found in the blood. Under injections of quinine he again improved, but the temperature remained variable for some time. He wasted rapidly, and developed a bed sore and boils during the first part of his stay in hospital. He was discharged on 20th October. After discharge he complained of loss of memory and great weakness until leaving the country.

(VIII.) Male, age 40, admitted on 3rd September complaining of pain in the back of the head and stiffness of the neck. The mental condition was not clear, but he said he had had a high temperature for some days with some pharyngitis. His wife said he had changed mentally very much. T. 101.4°, P. 90, R. 24; some injection of fauces and impairment of note at the base of the right lung. Knee jerks accentuated. Lumbar puncture gave an absolutely clear fluid under pressure, which was negative for meningococci. Under soamin injections he improved rapidly, but on getting up he was very weak. Discharged on 19th September, and has had no after effects.

Remarks.—It was unfortunate that the diagnosis of cerebro-spinal meningitis was only bacteriologically confirmed in four of the cases, and possibly the diagnosis is open to doubt in Cases II., IV., VII. and VIII. It is to be remembered, however, that in Case IV. injections of soamin had been given before lumbar puncture was performed, and it was noted among the natives that soamin very quickly destroyed meningococci in the cerebro-spinal fluid. Also in Case VI., an undoubted case of cerebro-spinal meningitis, no diplococci were found in the spinal fluid.

Clinically the classical symptoms were chiefly remarkable by their absence, particularly Kernig's sign; but in Case III., where there were no definite physical signs of any kind, a positive diagnosis was arrived at bacteriologically.

The points which to my mind confirmed the diagnosis were:—

- (1) The rapid wasting and weakness which took place in every case and was so marked in Case III.
- (2) The relief afforded to the headache by lumbar puncture.
- (3) The effect of treatment by injections of soamin, which, as in the native cases, was rapid and marked.
- (4) The presence of after effects, which occurred in Cases III., IV., VI. and VII.
- (5) The general similarity of symptoms.
- (6) The fact that three of the cases—II., III. and IV., of which No. III. was undoubtedly cerebro-spinal meningitis, came from one hotel.

Attention is directed to the report on native cases by Dr. P. H. Ross and Dr. J. O. Shircore, which appeared in the "Transactions of the Society of Tropical Medicine and Hygiene" for December, 1913, in which there appears an account of an European case whose only symptoms were headache, pain in the neck, and a high temperature. This case was not diagnosed during life as cerebro-spinal meningitis, and died very suddenly when he appeared to be almost well. At the *post-mortem* examination there was meningitis, and a few meningococci were found in the fluid from the ventricles, but in the fluid from the spinal canal no micro-organisms could be found, neither was there an excess of the fluid itself.

Also in that report there are two other cases mentioned in which the cerebro-spinal fluid was negative, but a pure culture of meningococcus resulted from incubating the blood with broth.

NOTE ON THE PROPORTION OF CASES OF ANKYLOSTOMIASIS OCCURRING AMONG THE PATIENTS IN KILINDINI HOSPITAL (1906). By DR. NORMAN L. LEYS.

The method employed was as follows. The stools of all the patients in hospital on June 1st were examined. Every case admitted after that date was similarly examined until, by August 11th, the number of 100 was reached. The stools of a few were for unavoidable causes not examined. These have not been counted in the return.

The return shows a proportion of infection of 30 per cent. But, whereas only 3 out of 42 Indians were infected, 29 out of 58 Africans and Arabs harboured the parasite. The number of Arabs admitted during the period of observation was not large enough to allow of separate statistics. But what I have seen in the outdoor department leads me to believe that they suffer even more than Africans. The three cases among Indians had all been six months and upwards in Africa. Most of the rest (*i.e.* the unaffected) were newcomers. Any error in the figures tends to underestimation of the proportion of the infected. The ova once seen are unmistakable. When scanty they have probably occasionally been missed.

Of the 32 cases seven were admitted for the disease (and 3 of these died), 6 more had symptoms attributed to the parasites, and the remaining

19 had no symptoms. In the fatal cases the diagnosis was verified *post mortem*.

While half of the Africans in hospital harbour ankylostomes, I do not suppose that half the Africans in the Island harbour them. The average hospital patient is poorer, dirtier, and, therefore, more liable to infection than the average man. In addition the disease itself is not only a primary but a secondary cause of the degree of ill-health which gives a man the title to admission. But I feel certain that not less than a fifth of the people on the Island are infected, and that much ill-health, often undiagnosed, and sometimes not believed in, except by the patient, is to be attributed to this cause.

The Swahili and Arabs know the disease well, and call it by an Arabic word meaning "swelling," in allusion to the œdema characteristic of the advanced type. They recognise a preliminary stage which they treat with a solution made by steeping iron scales fresh from a forge, and say is cured thereby. The type with œdema they say is incurable. Arabs from Zanzibar tell me the disease is very common there. It is well known among the Wateita and Wanyika, and I have seen an extreme case in a man who had not been out of Machakos for several years.

I am aware that infection by the skin is possible. But I presume it is the general opinion that a parasite which lives in the intestinal canal gains access thereto by the mouth. On such a supposition the three most likely methods of infection are as follows:—

(1.) *Earth eating*.—This is common among the Swahili, specially among the women and children. It is not the geophagy mentioned in the books as a symptom of insanity. Large quantities are not eaten. Those who indulge simply nibble as they feel inclined, much as one smokes tobacco, or as American schoolboys chew gum. A certain red earth is a favourite kind, and was sold in the Bazaar till Mr. Sanderson stopped it, a year ago. But many have little or no preference, and quite commonly eat scrapings from the walls of their houses.

(2.) Cleaning pot and table dishes with sand is another possible source of infection.

(3.) Drinking well water is the third obvious source.

These wells are the only means of getting water which the natives have, and all contain surface drainage water.

All these three sources are of course made possible by soil infection by faeces, an infection as constant and extensive on this Island as if sanitation was unheard of. Before the advent of Europeans it was the custom to make a convenience of the sea-shore. The police have stopped that largely. No other place is provided. There is not one public latrine on the Island. As a result every plot of grass or scrub, the shelter of every tree, every lane and back yard, is defiled. Even in the public streets, men, most commonly Indian Coolies, may be seen committing nuisances.

A classification of the stools of 100 consecutive cases admitted into Kilindini Hospital during May–August, 1906, giving the number of the cases which contained, and of those which did not contain, the ova of the *Ankylostomum duodenale*:—

		Present.		Absent.		Total.
Indians	...	3	...	39	...	42
Africans and Arabs	...	29	...	29	...	58
		—		—		—
		32		68		100
		—		—		—

NOTES ON INTERESTING CASES

By SUB-ASSISTANT SURGEON G. V. PATEL, MERU DISTRICT.

During the month of January, 1913, a patient was brought in very emaciated and unable to attend his usual work. He had many sand fleas (jiggers) in feet, knees, gluteal regions, back and palms of hands. Every possible examination of his body was made to find out the cause of emaciation, but no organic disorder was made out; and so the case was treated for jiggers.

Treatment:—The affected part was washed with antiseptics and kept in running stream of water. The treatment was carried out for about ten days, with the effect that the jiggers washed off, and the general health improved to such an extent that the man was observed working as a private boy during the next month.

Remarks:—Jiggers are generally considered to cause trifling injury; but in the above case it would have proved fatal in a little while longer. Also a running stream of water for such advanced cases does more good than pokes of needles.

During my tours in the District, a case of goitre was seen. The disease, I believe, is not endemic.

RETURNS.

TABLE I.

ADMINISTRATIVE DIVISION.

Dr. A. D. Milne ...	Principal Medical Officer.
Dr. J. A. Haran, C.M.G. ...	Deputy Principal Medical Officer.
Mr. R. Stanley ...	Office Superintendent.
Mr. T. Preston, Clerk ...	Principal Medical Officer's Office.
Mr. J. S. Robertson ...	Medical Storekeeper.

MEDICAL DIVISION.

Dr. L. D. Lowsley...	Senior Medical Officer.	
Dr. W. Owen-Prichard ...	"	
Dr. C. L. Chevallier ...	Medical Officer.	
Dr. F. L. Henderson ...	"	
Dr. A. Robertson ...	"	
Dr. J. O. Shircore ...	"	
Dr. G. R. H. Chell...	"	
Dr. T. F. Lumb ...	"	
Dr. J. L. Gilks ...	"	
Dr. J. Pugh ...	"	
Dr. R. Hamilton ...	Probationary Medical Officer.	
Dr. C. J. Wilson ...	"	
Dr. V. G. L. van Someren	"	(Dentist)
Dr. A. D. J. B. Williams ...	"	
Dr. T. H. Massey ...	"	
Dr. G. Dunderdale ...	"	
Dr. P. F. Nunan ...	"	
Dr. J. H. Thomson ...	"	
Dr. J. H. H. Pirie ...	"	
Dr. W. Tudhope ...	Temporary Medical Officer.	
Dr. H. H. V. Welch ...	"	
Dr. F. Collar ...	"	
Dr. E. N. Russell ...	"	
Dr. R. W. Spence ...	"	
Dr. J. M. Mackinnon ...	"	
Mr. G. Gillespie ...	Dispenser.	
Mr. F. Knott ...	"	
Mr. H. Ogden ...	"	
Miss K. E. Stollard ...	Matron, European Hospital.	
Miss E. R. Brown...	Nursing Sister.	
Miss A. M. Marston ...	"	
Miss M. MacMillan ...	"	
Miss H. M. Whitburn ...	"	
Miss S. E. Lumsden ...	"	
Miss L. Merryweather ...	"	
Miss R. Paul ...	"	
Miss I. L. Majendie ...	"	
Mr. W. Henfrey ...	Superintendent, Lunatic Asylum, Nairobi.	
Mrs. L. A. Henfrey ...	Matron, " " "	

LABORATORIES DIVISION.

Dr. P. H. Ross ...	Bacteriologist.
Mr. V. H. Kirkham ...	Analyst.

SANITATION DIVISION.

Dr. W. J. Radford	...	Chief Sanitation Officer.
Dr. R. Small	...	Medical Officer of Health, Mombasa.
Dr. A. Mouat	...	" Kisumu.
Dr. B. W. Cherrett	...	" Nairobi.
Mr. H. Lyon	...	Sanitary Inspector.
Mr. A. F. Dennett	...	"
Mr. B. E. F. Wetkin	...	"
Mr. W. H. Wood	...	"
Miss M. A. Thomlinson	...	Nurse attached to Health Office, Mombasa.

TABLE II.

FINANCIAL.

The sanctioned Medical Budget for the year 1913-14 was a total of £44,336, which was augmented by a special warrant for £8,000 to provide for measures being taken to combat an outbreak of plague in Mombasa, and a special warrant for £1,620 providing for the expenses of the Sanitary expert, making a grand total of £52,336, as compared with £33,844 for the preceding year.

Of the 1913-14 grand total, £50,211 were expended, leaving an unexpended sum of £2,125 as savings.

EXPENDITURE.

The headings under which the vote was arranged were as follows:—

SCHEDULE XIV.—MEDICAL DEPARTMENTS.

	Estimate.	Actual Expenditure.
	£	£
Personal emoluments	14,053	12,310

(Under this heading are included the salaries, and any duty allowances granted, of the Principal Medical Officer, Deputy Principal Medical Officer, Medical Officers, Bacteriologist, Analyst, Medical Storekeeper and clerical establishment.)

Other Charges.

Conservancy rates	...	...	...	...	54	50
Contingencies	...	...	...	...	300	440
Transport	1,820	2,266
Typewriter	23	21

SANITATION DIVISION.

Personal emoluments	5,329	3,959
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(Under this heading are included the salaries, and any duty allowances granted, of the Chief Sanitation Officer, Medical Officers of Health, Sanitary Inspectors, Nurse, Assistant and Sub-Assistant Surgeons, Vaccinators, Native Attendants for Infectious Diseases Hospitals and clerical establishment.)

TABLE II.—*continued.*SCHEDULE XIV.—MEDICAL DEPARTMENTS—*continued.**Other Charges.*

	Estimate.	Actual. Expenditure
	£	£
Epidemics	500	8,484
Special warrant No. 19 for Plague measures, Mombasa	8,000	
Special warrant No. 13, Expenses of Sanitary Expert...	1,620	1,859
Sanitary station, Zanzibar	750	807
Transport	770	569
Typewriter	23	21
Hospital equipment for 3 Infectious Diseases Hospitals	900	675
Maintenance of 3 Infectious Diseases Hospitals ...	1,095	494
Disinfecting apparatus	100	122
Working and maintenance of Clayton Disinfectors ...	50	...
Disinfectants	100	...
Bush clearing, mosquito and sleeping sickness preventive measures...	1,200	762
Contingencies	80	40

SCHEDULE XV.—HOSPITALS AND DISPENSARIES.

Personal emoluments	10,572	10,025
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(Under this heading are included the salaries of the Nursing Staffs of the European Hospitals, Superintendent and Matron of the Lunatic Asylum, European Dispensers, Indian Subordinate Medical Establishment, and native menial attendants.)

Other Charges.

Upkeep of European Hospitals	850	1,143
" " Laboratory	160	134
" " Native Hospitals	854	728
" " Lunatic Asylum and Leper Establishments	280	232
Medical and Surgical Stores	2,475	2,813
Transport	1,398	1,769
Furniture and equipment	100	184
Ration allowance to medical subordinates, Northern Frontier District	100	33
Gas plant and microscope	300	251
Uniforms for Hospital Staff	100	20

REVENUE.

The total amount of revenue collected as hospital fees, bills of health, registration fees, and sales of medicines and surgical stores was as follows:—

	£
Hospital fees	1,851
Bills of health	282
Registration fees	27
Laboratory fees	180
Sales of medicines, etc.	242
Total	£2,582

Last year the total revenue collected amounted to £1,878.

TABLE III.

RETURN OF STATISTICS OF POPULATION FOR THE YEAR, 1913.

EAST AFRICA.						Europeans and Whites.	Africans.	Asiatics.
1. Number of Inhabitants in 1913	...	...	...	...	...	6,510	3,000,000*	20,000*
2. Number of Births during 1913	...	...	...	...	...	108	†	†
3. Number of Deaths during 1913	...	...	...	...	...	53	†	†
4. Number of Immigrants during 1913...	...	...	...	...	...	3,875	2,233	9,190
5. Number of Emigrants during 1913	...	...	...	...	...	2,571	1,626	4,676
6. Number of Inhabitants in 1912	...	...	...	...	...	5,151	3,000,000*	14,644*
Increase ...	...	...	...	...	...	1,359	...	5,356*
Decrease ...	...	...	...	...	...	...	...	...

* Approximately.

† Not registered.

TABLE IV. (A.)

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

						Approximate Area.	Number of proclaimed Open Spaces.
1911	...	...	...	...	...	8½ sq. miles	1 public park.
1912	...	...	...	...	...	8½ " "	1 " "
1913	...	...	...	...	...	7 " "	1 " "

2.—POPULATION.

1911	...	...	17,481	(including 684 Goans and 90 Eurasians)
1912	...	...	19,900	(" 610 " " 90 ")
1913	...	...	25,380	(" 700 " " 80 ")

						Number of Asiatics and Natives.		Number of Europeans.		Total.
						Males.	Females.	Males	Females.	
1911	..	...	...	...	...	7,018	8,645	814	230	16,707
1912	...	...	...	...	...	8,686	9,314	935	265	19,200
*1913	...	...	...	...	...	*23,000		*1,600		24,600

* No means of estimating according to sex.

3.—HOUSING.

						Number occupied by Europeans.		Number occupied by Natives and Asiatics.	
Number of Houses :—									
1911	...	...	...	...	...	254		362	
1912	...	...	...	...	...	319		463	
1913	...	...	...	...	...	377		519	

Number of Huts :—

1911	...	...	...	1,500
1912	...	...	...	1,549
1913	...	...	...	1,583

TABLE IV. (A.)—*continued*.

4.—MOSQUITO PROTECTION OF HOUSES.

	1911.	1912.	1913.
Number of European houses wholly mosquito-protected ...	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number of European houses with mosquito room ...	"	"	"
Number rendered during the year wholly mosquito-protected	"	"	"
Number rendered during the year partially mosquito-protected	"	"	"

5.—ERECTION OF NEW BUILDINGS DURING THE YEAR.

	1911.	1912.	1913.
Number of public buildings erected with sanction as to site, construction, and relation to other buildings ...	...	3	2
Number of houses erected with sanction as to site, construction, and relation to other buildings ...	63	166	116
Number of huts erected with sanction as to site, construction, and relation to other buildings ...	67	46	75
Number of houses built without sanction ...	...	3	13
Number of huts built without sanction ...	...	...	...

ACTION TAKEN.

	Number of Prosecutions.		Number Demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	4	18	15
1912	1	...	...
1913	51	41*	2

* This includes mud and wattle huts, tin shanties and "boys' " quarters.

6.—MARKETS.

	Total number.	Number paved and drained.	Number unpaved.
1911 ...	3	2	1
1912 ...	3	2	1
1913 ...	2	1	1

7.—SLAUGHTER-HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1911 ...	1	1	<i>Nil</i>
1912 ...	1	1	"
1913 ...	1	1	"

TABLE IV. (A.)—*continued*.

8.—LATRINES.

	For Males.		For Females.	
	Number.	Number of Seats.	Number.	Number of Seats.
Number of public latrines :—			Public latrines are only provided for Asiatics and Africans and are used in common by males and females.	There is only one public latrine for Europeans at the railway station.
1911	11	52		
1912	10	96		
1913	10	62		
Number of new public latrines erected during the year :—				
1911	1	4		
1912	3	20		
1913	3	24		
Number of public latrines repaired during the year :—				
1911	4	...		
1912	2	...		
1913	2	16		
Number of public latrines demolished during the year :—				
1911	1	8		
1912	1	6		
1913	3	...		

	1911.	1912.	1913.
Number of private latrines	855	1,400	1,433
Average number of pails of night-soil removed daily	1,481	1,381	1,433
Average number of soiled pails removed and clean pails substituted	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number of night-soil men employed to clean latrines and remove excreta	39	43	60
Number of cesspools	81	107	101
Number of cesspools cleaned	81	107	101
Number of new cesspools constructed during the year	17	9	7
Number of old cesspools abolished ... ..	...	1	13
Number of cesspools oiled regularly by Department ... ..	...	...	...

9.—REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	245	254	550
Number of carts at work daily to remove refuse from streets	7	6	4
Amount of refuse removed daily	10 tons	20 tons	4 cart-loads
Number of carts at work daily to remove refuse from yards and premises	7	12	16
Amount of refuse removed daily from yards and premises	5 tons	10 tons	33 cart-loads
Number of men employed for removing refuse	14	54	88

TABLE IV. (A.)—*continued*.

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	1,481	1,000	1,433	...	...	20	1	2	3
Burnt ... ..	...	...	...	14	15	17	...	...	...
Thrown into sea ... ..	...	...	...	...	...	...	...	...	...
Otherwise dealt with ... ..	...	...	...	...	...	...	...	...	...

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.
2	35	20

12.—WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water:—			
Source (river, lake or spring)—	River and Spring.	River and Spring.	River and Spring.
Number of linear yards	116,140	461,500	481,930
Number of standpipes along roads	12	10	57
Number of standpipes in compounds and houses	405	546	610
Wells:—			
Public—			
Number	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number with pumps protected against surface water and mosquito-protected	"	"	"
Private—			
Number	8	2	2
Number protected against surface water and mosquito-protected ... ..	...	...	...
Tanks:—			
Public—			
Number underground	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
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	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number mosquito-protected	"	"	"
Number above ground	229	255	270
Number mosquito-protected	229	255	270
Number of 400-gallons capacity or less	90	102	102
Number above 400 gallons	139	153	168
Nature of tanks:—			
Wood	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Iron	229	255	270
Concrete	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Barrels:—			
Number	<i>Nil</i>	180	170
Number mosquito-protected	"	180	...

TABLE IV. (A.)—continued.

13.—DRAINAGE.

Nature of Drainage.								Public.	Private.
Masonry Drains—									
Linear yards of masonry drains—									
1911	...	...	...	...	...	...	...	5,504	...
1912	...	...	...	...	...	...	...	5,804	...
1913	...	...	...	...	...	...	...	9,493	...
Linear yards reconstructed during the year—									
1911	...	...	...	...	...	...	...	Nil	...
1912	...	...	...	...	...	...	...	"	...
1913	...	...	...	...	...	...	...	"	...
Linear yards repaired during the year—									
1911	...	...	...	...	...	...	...	Nil	...
1912	...	...	...	...	...	...	...	"	...
1913	...	...	...	...	...	...	...	"	...
Linear yards of new drains constructed during the year—									
1911	...	...	...	...	...	...	...	647	...
1912	...	...	...	...	...	...	...	300	...
1913	...	...	...	...	...	...	...	3,689	...
Earth Drains or Ditches—									
Number of linear yards of ditches cleansed—									
1911	...	...	...	...	...	...	...	398	...
1912	...	...	...	...	...	...	...	3,980	...
1913	...	...	...	...	...	...	...	No information	...
Number of linear yards of ditches dug and graded—									
1911	...	...	...	...	...	...	...	450	...
1912	...	...	...	...	...	...	...	3,600	...
1913	...	...	...	...	...	...	...	4,400	...
Average frequency of clearing ditches of grass—									
1911	...	...	...	...	...	...	...	Twice a year	...
1912	...	...	...	...	...	...	...	Monthly	...
1913	...	...	...	...	...	...	...	When necessary	...

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

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed ... ..	...	70,000	5,481,340
Average frequency of clearance of rank vegetation on same area	Twice a year	Monthly	When necessary

15.—EXCAVATIONS OF LOW-LYING LAND.

	1911.	1912.	1913.
Number of pools and excavations	25	237	138
Number of excavations filled up	50	21	108
Amount of low-lying and marsh land raised and drained	10 acres	6 acres	5 acres
Number of pools, marshes, etc., fish-stocked	Nil	Nil	Nil
Number of cubic yards of material used for filling up pools and excavations	No information	No information	No information
Number of persons fined for making new excavations	Nil	Nil	Nil
Average number of men daily employed in filling up pools, etc.	60	60	90

TABLE IV. (A.)—*continued.*

16.—OILING.

	1911.	1912.	1913.
Number of drains oiled ... ..	...	...	...
Number of pools and excavations oiled	35	50	79
Number of tanks and barrels oiled ... ..	...	...	...
Average number of men daily employed for oiling drains, pools and water-tanks or barrels	3	5	7

17.—INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of Inspectors employed	1	1	1
Number of houses inspected	25	30	898
Number of houses where larvæ were found	22	20	54
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	402	96	906
Number of persons fined for not removing insanitary conditions after notice	8	...	44
Number of soda and aerated water factories inspected	3	4	3

TABLE IV. (B.)

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

	Approximate Area.	Number of proclaimed Open Spaces.
1911	Island, 3,470 acres ... Native town, 270 acres	1 public garden. Area, 1·8 acres.
1912		
1913		

2.—POPULATION.

	Number of Natives.		Number of Europeans.		Total.
	Males.	Females.	Males.	Females.	
1911	Approx. 26,000		213	55	Approx. 26,500
1912	" 26,500		224	62	" 26,786
1913	" 26,724		231	42	" 26,997

TABLE IV. (B.)—*continued*.

3.—HOUSING.

	Number occupied by Europeans.	Number occupied by Natives.
Number of Houses :—		
1911	90	927
1912	91	954
1913	100	930

Number of huts :—

1911	3,182
1912	3,244
1913	3,369

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			
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 ... ..	...	...	...
Number of houses erected with sanction as to site, construction, and relation to other buildings	17	28	14
Number of huts erected with sanction as to site, construction, and relation to other buildings	127	157	125
Number of houses built without sanction ... ..	...	...	...
Number of huts built without sanction ... ..	...	...	...

ACTION TAKEN.

	Number of Prosecutions.		Number Demolished.	
	Huts.	Houses.	Huts.	Houses.
1911	1	45	2
1912	85	...
1913	2	29	1

TABLE IV. (B.)—continued.

6.—MARKETS.

	Total number.	Number paved and drained.	Number unpaved.
1911	3	2	1
1912	3	2	1
1913	3	2	1

7.—SLAUGHTER-HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1911	3	2	1
1912	3	2	1
1913	2	2	...

8.—LATRINES.

	For Males.		For Females.	
	Number.	Number of Seats.	Number.	Number of Seats.
Number of public latrines :—				
1911... ..	1	2	...	...
1912... ..	4	5	...	3
1913... ..	4	5	...	3
Number of new public latrines erected during the year :—				
1911... ..	1	2	...	...
1912... ..	3	3	...	3
1913... ..	...	...	...	...
Number of public latrines repaired during the year :—				
1911... ..	<i>Nil</i>	...	...	...
1912... ..	<i>Nil</i>	...	...	...
1913... ..	<i>Nil</i>	...	...	...
Number of public latrines demolished during the year :—				
1911... ..	<i>Nil</i>	...	...	...
1912... ..	<i>Nil</i>	...	...	...
1913... ..	<i>Nil</i>	...	...	...

	1911.	1912.	1913.
Number of private latrines	189	190	70
Average number of pails of nightsoil removed daily	305	310	173
Average number of soiled pails removed and clean pails substituted	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number of nightsoil men employed to clean latrines and remove excreta	18	18	15
	About	About	About
Number of cesspools	2,000	2,000	2,000
Number of cesspools cleansed	<i>Nil</i>	<i>Nil</i>	102
	About	About	About
Number of new cesspools constructed during the year	125	125	167
	About	About	About
Number of old cesspools abolished	40	40	6
Number of cesspools oiled regularly by Department	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>

TABLE IV. (B.)—*continued.*

9.—REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	9	9	112
Number of carts at work daily to remove refuse from streets	13	13	20
Amount of refuse removed daily	11 tons	12 tons	20 tons
Number of carts at work daily to remove refuse from yards and premises	1	1	1
Amount of refuse removed daily from yards and premises ...	$\frac{3}{4}$ ton	1 ton	1 ton
Number of men employed for moving refuse	102	104	200

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 ... ..	...	...	...	...	...	...	...	...	...
Burnt ... ..	...	...	...	20	24	34	...	...	...
Thrown into sea	305	310	173	4	2	3	200 lbs.	225 lbs.	10 lbs.
Otherwise dealt with ... ..	...	...	...	13	14	...	...	...	...

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.
Thrown into sea	$1\frac{1}{2}$	$1\frac{1}{2}$	2

TABLE IV. (B.)—*continued.*

12.—WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water :—			
Source (river, lake or spring)—			
Number of linear yards	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number of stand-pipes along roads	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number of stand-pipes in compounds and houses ...	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Wells :—			
Public—			
Number	28	28	28
Number with pumps protected against surface water and mosquito-protected	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Private—			
Number	90	93	96
Number protected against surface water and mosquito-protected	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Tanks :—			
Public—			
Number underground ... ..	...	...	...
Number mosquito-protected and served by pumps ...	...	...	...
Number above ground	2	2	2
Number mosquito-protected ... ..	...	...	...
Number of 400 gallons capacity or less	2	2	2
Number above 400 gallons ... ..	...	...	...
Private—			
Number underground... ..	70	73	66
Number mosquito-protected	Unknown	Unknown	Unknown
Number above ground... ..	20	20	20
Number mosquito-protected	Unknown	Unknown	Unknown
Number of 400 gallons capacity or less ... ..	...	...	...
Number above 400 gallons ... ..	...	...	66
Nature of tanks :—			
Wood ... ..	...	...	...
Iron	20	25	8
Concrete	70	70	66
Barrels :—	About	About	
Number	1,000	1,000	100
Number mosquito-protected	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>

TABLE IV. (B.)—continued.

13.—DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry Drains :—		
Linear yards of masonry drains :—		
1911	360	...
1912	360	...
1913	2,600	...
Linear yards reconstructed during the year :—		
1911 ... ..	...	...
1912 ... ..	...	...
1913	250 yds.	...
Linear yards repaired during the year :—		
1911	Approx. 150	...
1912	50	...
1913	30	...
Linear yards of new drains constructed during the year :—		
1911 ... ..	...	...
1912	30	...
1913	250	...
Earth drains or ditches cleansed—Number of linear yards of ditches cleansed :—		
1911	<i>Nil</i>	...
1912	<i>Nil</i>	...
1913	<i>Nil</i>	...
Number of linear yards of ditches dug and graded :—		
1911	<i>Nil</i>	...
1912	<i>Nil</i>	...
1913	30	...
Average frequency of clearing ditches of grass :—		
1911	<i>Nil</i>	...
1912	<i>Nil</i>	...
1913	Twice yearly	...

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

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed	Approx. 150 acres	Approx. 150 acres	Approx. 1,000 acres
Average frequency of clearance of rank vegetation on same area	6 months	6 months	6 months

TABLE IV. (B.)—*continued.*

15.—EXCAVATIONS AND LOW-LYING LAND.

	1911.	1912.	1913.
Number of pools and excavations	2
Number of excavations filled up	2
Amount of low-lying and marsh land raised and drained	2
Number of pools, marshes, etc., fish-stocked
Number of cubic yards of material used for filling up pools and excavations	<i>Nil</i>	<i>Nil</i>	10
Number of persons fined for making new excavations
Average number of men daily employed in filling up pools, etc.	Casual labourers

16.—OILING.

	1911.	1912.	1913.
Number of drains oiled	A few hundreds	A few hundreds	A few hundreds
Number of pools and excavations oiled			
Number of tanks and barrels oiled ... ..	...	Many barrels	Many barrels
Average number of men daily employed for oiling drains, pools, and water tanks or barrels	8	8	8

17.—INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of Inspectors employed	2	2	2
Number of houses inspected ... ..	...	173	1,186
Number of houses where larvæ were found ... ..	...	Uncounted	10
Number of notices served to remove conditions causing the breeding of larvæ ... ..	...	...	55
Number of persons fined for having mosquito larvæ on premises	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>
Number of notices served to remove insanitary conditions on premises	75	165	1,049
Number of persons fined for not removing insanitary conditions after notice ... ..	...	1	38
Number of soda and aerated water factories inspected	3	3	3

TABLE IV. (C.)

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

	Approximate Area.	Number of proclaimed Open Spaces.
1911 ... ..	...	...
1912 ... ..	...	...
1913	2½ sq. miles	1

2.—POPULATION.

	Number of Asiatics and Natives.		Number of Europeans.		Total.
	Males.	Females.	Males.	Females.	
1911 ... ..	...	...	...	...	...
1912 ... ..	...	...	...	...	...
1913	6,310	182	66	24	6,582

TABLE IV. (C.)—continued.

3.—HOUSING.

	Number occupied by Europeans.				Number occupied by Natives.			
Number of Houses :—								
1911			
1912			
1913	43	...			
Number of Huts :—								
1911			
1912			
1913	768			

4.—MOSQUITO PROTECTION OF HOUSES.

	1911.	1912.	1913.
Number of European houses wholly mosquito-protected	4
Number of European houses with mosquito room	1
Number rendered during the year wholly mosquito-protected...	<i>Nil</i>
Number rendered during the year partially mosquito-protected	5

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	1
Number of houses erected with sanction as to site, construction, and relation to other buildings	6
Number of huts erected with sanction as to site, construction, and relation to other buildings	173
Number of houses built without sanction	<i>Nil</i>
Number of huts built without sanction	15

ACTION TAKEN.

				Number of Prosecutions.		Number Demolished.	
				Huts.	Houses.	Huts.	Houses.
1911
1912
1913	20	...

6.—MARKETS.

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

TABLE IV. (C.)—continued.

7.—SLAUGHTER-HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1911 ... ..	...	...	...
1912 ... ..	...	...	...
1913	2	2	...

8.—LATRINES.

	For Males.		For Females.	
	Number.	Number of Seats.	Number.	Number of Seats.
Number of public latrines :—			Public latrines are only provided for Asiatics and Africans, and are used in common by males and females.	
1911... ..	...	...		...
1912... ..	...	...		...
1913... ..	11	97		...
Number of new public latrines erected during the year :—				
1911... ..	...	...		...
1912... ..	...	...		...
1913... ..	2	14		...
Number of public latrines repaired during the year :—				
1911... ..	...	...		...
1912... ..	...	...		...
1913... ..	6	Not recorded		...
Number of public latrines demolished during the year :—				
1911... ..	...	...		...
1912... ..	...	...		...
1913... ..	Nil	...		...

	1911.	1912.	1913.
Number of private latrines	232
Average number of pails of nightsoil removed daily	520
Average number of soiled pails removed and clean pails substituted...	Nil
Number of nightsoil men employed to clean latrines and remove excreta	33
Number of cesspools	113
Number of cesspools cleansed daily	113
Number of new cesspools constructed during the year	7
Number of old cesspools abolished	8
Number of cesspools oiled regularly by Department	10

9.—REMOVAL OF REFUSE.

	1911.	1912.	1913.
Number of dustbins	169
Number of carts at work daily to remove refuse from streets	6
Amount of refuse removed daily (carts)	12
Number of carts at work daily to remove refuse from yards and premises	6
Amount of refuse removed daily from yards and premises (carts)	12
Number of men employed for removing refuse	31

TABLE IV. (C.)—continued.

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 and trenched	520	...	...	...	...	...	...
Burnt
Thrown into sea
Otherwise dealt with	12 carts	...	...	1 cart

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.
		Unrecorded.

12.—WATER SUPPLY.

Nature of Water Supply.	1911.	1912.	1913.
Pipe-borne water:—			
Source (river, lake or spring)—	Lake	Lake	Lake
Number of linear yards ... ..	...	...	10,162
Number of standpipes along roads ... ..	...	...	8
Number of standpipes in compounds and houses ... ..	...	...	62
Wells:—			
Public—			
Number ... ..	...	...	Nil
Number with pumps protected against surface water and mosquito-protected ... ..	...	...	"
Private—			
Number ... ..	...	...	Nil
Number protected against surface water and mosquito-protected ... ..	...	...	"
Tanks:—			
Public—			
Number underground ... ..	...	...	Nil
Number mosquito-protected and served by pumps ... ..	...	...	"
Number above ground ... ..	...	...	"
Number mosquito-protected ... ..	...	...	"
Number of 400 gallon capacity or less ... ..	...	...	"
Number above 400 gallons ... ..	...	...	"
Private—			
Number partially underground ... ..	...	...	2
Number mosquito-protected ... ..	...	...	Nil
Number above ground ... ..	...	...	127
Number mosquito-protected ... ..	...	...	129
Number of 400 gallons capacity or less ... ..	...	...	...
Number above 400 gallons ... ..	...	...	129
Nature of Tanks:—			
Wood ... ..	...	...	...
Iron, Galvanized ... ..	...	...	95
Concrete ... ..	...	...	34
Barrels:—			
Number ... ..	...	...	...
Number mosquito-protected ... ..	...	...	...

TABLE IV. (C.)—*continued.*

13.—DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry Drains :—		
Linear yards of masonry drains—		
1911 ... ..	...	...
1912 ... ..	...	...
1913	930	...
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 cleaned—		
1911 ... ..	...	...
1912 ... ..	...	...
1913	700 yds. daily	...
Number of linear yards of ditches dug and graded—		
1911 ... ..	...	...
1912 ... ..	...	...
1913	400 yds.	...
Average frequency of clearing ditches of grass—		
1911 ... ..	...	...
1912 ... ..	...	...
1913	daily	...

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

	1911.	1912.	1913.
Number of square yards of weeds, grass and vegetation cut and removed	2 sq. miles
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
Number of excavations filled	20
Amount of low-lying and marsh land raised and drained
Number of pools, marshes, streams, etc., fish-stocked
Number of cubic yards of material used for filling up pools and excavations	No record.
Number of persons fined for making new excavations...
Average number of men daily employed in filling up pools, etc.

TABLE IV. (C.)—continued.

16—OILING.

	1911.	1912.	1913.
Number of drains oiled	66
Number of pools and excavations oiled	130
Number of tanks and barrels oiled	24
Average number of men daily employed for oiling drains, pools and water-tanks or barrels	One man

17.—INSPECTIONS AND PROSECUTIONS.

	1911.	1912.	1913.
Number of Inspectors employed...	2
Number of houses inspected	5 daily
Number of houses where larvæ were found	6
Number of notices served to remove conditions causing the breeding of larvæ	3
Number of persons fined for having mosquito larvæ on premises	Nil
Number of notices served to remove insanitary conditions on premises	236
Number of persons fined for not removing insanitary conditions after notice	Nil
Number of soda and aerated water factories inspected...	1

TABLE V.

METEOROLOGICAL RETURN FOR THE YEAR 1913.

GOVERNMENT LABORATORY—NAIROBI.

	TEMPERATURE.						RAINFALL.			WINDS.		Remarks.
	Solar Maximum.	Minimum on grass.	Shade Maximum.	Shade Minimum.	Mean Range.	Mean.	Amount in inches.	Degree of Humidity.		General Direction.	Average Force.	
								9 a.m.	4 p.m.			
January	71.34	55.11	16.23	63.22	0.05	73.7	63.7	...	...
February	76.34	57.46	18.88	66.90	3.41	79.9	62.1	...	...
March	76.87	58.50	18.37	67.68	7.23	82.1	67.8	...	...
April	74.85	59.73	15.12	67.29	4.38	84.9	63.3	...	...
May	75.70	59.40	16.30	67.55	4.92	82.7	68.2	...	...
June	71.63	55.83	15.80	63.73	3.91	82.3	75.2	...	...
July	70.92	53.08	17.84	62.00	0.10	82.7	69.8	...	...
August	70.55	53.10	17.45	61.82	0.48	79.3	69.3	...	...
September	77.30	55.88	21.42	66.59	0.09	78.2	59.6	...	...
October...	76.46	58.38	18.08	67.42	1.06	77.4	60.1	...	...
November	73.66	58.78	14.88	66.22	2.76	81.7	67.9	...	...
December	74.37	56.43	17.93	65.40	2.32	79.6	68.4	...	...
Year Average	74.16	56.80	17.36	65.48	30.71 Total.	80.4	66.3	...	...

TABLE V.—*continued.*METEOROLOGICAL RETURN FOR THE YEAR 1913—*continued.*

KABETE FARM, NAIROBI.

	TEMPERATURE.						RAINFALL.		WINDS.		Remarks.
	Solar Maximum.	Minimum on grass.	Shade Maximum.	Shade Minimum.	Range.	Max. and Min. Mean combined.	Amount in inches.	Degree of Humidity.	General Direction.	Average Force.	
January	79.0	43.0	36.0	62.3	0.08	...	...	...
February	82.5	46.0	36.5	64.6	2.59	...	...	...
March	82.5	45.5	37.0	64.2	11.00	...	...	...
April	77.5	52.0	25.5	64.5	3.84	...	...	...
May	77.0	51.0	26.0	63.4	5.14	...	...	...
June	74.5	44.5	30.0	59.9	3.02	...	...	...
July	76.0	37.0	39.0	58.0	0.06	...	...	...
August	77.5	36.5	41.0	59.0	1.12	...	...	...
September	81.0	41.0	40.0	63.5	0.14	...	...	...
October	82.8	47.5	35.3	65.2	2.92	...	...	...
November	80.2	50.0	30.2	64.1	2.20	...	...	...
December	82.0	45.0	37.0	63.4	2.13	...	...	...
Year Average	79.4	44.9	34.5	62.7	34.24 Total.	...	...	...

MOMBASA.

	TEMPERATURE.						RAINFALL.		WINDS.		Remarks.
	Solar Maximum.	Minimum on grass.	Shade Maximum.	Shade Minimum.	Range.	Max. and Min. Mean combined.	Amount in inches.	Degree of Humidity.	General Direction.	Average Force.	
January	88.0	72.0	16.0	79.7	0.02	...	...	...
February	92.2	74.0	18.2	81.8	0.37	...	...	...
March	91.0	72.4	18.6	81.3	3.42	...	...	...
April	87.5	71.2	16.3	80.0	11.60	...	...	...
May	85.0	70.9	14.1	77.3	12.51	...	...	...
June	82.0	70.0	12.0	75.6	2.50	...	...	...
July	82.0	68.4	13.6	75.5	2.85	...	...	...
August	82.0	67.6	14.4	77.5	1.72	...	...	...
September	83.0	67.9	15.1	76.0	3.48	...	...	...
October	86.2	70.6	15.6	78.4	4.05	...	...	...
November	89.4	70.5	18.9	79.9	0.11	...	...	...
December	87.0	74.5	12.5	80.9	0.25	...	...	...
Year Average	86.3	70.8	15.4	78.6	42.88 Total.	...	...	...

TABLE V.—*continued.*METEOROLOGICAL RETURN FOR THE YEAR 1913—*continued.*

KISUMU.

	TEMPERATURE.						RAINFALL.		WINDS.		Remarks.
	Solar Maximum.	Minimum on grass.	Shade Maximum.	Shade Minimum.	Range.	Max. and Min. Mean combined.	Amount in inches.	Degree of Humidity.	General Direction.	Average Force.	
January	91.0	63.0	28.0	76.4	0.54	...	...	...
February	93.0	61.0	32.0	76.0	2.27	...	...	...
March	90.0	62.0	28.0	74.2	10.89	...	...	...
April...	88.0	63.0	25.0	73.7	7.06	...	...	...
May	86.0	62.0	24.0	72.6	5.52	...	...	...
June	86.0	63.0	23.0	71.6	4.65	...	...	...
July	83.0	61.0	22.0	71.4	2.64	...	...	...
August	86.0	61.0	25.0	72.4	1.52	...	...	...
September	91.0	63.0	28.0	75.5	0.91	...	...	...
October	90.0	63.0	27.0	74.4	2.50	...	...	...
November	90.0	62.0	28.0	75.2	2.58	...	...	...
December	92.0	63.0	29.0	74.9	2.07	...	...	...
Year Average	88.8	62.3	26.5	74.0	43.15 Total.	...	...	...

FORT HALL.

	TEMPERATURE.						RAINFALL.		WINDS.		Remarks.
	Solar Maximum.	Minimum on grass.	Shade Maximum.	Shade Minimum.	Range.	Max. and Min. Mean combined.	Amount in inches.	Degree of Humidity.	General Direction.	Average Force.	
January	82.0	46.0	36.0	63.4	0.02	...	...	...
February	86.0	46.0	40.0	66.1	3.20	...	...	...
March	93.0	50.0	43.0	71.2	11.20	...	...	...
April...	87.0	50.0	37.0	66.6	5.46	...	...	...
May	82.0	52.0	30.0	66.4	8.42	...	...	...
June	80.0	46.0	34.0	62.1	2.94	...	...	...
July	79.0	40.0	39.0	60.6	0.18	...	...	...
August	87.0	41.0	46.0	63.1	0.61	...	...	...
September	89.0	53.0	36.0	68.1	0.00	...	...	...
October	85.0	52.0	33.0	68.3	5.25	...	...	...
November	88.0	52.0	36.0	66.3	5.90	...	...	...
December	85.0	50.0	35.0	65.6	1.15	...	...	...
Year Average	85.2	48.1	37.1	65.6	44.33 Total.	...	...	...

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1913.

DISEASES.	EUROPEAN OFFICIALS.			NATIVE OFFICIALS.			GENERAL EUROPEAN POPULATION.			GENERAL NATIVE POPULATION.		
	Remaining in Hospital at end of 1912.	YEARLY TOTAL.		Remaining in Hospital at end of 1913.	Remaining in Hospital at end of 1912.	YEARLY TOTAL.		Remaining in Hospital at end of 1913.	Remaining in Hospital at end of 1912.	YEARLY TOTAL.		Remaining in Hospital at end of 1913.
		Admissions.	Deaths.			Admissions.	Deaths.			Admissions.	Deaths.	
INFECTIVE DISEASES:—												
Beri-beri	1	1	...	...	1	57	2	58
Cerebro-spinal fever	2	1	2	1	1	...	6	1	6	333	198
Chicken-pox	1	...	1	4	4	...	...	3	440	1	443
Cholera
Dengue
Diphtheria
Dysentery	7	...	7	1	102	103	1	19	2	11	1
Endocarditis—Infective...	23	431
Enteric ...	1	6	1	7	...	...	...	1	14	...	15	1
Erysipelas ...	1	1	...	2	...	...	...	...	...	...	5	5
Gonorrhoea	2	...	2	5	5	...	1	...	1	2	73
Influenza	8	...	8	1	29	21	...	...	...	6	...
Kala Azar
Leprosy (a) Nodular	4	...
(b) Anæsthetic
Malaria (a) Tertian	41	...	41	3	225	226	31	1	31	15	1106
(b) Quartan	1	103	104	...	...	...	34	1121
(c) Estivo-autumnal ...	2	108	2	110	4	948	1	552	9	69	12	854
(d) Chronic malaria	8	1
(e) Blackwater	1	...	1	...	...	...	4	2	4	...	9
Measles	1	1	1	1	...	1	...	15
Undulant fever
Plague	5	1	5	1	...	1	...	79
Pneumonia	5	...	5	13	1	13	1	4	1	5	4
Rabies	397
Relapsing fever	1	1	...	1	...	1	...	...
Rheumatic fever	4	...	4	37	37	...	3	...	3	4	137
Septicæmia	4	4
Trypanosomiasis (Sleeping sickness)	2	5
Small-pox	1	1	...	...	...	...	9	146
Syphilis (a) Primary	5	5	...	1	...	1	9	93
(b) Secondary	7	7	...	...	...	...	9	87
(c) Inherited	1	9
Tetanus	6	2
Tuberculosis	2	2	2	3	3	...	4	1	4	8	52
Whooping cough	23	69
Yaws	37	...
Yellow fever	39
Other Infective Diseases	...	4	...	4	9	9	...	1	...	1	49	...
INTOXICATIONS:—												
Alcoholism	1	...	1	...	...	...	3	...	3	...	1
Morphinism
Others	1	...
GENERAL DISEASES:—												
Anæmia	3	...	3	6	6	...	3	...	3	23	2
Anæmia—Pernicious	1	1
Diabetes	1	1	...	...	...	...	2	...
Exophthalmic goitre
Gout	1	...	1	...	...	...	1	...	1	...	...
Leucocythæmia
Hodgkin's disease
Myxœdema
Purpura
Rickets	2	...
Scurvy	6	6	...	...	...	...	2	...
Other General Diseases	...	6	...	6	1	24	1	25	2	1	6	48
LOCAL DISEASES:—												
Diseases of the Nervous System:—												
Sub-section 1.												
Neuritis	1	1	...	...	...	...	6	...
Meningitis	8	...
Myelitis
Hydrocephalus	1	...
Encephalitis
Abscess of brain	1	1
Congestion of brain	1	...
Sub-section 2.												
Apoplexy	4	...
Paralysis	8	...
Chorea	1	...	1	...	...
Epilepsy	1	1	...	...	...	...	8	...
Neuralgia	6	...	6	34	24	...	4	...	4	2	95
Hysteria	1	...	1	...	5
Other Nervous Diseases	...	1	...	1	6	6	...	...	...	...	17	1
Sub-section 3.												
Mental Diseases—												
Idiocy	3	4
Mania	9	3
Melancholia	2	1
Dementia	11	18
Delusional insanity	1	...	1	4	6
Other Mental Diseases	4	...	4	1	6

TABLE VI.—RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1913.—(contd.)

DISEASES.	EUROPEAN OFFICIALS.			NATIVE OFFICIALS.			GENERAL EUROPEAN POPULATION.			GENERAL NATIVE POPULATION.		
	Remaining in Hospital at end of 1912.	YEARLY TOTAL. Admissions. Deaths.	Total cases treated.	Remaining in Hospital at end of 1912.	YEARLY TOTAL. Admissions. Deaths.	Total cases treated.	Remaining in Hospital at end of 1912.	YEARLY TOTAL. Admissions. Deaths.	Total cases treated.	Remaining in Hospital at end of 1912.	YEARLY TOTAL. Admissions. Deaths.	Total cases treated.
LOCAL DISEASES—continued:—												
Diseases of the Eye:—												
Conjunctivitis	1 ...	1 ...	...	46 ...	46 ...	2 ...	...	...	2 ...	111 ...	113 ...
Keratitis	1 ...	1 ...	...	...	...	...	7 ...	8 ...
Ulceration of cornea	1 ...	1 ...	...	7 ...	7 ...	1 ...	...	...	...	11 ...	11 ...
Iritis	1 ...	1 ...	...	...	...	...	6 ...	6 ...
Optic neuritis
Cataract	11 ...	11 ...
Other Diseases												
...	11 ...	11 ...	...	1 ...	1 ...	...	20 ...	20 ...
Diseases of the Ear:—												
Inflammation	1 ...	1 ...	...	6 ...	6 ...	...	...	...	...	10 ...	10 ...
Other Diseases	6 ...	6 ...	...	...	...	...	4 ...	4 ...
Diseases of the Nose												
...	58 ...	58 ...	1 ...	...	...	...	23 ...	23 ...
Diseases of the Circulatory System:—												
Pericarditis	2 ...	2 ...
Endocarditis	1 ...	1 ...	...	...	...	...	3 ...	3 ...
Valvular Mitral	2 ...	2 ...	...	...	...	...	...	...
Aortic	2 ...	2 ...	...	...	...	...	1 ...	1 ...	...	...	...
Tricuspid
Pulmonary
Arterial sclerosis
Aneurism	1 ...	1 ...
Other Diseases	2 ...	2 ...	...	1 ...	1 ...	...	...	...	...	5 ...	5 ...
Diseases of the Respiratory System:—												
Laryngitis	2 ...	2 ...	...	...	...	...	9 ...	9 ...
Bronchitis	10 ...	10 ...	...	212 ...	212 ...	4 ...	9 ...	9 ...	12 ...	321 ...	333 ...
Broncho-pneumonia	1 ...	1 ...	...	12 ...	12 ...	...	2 ...	2 ...	9 ...	159 ...	168 ...
Abscess of lung	1 ...	1 ...
Gangrene of lung
Emphysema	1 ...	1 ...
Pleurisy	1 ...	1 ...	...	11 ...	11 ...	1 ...	3 ...	3 ...	1 ...	55 ...	56 ...
Empyema	1 ...	1 ...
Other Diseases	3 ...	3 ...	...	22 ...	22 ...	1 ...	2 ...	2 ...	...	37 ...	37 ...
Diseases of the Digestive System:—												
Stomatitis	3 ...	3 ...	...	...	...	...	6 ...	6 ...
Caries of teeth	13 ...	13 ...	...	...	...	...	9 ...	10 ...
Glossitis
Sore throat	2 ...	2 ...	...	3 ...	3 ...	...	2 ...	2 ...	...	1 ...	1 ...
Inflammation of tonsils	10 ...	10 ...	...	24 ...	24 ...	...	5 ...	5 ...	8 ...	19 ...	27 ...
Gastritis	16 ...	16 ...	1 ...	5 ...	5 ...	...	23 ...	23 ...
Ulceration of stomach	1 ...	1 ...
Hæmatemesis	1 ...	1 ...
Dilatation of stomach
Stricture of stomach
Dyspepsia	3 ...	3 ...	...	16 ...	16 ...	...	2 ...	2 ...	...	17 ...	17 ...
Enteritis	5 ...	5 ...	...	3 ...	3 ...	...	7 ...	7 ...	...	4 ...	4 ...
Appendicitis	3 ...	3 ...	1 ...	1 ...	1 ...	1 ...	5 ...	6 ...	1 ...	1 ...	1 ...
Colitis	1 ...	1 ...	...	...	...
Ulceration of intestines
Sprue	2 ...	2 ...	...	1 ...	1 ...	...	9 ...	9 ...
Hernia
Diarrhoea	6 ...	6 ...	...	50 ...	50 ...	1 ...	7 ...	7 ...	9 ...	462 ...	411 ...
Constipation	16 ...	17 ...	...	4 ...	4 ...	...	23 ...	23 ...
Colic	2 ...	2 ...	1 ...	40 ...	41 ...	...	5 ...	5 ...	...	67 ...	67 ...
Hæmorrhoids	4 ...	4 ...	...	12 ...	12 ...	...	2 ...	2 ...	...	4 ...	4 ...
Pancreatitis
Hepatitis (Acute)	4 ...	4 ...	...	...	...	...	10 ...	10 ...
Abscess	1 ...	1 ...	...	4 ...	4 ...	...	...	...	...	8 ...	8 ...
Cirrhosis	2 ...	2 ...	...	...	...	...	3 ...	3 ...	1 ...	3 ...	3 ...
Jaundice	1 ...	1 ...	...	...	...	...	...	...	...	8 ...	8 ...
Peritonitis	1 ...	1 ...	...	...	...	...	...	...	...	2 ...	2 ...
Ascitis	2 ...	2 ...
Other Diseases	10 ...	10 ...	...	9 ...	9 ...	...	...	...	...	45 ...	45 ...
Diseases of the Lymphatic System:—												
Splenitis	14 ...	14 ...	...	...	...	...	16 ...	16 ...
Inflammation of lymphatic gland	5 ...	5 ...	...	4 ...	4 ...	...	...	...	...	52 ...	52 ...
Suppuration of lymphatic gland	1 ...	1 ...	...	7 ...	7 ...	...	1 ...	1 ...	1 ...	29 ...	39 ...
Lymphangitis	4 ...	4 ...
Elephantiasis	1 ...	1 ...
Other Diseases												
...
Diseases of the Urinary System:—												
Acute nephritis	1 ...	1 ...	...	...	...	...	1 ...	1 ...
Bright's disease	2 ...	2 ...	...	6 ...	6 ...
Pyelitis
Calculus	2 ...	2 ...	...	...	...	...	...	...
Renal colic	1 ...	1 ...	...	2 ...	2 ...
Cystitis	7 ...	7 ...
Vesical calculus
Suppression	1 ...	1 ...
Hæmaturia	3 ...	3 ...
Chyluria	1 ...	1 ...
Other Diseases	1 ...	1 ...	...	2 ...	2 ...	...	1 ...	1 ...	...	8 ...	8 ...

TABLE VI.—RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1913—(contd.).

DISEASES.	EUROPEAN OFFICIALS.			NATIVE OFFICIALS.			GENERAL EUROPEAN POPULATION.			GENERAL NATIVE POPULATION.		
	Remaining in Hospital at end of 1912.	YEARLY TOTAL.	Total cases treated.	Remaining in Hospital at end of 1913.	YEARLY TOTAL.	Total cases treated.	Remaining in Hospital at end of 1912.	YEARLY TOTAL.	Total cases treated.	Remaining in Hospital at end of 1912.	YEARLY TOTAL.	Total cases treated.
LOCAL DISEASES—cont./nued—												
Diseases of the Generative System:—												
Male Organs:—												
Urethritis
Gleet
Stricture	...	1	1	...	...	...	1	1	2	...	7	1
Prostatitis
Soft chancre	2	2	...	6	6
Condyloma
Inflammation of scrotum	1	1
Hydrocele	...	1	1	...	3	3	...	...	...	...	5	5
Orchitis	...	1	1	...	12	12	...	1	1	...	2	33
Epididymitis	4	4
Abscess of testicle	8	8
Other Diseases	...	2	2	...	1	1	...	...	...	...	...	...
Female Organs:—												
Ovaritis
Ovarian cyst	1	1	...	...	...
Endometritis
Displacement of uterus
Vaginitis	1	1
Amenorrhoea	1	1
Dysmenorrhoea	2	2	...	1	1
Menorrhagia	2	2
Leucorrhoea
Abortion	5	5	...	1	1
Delayed labour	5	5
Post-partum hæmorrhage
Retained placenta	2	2	...	1	1
Premature birth
Puerperal septicæmia	3	2
Mastitis	4	4
Abscess of breast	4	4
Other Diseases	...	1	1	...	...	...	...	4	4	...	4	4
Diseases of the Organs of Locomotion:—												
Osteitis	1	1	...	...	...	...	7	7
Arthritis	...	1	1	...	1	1	...	...	...	...	39	32
Spondylitis
Bursitis	1	1
Other Diseases	...	4	4	...	77	77	...	2	2	...	92	94
Diseases of the Connective Tissue:—												
Cellulitis	11	11	...	3	3	...	81	83
Abscess	...	6	6	...	44	45	...	1	1	...	175	178
Elephantiasis	1	1
Other Diseases	...	1	1	...	2	2	...	...	...	...	19	19
Diseases of the Skin:—												
Urticaria	...	1	1	...	3	3	...	...	...	...	5	5
Eczema	...	1	1	...	4	5	...	...	...	...	24	25
Boil	...	2	2	...	34	34	...	2	2	...	46	46
Carbuncle	...	2	2	...	1	1	...	...	...	...	...	...
Herpes	1	1	...	...	...	...	2	2
Psoriasis	...	1	1	...	...	...	...	...	...	...	...	...
Oriental sore	2	2	...	...	...	...	3	23
Tinea	1	1
Scabies	17	17	...	...	...	...	38	38
Aene
Prickly heat
Other Diseases	...	2	2	...	33	33	...	2	2	...	139	142
Injuries—General												
Local	...	14	14	...	5	5	...	2	2	...	27	28
Surgical Operations
Tumours	13	13	...	42	1187
Malformations	2	16
Poisons	...	1	1	...	...	...	...	1	1	...	16	1
Parasites—Animal—												
Protozoa	5	1
Trematoda (Flukes)	...	1	1	...	...	...	...	...	...	...	3	3
Cestoda—												
Tenia solium	1	1	...	3	3
Tenia saginata	1	1
Nematoda—												
Ascaris	1	1	...	...	...	...	1	1
Trichocephalus dispar
Trichina
Dracunculus	3	3
Filaria	3	2
Strongylus
Ankylostomiasis	1	14
Oxyuris	4	15
Insecta—												
Myiasis
Other Diseases	20	20	...	2	2	...	3	3
TOTAL	4	332	6	336	6	14	2785	7	2799	45	5	277
											10	282
											8	270
											8291	757
											8561	273

* Recorded under respective Diseases.

TABLE VII.

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1913.

DISEASES.	EUROPEAN OFFICIALS.	NATIVE OFFICIALS (including Asiatics).	EUROPEAN GENERAL POPULATION (NON-OFFICIALS).		GENERAL NATIVE POPULATION.	
	Male.	Male.	Male.	Female.	Male.	Female.
Infective Diseases :—						
Beri-beri ... ..	...	...	...	...	2	...
Cerebro-spinal fever ... ..	...	...	...	1	16	...
Chicken-pox ... ..	...	3	2	...	165	...
Cholera ... ..	...	...	...	...	...	...
Dengue ... ..	...	...	...	...	...	...
Diphtheria ... ..	...	3	...	...	...	...
Dysentery ... ..	...	36	8	6	1,006	118
Endocarditis—Infective ... ..	...	...	...	...	...	...
Enteric fever ... ..	...	...	3	2	4	1
Erysipelas ... ..	...	...	...	...	3	1
Gonorrhoea	5	16	13	...	766	36
Influenza	1	...	4	5	33	6
Kala Azar ... ..	...	...	...	...	...	...
Leprosy (a) Nodular ... ..	...	...	...	...	2	...
(b) Anaesthetic ... ..	...	...	...	...	3	1
Malaria (a) Tertian	50	463	52	21	5,646	968
(b) Quartan ... ..	...	...	...	...	1	...
(c) Estivo-autumnal	27	472	28	10	4,045	414
(d) Chronic malaria ... ..	...	...	...	...	32	2
(e) Blackwater ... ..	...	...	...	1	1	...
Measles ... ..	...	...	...	1	29	3
Undulant fever ... ..	...	...	...	...	...	...
Plague ... ..	...	...	...	...	15	1
Pneumonia ... ..	...	...	...	...	49	7
Rabies ... ..	...	...	...	...	...	...
Relapsing fever	1	...	...	...	...	...
Rheumatic fever	2	54	5	...	899	146
Septicemia ... ..	...	...	...	...	1	...
Trypanosomiasis (Sleeping Sickness) ... ..	...	...	...	...	1	...
Small-Pox ... ..	...	...	...	...	19	...
Syphilis (a) Primary ... ..	...	...	1	...	384	45
(b) Secondary ... ..	...	6	5	...	468	81
(c) Inherited ... ..	...	...	...	...	54	18
Tetanus ... ..	...	...	...	...	6	...
Tuberculosis ... ..	...	...	1	...	69	12
Whooping cough ... ..	...	...	...	...	7	3
Yaws ... ..	...	2	...	...	197	31
Yellow fever ... ..	...	...	...	...	...	...
Other Infective Diseases ... ..	...	...	...	1	42	4
Intoxications :—						
Alcoholism ... ..	...	1	1	...	...	...
Morphinism ... ..	...	...	...	...	...	...
Others ... ..	...	...	...	...	...	...
General Diseases :—						
Anæmia	10	32	7	11	294	59
Anæmia-Pernicious ... ..	...	...	...	...	7	...
Diabetes ... ..	...	...	...	...	7	...
Exophthalmic Goitre ... ..	...	...	...	...	1	...
Gout ... ..	...	1	1	...	1	...
Leucocythæmia ... ..	...	...	...	...	...	...
Hodgkin's Disease ... ..	...	...	...	...	...	...
Myxœdema ... ..	...	...	...	...	...	...
Purpura ... ..	...	...	...	...	1	...
Rickets ... ..	...	...	...	...	1	...
Scurvy ... ..	...	1	...	...	35	7
Other General Diseases	2	24	8	6	359	57
Local Diseases :—						
Diseases of the Nervous System	37	99	15	17	2,847	289
Mental Diseases ... ..	...	...	...	...	7	4
Diseases of the Eye	8	142	7	5	2,473	793
" Ear	5	53	5	3	928	123
" Nose	8	78	3	3	1,025	48
" Circulatory System	3	...	5	2	59	8
" Respiratory System	31	329	46	31	10,270	1,032
" Digestive System	85	593	99	69	13,427	1,685
" Lymphatic System	2	72	3	...	848	61
" Urinary System	6	5	4	1	53	6
" Generative System	2	13	3	20	408	127
" Organs of Locomotion	13	60	11	5	2,289	140
" Connective Tissue	3	61	6	5	1,857	162
" Skin	39	248	31	15	8,712	978
Injuries :—						
General ... ..	...	25	3	...	78	15
Local	42	519	44	6	22,096	1,771
Surgical Operations ... ..	...	2*	...	...	...	...
Tumours	1	...	...	...	18	19
Poisons	1	...	1	...	18	2
Parasites-Animal	6	32	5	3	913	498
TOTAL	381	3,383	430	240	82,808	9,593
Surgical Operations ... ..	...	...	6	6	177	48

* Recorded under respective Diseases.

TABLE VIII.

EUROPEANS.

RETURN OF INFECTIVE DISEASES TREATED AT THE VARIOUS HOSPITALS AND DISPENSARIES IN THE PROTECTORATE DURING 1913.

DISEASES.	Montbana.	Lamu.	Malindi.	Vol.	Nairobi.	Nakuru.	Eldoret.	Baringo.	Eliliana Bayine.	Natrusba.	Nandi.	Machakos.	Kisumu.	Kisil.	Kericho.	Mumias.	Port Hall.	Nyeri.	Embu.	Meru.	Kisumu.	Gobwen.	Maerich.	Marakwet.	Makindu.	Kyambou.	Total.
Cerebro-Spinal Fever	8	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
Dysentery	9	6	4	...	...	2	...	...	1	...	...	...	2	...	...	...	...	...	1	...	...	...	31
Enteric Fever	15	2	...	...	...	...	...	...	...	...	...	...	1	3	...	...	...	...	...	...	...	...	2
Malaria	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25
Blackwater Fever	65	45	12	3	2	3	3	2	29	5	2	7	5	2	2	4	2	2	19	6	1	7	428
Measles	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Plague	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
Tuberculosis	5	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1

N.B.—This Table only gives the numbers *actually* treated at Government Institutions.

TABLE VIII.
NATIVES (INCLUDING ASIATICS).
RETURN OF INFECTIVE DISEASES TREATED AT THE VARIOUS HOSPITALS AND DISPENSARIES IN THE PROTECTORATE DURING 1913.

DISEASES.		Mombasa.	Lamu.	Malindi.	Vol.	Shimba Hills.	Nairobi.	Nakuru.	Eldoret.	Isiango.	Eldama Ravine.	Natasha.	Londiani.	Nandi.	Maehakos.	Kyambu.	Ndarugu.	Makindu.	Kisumu.	Kisii.	Kericho.	Mumias.	Fort Hall.	Nyeri.	Embu.	Meru.	Kitui.	Kisumu.	Yote.	Gobwen.	Sereniti.	Moyale.	Maerich.	Marakwet.	Marsabit.	Total.	
Beri-beri	...	29	...	...	28	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	
Cerebro-spinal meningitis	...	4	...	4	5	...	249	11	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	350
Chicken-pox	...	15	...	...	2	...	209	35	8	...	...	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	199	
Dysentery	...	293	39	7	72	60	343	120	6	22	50	52	2	24	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,783	
Enteric fever	...	...	...	...	1	10	24	19	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	
Leprosy	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	
Malaria	...	3,577	321	1,233	748	105	1,350	247	7	92	120	134	10	90	154	72	296	915	1,738	130	129	247	156	147	132	94	890	443	336	588	369	254	121	46	123	15,227	
Blackwater fever	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	78	
Measles	...	20	...	...	...	...	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	
Plague	...	34	...	...	...	...	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	
Sleeping sickness	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	39	
Small-pox	...	29	...	3	1	...	43	...	19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	91	
Tuberculosis	...	55	15	6	...	...	12	10	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	
Yaws	...	25	10	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	

N.B.—This Table only gives the numbers *actually* treated at Government Institutions.

TABLE IX.

TABLE SHOWING DENTAL TREATMENT DURING 1913.

The following shows the respective number and class of patients per month from July to December :—

	July.	August.	September.	October.	November.	December.	Total.
Appointments... ..	84	62	55	55	54	76	386
European Officials	18	11	6	20	13	14	82
Wives, families and households	9	10	7	7	10	10	53
Goans and Indians	5	1	6	3	8	6	29
Africans (Treated after hours)	...	...	...	...	...	...	6
Total treated ... ..	...	...	...	...	...	...	170

The following conditions were treated :—

Simple caries ... ..	...	...	...	...	...	...	317
Pulpitis ... ..	...	...	...	...	...	...	30
Dento-alveolar abscess	...	...	...	...	...	...	60
Dento-alveolar periostitis	...	...	...	...	...	...	2
Dental neuralgia	...	...	...	...	...	...	3
Pyorrhœa ... ..	...	...	...	...	...	...	21
Erosion ... ..	...	...	...	...	...	...	20
Polypus of gum	...	...	...	...	...	...	1
Polypus of pulp	...	...	...	...	...	...	2
Exostosis ... ..	...	...	...	...	...	...	1
Stomatitis ... ..	...	...	...	...	...	...	2
Antrum disease	...	...	...	...	...	...	1
Gingivitis acuta	...	...	...	...	...	...	3
Mecrosis of jaw	...	...	...	...	...	...	1
Total ... ..	...	...	...	...	...	...	464

TABLE X.

VITAL STATISTICS.

The following table gives the estimated population and the numbers of births and deaths for the European population for the last three years :—

	1911.	1912.	1913.
Population... ..	3,175	5,151	6,510
Births	92	85	108
Deaths	42	36	53

The estimated ratio per 1,000 is, therefore, as follows :—

	1911.	1912.	1913.
Births	28.97	16.50	16.59
Deaths	13.22	6.98	8.14

TABLES SHOWING MORTALITY AMONGST EUROPEANS IN
THE EAST AFRICA PROTECTORATE BY PERIODS OF AGE
AND RESIDENCE FOR THE LAST TWO YEARS.

1913.

AGES.	Residence in the Protectorate.					
	Under 1 year.	1 year and under 2 years.	2 years and under 3 years.	3 years and under 5 years.	5 years and under 10 years.	Over 10 years.
Under 1 year	10	...	...	...	...	...
Under 2 years ... ..	...	1	...	...	...	...
Under 3 years ... ..	...	...	...	...	...	...
3 and under 5 years ... ..	...	...	...	...	...	...
5 and under 10 years ... ..	...	...	...	...	...	...
10 and under 15 years ... ..	...	...	...	...	...	...
15 and under 20 years ... ..	...	...	...	...	...	...
20 and under 25 years	1	...	...	...	...	1
25 and under 30 years	5	2	2	...	2	...
30 and under 35 years	1	...	...	2	1	...
35 and under 40 years	2	1	3	...	...	1
40 and under 45 years	2	...	...	...	1	...
45 and under 50 years ... ..	...	3	...	1	...	...
50 and upwards	4	...	...	...	2	5
TOTAL	25	7	5	3	6	7

1912.

AGES.	Residence in the Protectorate.					
	Under 1 year.	1 year and under 2 years.	2 years and under 3 years.	3 years and under 5 years.	5 years and under 10 years.	Over 10 years.
Under 1 year	5	...	...	...	...	...
Under 2 years ... ..	...	...	...	...	...	...
Under 3 years	1	...	...	...	...	...
3 and under 5 years	1	...	...	...	...	...
5 and under 10 years ... ..	...	...	...	...	...	...
10 and under 15 years ... ..	...	...	...	1	...	...
15 and under 20 years ... ..	...	1	...	...	...	...
20 and under 25 years	2	...	...	1	...	...
25 and under 30 years	3	1	...	...	1	...
30 and under 35 years	1	2	3	...	1	...
35 and under 40 years ... ..	...	2	...	...	1	...
40 and under 45 years ... ..	...	...	...	...	...	1
45 and under 50 years	1	...	...	...	...	...
50 and upwards	2	3	...	1	1	...
TOTAL	16	9	3	3	4	1

APPENDIX I.

EAST AFRICA PROTECTORATE.

SANITATION DIVISION.

CIRCULAR No. 164.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

Epidemic cerebro-spinal meningitis is a disease caused by infection by a bacterium known as the "*Meningococcus*."

Symptoms and course:—The symptoms and course of the disease are liable to vary very much. Abnormal and mild cases can only be diagnosed by a man with some experience of the disease and often require the services of a bacteriologist for a certain diagnosis to be made.

In typical cases the first symptoms are fever, of sudden onset, and headache. The headache becomes localized in the back of the head and neck, and becomes not so much an ache as an acute pain which may extend down to the spine. The head becomes drawn back and there may be tenderness along the spine. At this stage the patient's mind may be clear but extreme restlessness is common. In mild cases the disease may stop here and the symptoms pass off; in severe cases the symptoms become aggravated, the patient becomes delirious or unconscious and may fall into a state of coma and die after only a few days' illness. Should the coma clear up, the patient may become convalescent.

In the case of Indians and Africans a history of fever and headache is usually all that is obtainable, but among intelligent European cases it is often possible to obtain a history of "cold in the nose" with or without sore throat preceding by some days the onset of the typical symptoms. As will be shown later, this "cold in the nose" is a most important point when dealing with the spread of the disease.

Spread of the disease:—In recent years it has been recognized that cases of epidemic cerebro-spinal meningitis are really cases of a much milder but more widespread disease in which a severe and dangerous complication has arisen. This widespread disease is a "meningococcal naso-pharyngitis" or cold and sore throat caused by the *Meningococcus*. People may suffer from this milder complaint and recover without ever showing any sign of the dangerous complication, or they may develop the dangerous complication and become typical cases of meningitis. But a person suffering from the milder symptoms is able to pass the microbe to healthy persons who may develop meningitis. These cases of meningococcal "colds" are the great difficulty in the way of attempts to stop the spread of the disease, the sufferers being known as "carriers." A case of meningitis can be isolated and precautions taken, but it is not possible to decide whether every person is suffering from the ordinary form of cold or from a meningococcal one.

Precautions:—When dealing with a case of acute meningitis, the patient should be isolated and the greatest care taken to disinfect sputum and nasal discharge. The *meningococcus* is easily killed by drying or heat, so that articles of furniture in a room should be frequently turned out into the sun and any articles used by the patient should be put into boiling water. Handkerchiefs should be frequently changed and the soiled ones put at once into boiling water. The patient when convalescent should use antiseptic gargles and nasal douches, and these should be used as a routine by attendants on a patient.

When meningitis is known to be about, every "cold" should be looked on with suspicion and any one suffering from a "cold" should use antiseptic gargles and nasal douches. Particular attention should be paid to handkerchiefs which should be frequently changed, promptly boiled, and never, as is sometimes done, used for a child or indeed for anybody else.

APPENDIX II.

EAST AFRICA PROTECTORATE.

MEDICAL DEPARTMENT SANITATION DIVISION.

CIRCULAR No. 150.

MEMORANDUM OF ADVICE REGARDING RAT DESTRUCTION.

The following measures will be found useful for this purpose, *viz.* :—

I.—THE LAYING OF RAT POISON.—Various preparations exist. One commonly used in this country is called "Common Sense Exterminator." Full directions for its use are given on the labels of the tins containing it.

The following precautions should be taken when laying it :—

- (1) The prepared bait should be placed as near the runs and holes of rats as possible *at night*. The number of portions laid should be counted.
- (2) All bait left over next morning must be removed and burnt.
- (3) Repeat nightly till no more bait is taken.

II.—THE SETTING OF TRAPS.

(1) *Wire Traps.*

The large wire traps are a serviceable type. They can be advantageously set near the animals' haunts and preferably close to a wall.

Great care should be taken in choosing baits; these should be changed frequently and should be of a nature to attract the rat.

Barrel Traps.

This form is useful in warehouses and other places where rats are known to exist in large numbers. It consists of a barrel or cask half full of water with a tilting lid which precipitates the rat into the water beneath. The lid should be made a little smaller than the top of the barrel to allow it to cant freely upon an iron bar which should be fixed at the top of the barrel. A large piece of rancid cheese is attached beyond the middle of the lid to serve as a bait.

The trap is completed by placing a board on the chimes of the barrel and resting it on the floor to ensure the approach of the rat from the proper side.

III.—All live rats should be killed by drowning in water to which a disinfectant has been added.

IV.—All rats killed, or found dead, should be sent to the Government Laboratory for examination in a tin containing a solution of disinfectant with the following information :—

Name of place or address.

Sender's name.

Date.

V.—WHEN MEASURES OF RAT EXTERMINATION ARE INITIATED OR IN PROGRESS :—

- (1) Warning should be given to the inhabitants of the neighbourhood in which poison is laid as to its danger.
- (2) Precautions should be taken to prevent rats having access to foodstuffs. Such should be locked up when poison is distributed.
- (3) Records should be kept of poison laid in any particular place.
- (4) Traps should be kept clean by scalding.
- (5) Great care should be exercised in handling the bodies of dead rats; these should be lifted by means of a pair of tongs, a shovel, sticks or some such means and dropped into a tin containing a solution of disinfectant.
- (6) Kitchen or other refuse or disused foodstuffs should not be allowed to accumulate near the main building or outhouses.

APPENDIX III.

EAST AFRICA PROTECTORATE.

MEDICAL DEPARTMENT.—SANITATION DIVISION.

CIRCULAR No. 158.

PLAGUE.

Plague is a dangerous disease and every case of sickness should be immediately reported to the Health Office or Medical Officer.

Plague shows itself in three forms, *viz.*, Bubonic, Septicæmic and Pneumonic. In the Bubonic there are swellings or buboes in the groin, armpit, or neck. In the Septicæmic and Pneumonic there are no buboes or swellings. The two latter forms without buboes or swellings are the most fatal. The Pneumonic form attacks the lungs.

All forms of plague take their origin from a disease in rats, and it is by rats that the Bubonic or Septicæmic forms of plague are spread. The rats spread the disease in two ways. The fleas on the sick rat bite human beings and infect them with plague. The sick rats also infect food and those who eat this food are attacked with plague.

Bugs also spread plague. On the other hand Pneumonic plague is directly contagious and is spread by the breath of those who suffer from the disease.

PRECAUTIONS.

1. INOCULATION AGAINST PLAGUE.—Inoculation gives an extraordinary protection against an attack of plague, and in those exceptional cases where an inoculated person is attacked he or she has twice the chance of recovery over that of one not inoculated. Everyone should be inoculated against plague.

- (a) This will be done in the Health Offices or Government Dispensaries daily, between half past eight and noon, and again from two to four, Sundays excepted, free of charge by a Medical Officer.

There is a special room in the Health Office at Mombasa where ladies and women can be inoculated privately by a lady inoculator.

The inoculation is perfectly harmless and is much less painful than vaccination against small-pox.

- (b) Arrangements can also be made in Mombasa for inoculation by a lady inoculator of parties of Purdah or Zenana ladies provided they assemble at a private house or place.

- (c) Inoculation in private houses with Haffkine's prophylactic will be only performed under conditions noted hereafter.

2. DESTRUCTION OF RATS.—All rats inside and outside the house should be destroyed and the bodies burnt.

3. PROTECTION OF FOODSTUFFS.—All food should be kept in covered vessels so that rats may not infect it.

4. REMOVAL OF WASTE AND RUBBISH.—All accumulations of unconsumed foodstuff and of rubbish in and outside the house, also in court yards and back yards, should be collected and placed in covered kerosene oil tins or baskets and should be put outside the house, whence they will be removed by the conservancy staff. Any complaints of non-removal should be addressed to the Health Officer. If this rubbish cannot be removed by a conservancy staff, it should be destroyed by burning, or buried in pits.

5. CLEARING OF BUSH.—Bush or undergrowth around houses and in compounds should be cleared in order to avoid the harbouring of rats.

6. CATS.—Each householder should keep a cat on his premises.

7. ADMISSION OF AIR AND SUNLIGHT TO HOUSE.—Every door and window in each house should remain open for not less than 8 hours daily, so that as much light and air as possible may be admitted into every portion of the house.

8. DAILY EXPOSURE OF HOUSEHOLD GOODS TO SUNLIGHT.—All bedding, blankets, clothes, curtains, mats and fabrics, which harbour fleas and bugs, should be spread out and exposed to the sun for several hours each day. Blankets and mats should be thoroughly shaken and beaten daily and the bedsteads frequently washed.

9. CLEANSING OF HOUSE AND MEASURES AGAINST FLEAS AND BUGS.—Every portion of the house and its contents should be thoroughly cleaned every day, and washed with disinfectants which will be supplied free by the Health Office to the poor on application. Mats and other fabrics should, especially, be boiled in water, and bedsteads washed with sea water or disinfectants and afterwards placed in the sun in order to destroy fleas and bugs.

10. NOTICE OF SICKNESS TO THE HEALTH OFFICE.—All cases of sickness should be immediately reported to the Health Office or Medical Officer, and also the presence of dying or dead rats in the house or premises.

11. GENERAL CLEANLINESS ESSENTIAL.—Cleanliness of person, clothes, house and household goods, and freedom from fleas, bugs and rats in the house are, in addition to inoculation, the best safeguards against plague.

12. INOCULATION BY HAPPKINE'S PROPHYLACTIC IN PRIVATE HOUSES:—

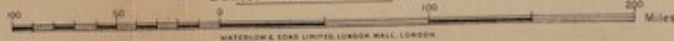
- (a) The Medical Officer, Assistant Surgeon or others who act on his behalf, should use the utmost circumspection, and in no way offend the racial scruples or religious prejudices of those who may benefit.
- (b) In all cases the husband or representative of the family should be informed of the intention to inoculate, and he should be present at the time such inoculation is performed.
- (c) Under no circumstances should any inoculation be performed on any Asiatic or Arab woman, unless a previous request from the parties concerned has been received, and such request recorded in the office for reference.
- (d) Under no circumstances should any representative of the Medical Department enter any house for the purpose of inoculating Asiatic or Arab women, unless a specific request is presented which must state the reasons for such entry.
- (e) No representative of the Medical Department shall receive any fee or remuneration whatever for performing any inoculation or vaccination that may be considered necessary in these circumstances.
- (f) A separate record shall be kept in the office of all inoculations and vaccinations performed in private houses on the prescribed form.

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29. The twenty-ninth is the fact that the...
30. The thirtieth is the fact that the...

— EAST AFRICA PROTECTORATE —



— Scale. 54 Miles = 1 Inch. —



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