Annual medical report / Colony and Protectorate of Kenya.

COLONY AND PROTECTORATE OF KENYA.

ANNUAL MEDICAL REPORT

FOR THE

YEAR ENDING 31ST DECEMBER, 1923,

INCLUDING THE

ANNUAL REPORT

OF THE

BACTERIOLOGICAL LABORATORY

FOR THE YEAR 1923.

THE SWIFT PRESS, LTD., NAIROBI.

Med. Form LXVIII.

MEDICAL DEPARTMENT,
OFFICE OF THE P.M.O.,
NAIROBI, KENYA COLONY.

20th May 1925.

Forwarded with the Compliments of the Principal Medical Officer.

To The Director, Tropical Diseases Bureau,
23, Endsleigh Gardens,
London, N.W.1.

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I.-ADMINISTRATION.

SECTION I.—DEPARTMENTAL.

I.—ESTABLISHMENT.

At the beginning of the year the Medical Department was faced with the prospect of carrying out its functions with a staff in which, owing to the financial condition of the Colony at that time, considerable retrenchment had just taken place, and in accordance with an estimate of expenditure which was less than the previous year's estimate of £177,436 by £51,193. It is satisfactory at the close of a year which has naturally been a period of considerable anxiety, to be able to state that, though the populations of certain areas have of necessity remained without any facilities for medical relief or for sanitary supervision, still it was not found necessary to discontinue any of the more essential public health services which had previously been rendered. On the contrary by re-organization of the resources of the Department, and by a re-distribution and regrouping of the available staff in the light of the experience of the two previous years, it has even been possible to afford medical relief to a larger number of sick than had hitherto been possible. For example there were treated by intramuscular injections no less than 64,344 cases of yaws, as compared with 24,233 cases in the previous year. It is a further matter for satisfaction that the medical services provided during the year under review have been of a distinctly higher standard than heretofore.

While the record of the year has been satisfactory in that there has been no falling off either in the sanitary or the medical work of the Department, and that on the whole there has even been expansion, still the fact must not be lost sight of that the expansion has been much less than is required, and that it has still been impossible, as in the past, to deal in anything like an adequate fashion with all the emergencies which have occurred. That none of these emergencies resulted in untoward developments was a matter of good fortune, on the continuance of which in the future it would be unwise to rely. It is to be trusted that by 1925 at least the finance of the Colony will be such that the Department may be placed in a position as regards establishment to face emergencies, if not with equanimity, at least without undue anxiety.

It is necessary to record the opinion that the activities of the Department have not been maintained without the imposition of an undue strain upon the existing establishment. In this connection "imposed" is hardly a correct expression since the strain has been not so much imposed upon as willingly undertaken by an enthusiastic staff. The strain entailed is, however, greater than could be indefinitely maintained, even if it were wise policy to attempt to do so. It is true that a certain relief will result from the additional appointments which have been sanctioned for the current year, as recorded later in this Report; but it is no easy matter to restrain the energies of a staff, which has the prestige of their profession and their Department and the interests of the Colony at heart. Unless still further relief can be afforded within the next year or so the attempt to deal with an almost unlimited field of work is more than likely to prove exhausting to the point at which initiative will automatically be damped.

The changes of policy involved by retrenchment in 1922, as detailed at the beginning of the 1922 Report, viz. the withdrawal of subsidies to Missions, the abolition of dental facilities to officials, and the handing over of the European Hospital at Eldoret to the local community, do not appear to have been attended by unfortunate results. The medical activities of the Missions have continued as before, and in addition it has been possible by reorganization and re-arrangement to effect a large increase in the Government medical activities in the Kikuyu Reserve, in which are situated the two Missions previously subsidized.

The abolition of medical facilities in various districts, which resulted from the withdrawal of Sub-Assistant Surgeons from various out-stations, would not appear to have been followed by serious results. The medical relief which had been given at these outstations was never very great in amount or very excellent in quality. Though the presence of a Sub-Assistant Surgeon at an out-station may doubtless have given a considerable feeling of security to the administrative officers in charge, it is doubtful whether these appointments, with a few exceptions, ever effected much more than to conceal the urgent need which has always existed for efficient hospitals and sound and well-organised medical and sanitary campaigns among the native populations. With the advent of better times it is earnestly to be hoped that the staff of the Department will be sufficiently augmented to allow of the posting of Medical Officers to at least some of the districts affected by the reduction of Sub-Assistant Surgeons, in order that these may be opened up from the medical and sanitary point of view as a preliminary to further economic and educational development.

In the provision of medical relief on a large scale throughout not only the Native Reserves but also on the many large estates which are now being developed under European management, an essential factor is an adequate supply of well-trained African dressers and hospital attendants.

The establishment of a satisfactory and up-to-date Native Hospital at Nairobi towards the end of 1922, to which two European nurses were attached, afforded a suitable training centre, and during 1923, it has been possible to provide quarters for the accommodation of about fifteen dressers in training, in addition to the native staff actually required for the work of the hospital, while a suitable lecture room has also been built. It is hoped that in 1924 it will be possible to increase the medical staff of the hospital, in order that more attention may be given to the educational side of the work.

A beginning has also been made with the training of African Dispensers, but it is too soon to say whether, with the material yet available, satisfactory results can be achieved.

At the Bacteriological Laboratory a number of Africans have been engaged and are being trained as laboratory assistants. Their progress has been considerable, and it is hoped that in a few years it may be possible to provide Medical Officers at out-stations with African assistants who will be capable of performing in a reliable manner all the more ordinary microscopical and other examinations which are required in connection with the routine work of a Hospital.

During the past year there has been very considerable development in the country generally; European settlement has increased, the construction of railways and ports has been proceeded with, towns have increased in size, suburban areas have been further opened up, the maize, coffee and sisal industries have progressed, and a cotton-growing industry has been instituted. It would appear that the country is on the threshold of a period of active development both of the Native Reserves and of the Settled Areas. Development as outlined will of necessity require more detailed and intimate sanitary administration and control than has hitherto sufficed. It will be a matter of paramount importance to ensure that durnig the next few years the development of the Medical Department does not lag behind the development of the country, but that, if possible, it should precede it, in order that there may be prevented from arising those insanitary conditions which have too often in the past accompanied economic development and proved the cause of large financial outlay at a later date.

TABLE "A"

ESTABLISHMENT.

The establishment of the Medical Department as sanctioned for the year 1923, was as follows:—

Administrative Division.

Principal Medical Officer	1	Stenographer	1
Deputy Principal Medical Officer	1	1st Grade Clerks	2
Chief Sanitation Officer	1	2nd Grade Clerks	6
Medical Storekeeper	1	3rd Grade Clerks	9
Office Superintendent	1	4th Grade Clerks	5
Accountant	1	Messengers and Packers	18
Clerks	2		

Medical Division.

Senior Medical Officers	4	Matron, Lunatic Asylum	1
Resident Surgical Officer	1	Assistant Matron, Lunatic Asylum	1
Medical Officers	15	Asylum Warders	2
District Surgeons	3	Assistant Surgeons	5
European Dispensers	2	Sub-Assistant Surgeons	22
Matron	1	Compounders	8
Nursing Sisters	19	Native Hospital Attendants	(as necessary)
Superintendent, Lunatic Asylum	1	Lunatic Asylum Attendants	(as necessary)

Sanitation Division.

Medical Officers of Health	4	Nurses	2
Senior Sanitary Inspectors	2	Mechanics and Greasers	3
Sanitary Inspectors, 1st Grade.	6	Native Attendants for Infectious Diseases Hospitals, Leper Lazarettos and Quarantine Stations.	(as necessary)
Sanitary Inspectors, 2nd Grade.	2		
Sanitary Overseer	1		
Superintendent, Infectious diseases Hospital.	1		

Laboratory Division.

Bacteriologist	1	Laboratory Assistants (Asiatic)	2
1st Assistant Bacteriologist	1	Native Laboratory Attendants	(as necessary)
2nd Assistant Bacteriologist	1		
Laboratory Assistant (European)	1		

At the end of the year the following new posts and increases in staff were passed by the Legislative Council:—

Administrative Division.

Chief Sanitary Inspector	1	European Clerk	1

Medical Division.

Medical Officers	2	Ward Master	1
Male Nursing Orderly	1		

Sanitation Division.

Sanitary Inspectors, 2nd Grade.	2

Laboratory Division.

Chemical Officers	2	European Laboratory Assistant,	
Entomologist	1	Learner Grade	1

2.—LIBRARIES.

A medical library is maintained at the Laboratory and a lesser one at the Headquarter Medical Offices, both of which are avaliable for reference by Medical Officers who make applications. The libraries are added to by the purchase of the latest medical publications from time to time, whilst a varied number of scientific periodicals are regularly supplied.

A notable event has been the monthly production of a typewritten circular entitled "The Journal of the Kenya Medical Service" which has been distributed to all members of the service. The Journal comprises original articles of local medical interest, notes of cases, reviews of current literature and items of departmental interest. The production has already proved its usefulness in keeping members of the Department in touch with one another and in preventing a part of the waste of acquired knowledge and experience which inevitably occurs when medical men are widely scattered over a large area. There are already indications of a considerable demand for the Journal outside the Kenya Medical Service.

Dr. C. J. Wilson, Deputy Principal Medical Officer, has undertaken the editorial duties.

SECTION II.—EXTRA DEPARTMENTAL.

3.—REGISTRATION OF MEDICAL PRACTITIONERS AND DENTISTS.

The Ordinance governing registration came into force on the 24th September, 1910.

Since that date and up to the end of the year the following have been placed on the Register:—

Registered Medical Practitioners	128
Licensed Medical Practitioners	6
Dentists	10

Seventy-six medical practitioners were registered for Government service, and sixty-three as private practitioners.

The Board nominated for the purposes of the Ordinance consisted of:—
Principal Medical Officer (Chairman).
Dr. A. R. Paterson.
„ C. J. Wilson, M.C.
„ W. H. Kauntze, M.B.E.
„ A. J. Jex-Blake,
„ R. W. Burkitt,
with the Principal Medical Officer as Chairman and Registrar.

2 meetings were held during the year.

4.—THE DRUGS AND POISONS ORDINANCE, 1909.

This Ordinance controls the licensing of chemists and druggists as well as the sale of poisons throughout the country.

Twenty-nine names have been placed on the Register since the introduction of the Ordinance to the end of 1923.

The Board appointed under the Ordinance consisted of the following:—
Principal Medical Officer (Chairman),
Dr. A. R. Paterson,
„ C. J. Wilson, M.C.
„ W. H. Kauntze, M.B.E.
V. H. Kirkham, Esq., F.I.C., B.Sc.
A. A. White Esq., M.P.S.
L. A. Howse, Esq., M.P.S.
with the Principal Medical Officer as Chairman and Registrar.

One meeting was held during the year.

5.—THE PUBLIC HEALTH ORDINANCE, 1913.

The Board established under this Ordinance deals with proposals for the sub-division into building sites of land in the neighbourhood of townships. Six meetings were held during the year.

The Annual Report of the proceedings of the Board will be found in Appendix "A".

6.—THE PUBLIC HEALTH ORDINANCE, 1921.

Under this Ordinance there is established a Board—the Central Board of Health—with the Principal Medical Officer as Chairman. The function of the Board is to advise the Governor on any matter affecting the public health.

Five meetings were held during the year.

The Annual Report of the proceedings of the Board will be found in Appendix "B".

SECTION III.—FINANCIAL.

Though detailed returns of revenue and expenditure are given in Table II, which will be found at the end of this report, it would appear desirable at this point shortly to analyse the budget of the Department, and to review it in relation to the work which is done, the work which still remains to be undertaken and the revenue of the country as a whole.

The sanctioned estimates, the actual expenditure and revenue for the past two years, and the draft estimates and anticipated revenue for 1924, are given below:—

Sanctioned Estimates.	Extraordinary Estimates.	Total Sanctioned.	Actual Expenditure.	Extraordinary Expenditure.
£	£	£	£ Sh. Cts.	£ Sh. Cts.
1922.				
177,436.	3,834	181,270	137,881.10.67	9,455.7.61
1923.				
126,243.	3,934	130,177	115,557.13.92	6,224.6.56
1924. Draft Estimate.				
126,593	350	126,943		

EXPENDITURE.

	£	Sh.	Cts.
1922	147,336	. 18	. 28
1923	121,782	. 00	. 48

REVENUE.

1922	8,090	. 00	. 00
1923	11,908	. 14	. 34*
Anticipated Revenue.			
1924	8,550	. 00	. 00

Comparison of the estimated ordinary expenditure of the Medical Department for the year 1924, with that for the year 1923 shows:—

	£
Draft Estimates 1924.	126,593
Sanctioned Estimates 1923.	126,243
Net increase for 1924	350

The Estimates for 1924 include, however, a sum of £1,920, distributed over various items, provision for the taking over by the Medical Department of a portion of the Chemical Research Department, which was abolished on the 31st of December. For comparison with the Estimates of 1923, the 1924 figure should be reduced by the above figure.

	£
Total Draft Estimates for 1924	126,593
Less £1,920 for Chemical Services.	124,673
Sanctioned Estimates 1923	126,243
Net Medical Estimates 1924	124,673
Decrease	1,570

*Including re-embursements from Uganda Government on account of Zanzibar Sanitary Station and re-embursements Uganda Railway, on account of Medical services.

It is noted that this decrease has been effected in spite of the fact that provision has also been made for the appointment of the additions to the Staff already detailed.

The new appointments will involve an expenditure, including all allowances and passages, of about £5,000. That this provision could be made without increasing the Estimates over those for 1923 was partly the result of it being no longer necessary to incur large expenditure on Novarsenobillon for the treatment of yaws, and partly the result of numerous minor economies which it has been possible to make in various branches of the Department without affecting efficiency.

It is to be noted that the item "Medical Work in Native Reserves" will not again appear in the Estimates of this Department. This item, which for some years past has been inserted in the Estimates, was a one line vote under which provision was made for one Medical Officer, one Sub-Assistant Surgeon, the purchase of N.A.B. and various activities in Native Reserves. It was originally inserted at a time when expansion was actively taking place with regard to work in the Native Reserves, in order that the Department might be in a position to deal with unforeseen contingencies. Now however that these activities have been organised there seems no necessity to retain it as a separate item, and the provision previously made thereunder has been re-allocated to various other items of the Estimate. A further reason for abolishing this item was that its continued retention undoubtedly gave rise to a false impression with regard to the actual provision made for the medical and sanitary care of the native population. If in a total estimate of about £125,000 there appears an item of about £5,000 or £8,000 for medical work in Native Reserves the impression is not unlikely to be gathered that £5,000 or £8,000 is the total sum expended in connection with the native population. Such however is not the case. A careful analysis of the expenditure of the Department made in 1923, clearly showed that at least 75% of the total vote of the Department was expended in connection with the promotion of the public health of, and the provision of Medical relief for, the native populations alone. Though therefore the item "Medical Work in Native Reserves" has disappeared from the Estimates there will be no diminution in the activities of the Department with regard to the native population, while on the other hand owing to provision of extra staff in 1924, and specially on account of the provision of additional Medical Officers, an Entomologist and Sanitary Inspectors, there should be a very considerable increase.

As noted above, the Estimates for 1924 make provision for the absorption of a section of the old Chemical Research Department. This provision will include two Chemical Officers. Of these, one will carry out the duties of Government Analyst and will be responsible for the performance of all public health, toxicological and other examinations, while the other will more particularly devote himself to biological chemistry. It is hoped that as a result it may be possible to carry out some urgently needed researches with regard to the food values and more particularly with regard to vitamin content of the staple articles of native diet under varying conditions, as well as certain urgently required researches with regard to the preparation of various laboratory media.

The ratio which expenditure on public health and medical relief in Kenya bears to the total expenditure of the Colony was in the past year 1 to 13.9, i.e., of a total estimated expenditure for the Colony of £1,757,028, £126,243 or 7.1% was sanctioned for expenditure in connection with the public health or medical relief.

II.–PUBLIC HEALTH.

Trade has revived considerably during the year under review, and the farming community at any rate have experienced a measure of prosperity which has not been enjoyed for some time previously. The increasing export of maize and coffee which has already been commented on is already beginning to be reflected by increased activities generally. With the passing of the general financial depression it will be possible, given the necessary staff, to institute sanitary reforms both in townships and agricultural areas which have hitherto perforce had to be deferred.

The non-native census taken on April 1st 1921 revealed the following :—

Europeans	9,651
Indians	22,822
Goans	2,431
Arabs	10,102
Others	627

The above figures may be taken as approximately correct, though definite data are not available. It is probable that following a decrease in 1922 a slight increase has occurred in 1923.

No steps have been taken as regards enforcing the registration of non-European births and deaths, and the preparation of vital statistics remains impossible.

The numbers of European births, deaths and marriages in 1923 were as follows:—

Births	194
Deaths	64
Marriages	117

Such information as is available with regard to vital statistics in the three larger townships, Mombasa, Nairobi and Kisumu, is given below :—

(A) MOMBASA.

Population.—The population of the township was obtained by Census in 1921. This, together with the estimated population for 1922, is given below. No figures are available with which to estimate for the close of the year 1923 :—

	1921				1922			
	Males	Females	Children	Total	Males	Females	Children	Total
Europeans.	383	175	95	653	499	108	145	752
Arabs	2,152	1,610	1,938	5,700	2,206	1,408	1,512	5,126
Indians	2,896	1,506	2,900	7,302	3,081	1,372	2,548	7,001
Goans	489	83	124	696	552	74	101	727
Natives	7,438	6,828	3,719	17,985	11,676	10,253	5,240	27,169
	13,358	10,202	8,776	32,336	18,014	13,215	9,546	40,775

The accuracy of these figures is open to the gravest doubt.

Births.—The number of births registered during the year is 34 as compared with 17 during 1922.

Of the births registered 15 were of Europeans and 19 of non-Europeans.

Deaths.—The number of deaths from all causes reported as having occurred in the township is 678, of which 421 were males and 257 were females.

The numbers of deaths from all causes reported during each of the previous ten years were:—

1913	1,053
1914	645
1915	614
1916	633
1917	676
1918	977
1919	723
1920	1,284
1921	692
1922	680

Owing to the fact that in a large number of cases it cannot be ascertained whether the person dead is normally resident in the township or had migrated to the town shortly before death, it is impossible to give the relative numbers of deaths of residents and non-residents.

No recorded death-rate can therefore be attempted. Taking the total population to be 40,775, the crude annual death-rate for 1923 is therefore 16.6 per thousand living as compared with 16.7 for 1922.

Infant Mortality.—Of the total number of deaths reported in the township during the year, 103 or 15.2 per cent. were of infants under one year of age.

Bronchitis and Pneumonia were the diseases primarily responsible for deaths in infants.

Diarrhoea and enteritis accounted for only 10 deaths, but it would be interesting to know how many of the children whose deaths are attributed to inanition, debility, etc., suffered from diarrhoea shortly before death.

AGE DISTRIBUTION OF INFANT MORTALITY.

Under 4 weeks	4 weeks to 3 months	Total under 3 months	3 to 6 months	6 to 12 months	Total under one year
33	11	44	18	41	103

The above shows a somewhat striking fact, i.e., the relatively very large number of deaths in the second six months of life, this number being almost as great as that of the total deaths under three months; this is unusual.

The number of deaths in the period— 4 weeks to 3 months—is also relatively smaller than would be expected.

The difficulty frequently met with in obtaining accurate information as to a child's age would scarcely constitute a full explanation.

Adult Mortality.—Of the total number of deaths, 115 or 16 per cent, are due to causes unspecified and a further 34 or 5 per cent. to senility.

Owing to the fact that a large number of persons dying are not seen by a medical practitioner before death, the accurate allocation of the cause of death is a matter of considerable difficulty. The totals ascribed to the above mentioned causes are a result of this.

It is a matter for regret that statistics as to causes of mortality in this town must be regarded as only approximately accurate.

Of the deaths reported, the notifiable infectious diseases other than tuberculosis account for 27 or 3.9 per cent.

Tuberculosis, almost all of which refer to the pulmonary variety, for 85 or 12.5 per cent.

74 or 10.9 per cent are attributed to malaria.

Pneumonia and broncho-pneumonia and bronchitis are responsible for 132 deaths or 19.5 per cent.

Diseases of the digestive and nervous and circulatory systems are given as 41, 34 and 17 respectively.

The three main causes of adult mortality in this township are:—

(1) Pneumonia and the allied diseases.

(2) Pulmonary tuberculosis.

(3) Malaria.

(B) NAIROBI.

Population.—The population of the township as obtained by Census and as estimated in 1921 and 1922 is given below, though the 1922 figures cannot be considered as more than approximately correct. No estimate has been made for 1923.

	1921.				1922.			
	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Total.
Europeans.	1,438	976	605	2,929	1,249	892	726	2,867
Goans.	848	115	137	1,100	852	142	199	1,193
Indians	4,681	1,205	2,120	8,006	3,519	1,264	2,211	6,994
Arabs.	59	14	15	88	59	14	15	88
Others.	118	62	75	255	118	62	75	255
	7,054	2,372	2,952	12,378	5,797	2,374	3,226	11,397
Africans (estimated).				12,378				12,200
TOTAL.				24,466				23,597

Births.—The number of births registered during the year is 131 as compared with 128 in 1922.

Of the births registered, 106, 55 males and 51 females, were of Europeans, and 25, 17 males and 8 females, of non-Europeans.

In Nairobi many of the births occur in nursing homes, the mothers being not usually resident in the township.

Deaths.—The number of deaths from all causes reported as having occurred in the township was 575, of which 453 were males and 122 females.

In 1922 the total deaths were 504 and in 1921, 570. European deaths in 1923 totalled 24, 15 males and 9 females, and these included deaths of non-residents, which occurred in the nursing homes and hospital.

Asiatic deaths numbered 141, 91 males and 50 females.

African deaths were 410, 347 males and 63 females.

Deaths from communicable diseases numbered 367, of which 164 were due to pneumonia and 92 to plague.

(C) KISUMU.

The 1921 and 1922 figures of population are reproduced as a guide, though their accuracy is open to doubt.

	1921.				1922.			
	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Total.
Europeans	162	66	25	753	80	39	32	151
Arabs.	62	7	22	91	20	5	5	30
Indians.	897	261	468	1,626	448	157	189	794
Goans.	112	30	27	169	83	20	35	138
Others.	9	6	11	26	3	3	8	14
	1,242	370	553	2,165	634	224	269	1,127
Africans (estimated).				3,143				4,154
TOTAL.				5,308				5,281

It is probable that there has been some decrease in the number of the Asiatic population during the year.

The deaths recorded in Kisumu during the year totalled 129 from all causes, and by nationalities these were.—

Europeans.	Asiatics.	Africans.
1	24	104

The deaths included all those from the European and Native Hospitals, many of which occurred in people living normally outside the township.

GENERAL NATIVE POPULATION.

The table which was produced in the 1922 Report showing the estimated native population and the density thereof to the square mile is approximately correct for 1923.

No such extensive investigation, as was recorded in the 1922 Report, with regard to the Vital statistics of the population in the Native Reserves, has been carried out during 1923. A certain amount of information has been collected by the Medical Officer at Chuka, but the figures are too small for any definite conclusion to be drawn. It would appear however that the infantile death-rate in that part of the Colony is no less than that which obtains in Central Kavirondo.

EUROPEAN OFFICIALS.

During 1923, there was a considerable drop in both the total and average numbers of officials resident. The average sick time was appreciably less, and the invaliding rate was only half as much as in the preceding year.

The comparative table of in-patients and out-patients is:—

	In-patients.	Out-patients.
1923	596	275
1922	635	567
1921	603	676

Deaths among officials totalled 4, being due to:—

Malaria	2
Blackwater	1
Hernia	1
	4

Seven invalidings took place, the causes being.

Bronchitis	1
Tuberculosis	1
Debility	2
Malaria	1
Otitis media	1
Central nervous lesion	1
	7

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES AMONGST EUROPEAN OFFICIALS IN THE COLONY AND PROTECTORATE OF KENYA.

	1921.	1922.	1923.
Total number of officials resident.	1,353	1,337	1,190
Average number resident.	1,011	940	846
Total number on sick list.	592	635	595
Total number of days on sick list.	8,704	5,640	3,884
Average daily number on sick list.	23.84	15.45	10.64
Percentage of sick to average number resident.	2.35	1.64	1.25
Average number of days on sick list to each patient.	14.70	8.88	6.50
Average sick time to each resident.	6.43	6.00	4.59
Total number invalided.	16	16	7
Percentage of invaliding to total residents.	1.18	1.19	.59
Total deaths.	4	5	4
Percentage of deaths to total residents.	.29	.37	34
Percentage of deaths to average number resident.	.39	.53	.47
Number of cases of sickness contracted away from residence.	—	—	—

NON-EUROPEAN OFFICIALS.

The figures for sickness, invaliding and deaths among the non-European officials again show a satisfactory drop, and the improvement recorded in 1922, has been continued in 1923.

Deaths were 2 in number as against 6 in the preceding year and were due to:—

Blackwater	1
Pneumonia	1

Invalidings totalled 35, and were caused by:—

Bronchitis	1
Anaemia	2
Periostitis	1
Neurasthenia	6
Tuberculosis	3
Rheumatism	3
Debility	9
Obesity	1
Elephantiasis	1
Dyspepsia	2
Asthma	1
Myopia	1
Tachycardia	1
Diabetes	1
Blackwater	1
Hepatitis	1

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES AMONGST NON-EUROPEAN OFFICIALS IN THE COLONY AND PROTECTORATE OF KENYA.

	1921.	1922.	1923.
Total number of officials resident.	2,429	2,325	2,035
Average number resident.	1,987	1,879	1,649
Total number on sick list.	3,951	3,337	2,603
Total number of days on sick list.	22,865	18,207	13,585
Average daily number on sick list.	62.64	49.88	37.22
Percentage of sick to average number resident.	3.15	2.65	2.25
Average number of days on sick list to each patient.	5.78	5.45	5.22
Average sick time to each resident.	9.41	9.68	8.24
Total number invalided.	53	42	35
Percentage of invaliding to total residents.	2.18	1.81	1.23
Total deaths.	10	6	2
Percentage of deaths to total residents.	.41	.25	.09
Percentage of deaths to average number resident.	.50	.32	.12
Number of cases of sickness contracted away from residence.	—	—	—

III.–MAJOR ENDEMIC AND EPIDEMIC DISEASES.

I.—YAWS.

The experience of 1923 does not show that yaws is present to any great extent in districts other than those set forth in the previous Annual Report. From Kitui considerable numbers of cases have been returned, but this location adjoins the Embu Reserve in which yaws is as wide-spread as anywhere in the country.

The total number of cases which have been treated in 1923, 64,344, is far in excess of that of the previous year and shows that the estimate as to the number of the population requiring treatment at the end of 1922 was very much less than was actually the case. While reports from the districts chiefly affected indicate that there is probably a decrease in the numbers requiring treament in the neighbourhood of the hospitals and dispensaries already established, it is quite evident that many thousands of cases yet remain.

The districts in which the most numbers have been treated are Fort-Hall with 18,243 cases and South Kavirondo with 17,821. At Fort-Hall, in addition to the hospital and yaws camp at the central station, the disease has been attacked by the stationing of specially trained dressers, able to give injections of bismuth, at the various dispensaries scattered through the Reserve. The system which is also in existence to a smaller extent in the Chuka and South Kavirondo districts has worked well and will be extended; 8,523 persons have been treated at the dispensaries in the Fort-Hall area. In South Kavirondo the large total has been obtained through the frequent tours made by the Medical Officer through the district.

The mode of treatment adopted generally has been by the administration of intramuscular injections of bismutho-tartrate of sodium and potassium. A few cases have received novarsenobillon, when exceptional circumstances seemed to warrant such.

There has been no reason to modify the good opinion expressed in the 1922 Annual Report with regard to the efficacy of the bismuth treatment. Medical Officers without exception have expressed themselves as satisfied with the results obtained, and the general opinion is that the salt used is as effective as is novarsenobillon when given intramuscularly. Toxic effects have not been unpleasantly prominent, and these were more often reported at the beginning of the year before the standard dose of 3 grains (0.2 gramme) for adults was universally adopted. The most common toxic effect noted has been the production of stomatitis. The Medical Officer, Chuka, reports as follows:—

"The following stages of poisoning have been noted:—

(a) A blue line on the gums.
(b) Bleeding from the gums.
(c) Stomatitis.
(d) Severe pyorrhoea with or without (c).
(e) Intensive oedema of the lips, cheeks, eyelids, crown of head and occasionally of the neck.
(f) Tonic and clonic spasms of the limbs and unconsciousness with low muttering delirium.

The latter condition was seen in only one case, which incidentally recovered, but the other less severe phenomena were often observed especially when, trying the drug at the beginning of the year, doses of 5 grains were given as a routine measure to adults."

The intramuscular injection of sodium potassium bismuth tartrate is usually followed by a brawny painful, frequently very painful, induration but, as is evident from the figures, this has had no effect in deterring yaws patients from applying for treatment. Possibly even the production of pain and swelling is regarded as evidence of the potency of the medicine.

From the foregoing it is not surprising that a certain number of abscesses have supervened, but the number has been very small indeed; considering the conditions under which injections are given when travelling it is a matter for wonder rather that the incidence has not been greater.

An endeavour has been made to give each case at least two injections of bismuth as a routine, but the native usually cannot be persuaded that the healing of his external lesions does not necessarily indicate that he is cured. Attendances are rare after healing has taken place which, with primary and secondary manifestations, frequently occurs after one injection only. Many cases do receive two and even more injections, but the majority of these are in the tertiary stage.

The effect of treatment wth regard to the healing of the external lesions has been good, and though a certain proportion of cases undoubtedly relapse, yet it would appear that such is but small. There is little definite information to go on, but the general opinion is that relapses are few, compared to the numbers of cases treated. It is almost an impossible task to get natives to take the trouble to report themselves for observation after treatment, but at Chuka a certain number were seen and are tabulated below. All the cases had received two injections of sodium potassium bismuth tartrate from six to ten months previously, and all were in excellent health:—

Stage of Disease when admitted to Hospital.	Males: adult.	Males: children.	Females: adult.	Females: children.
Primary.	4	6	10	11
Primary and Secondary. ..	1	13	11	5
Secondary.	5	17	18	7
Tertiary.	6	4	30	3
Gangosa.	1	—	1	2
Total.	17	40	70	28

A large number of cases was especially selected at the time of treatment, for later observation, as being exceptionally well marked examples of the disease, but only 11 patients presented themselves when search was made for them from six to eight months later; all were free from any signs of active yaws.

Little information, as is evident from the foregoing, has been obtained with regard to the effect of the bismuth treatment on the Wassermann reaction. A certain number of cases have been tested, but the total has been too small and the results too confusing for any deduction to be made.

The lack of a test to differentiate between syphilis and yaws is still acutely felt. The reports as to the relative incidence of the two diseases does and must, in the absence of a distinguishing test, vary in the localities where both are found according to the personal views of different Medical Officers.

The results of the yaws campaign to date indicate that cases are more numerous than had previously been estimated but that there is reasonable prospect of stamping out the disease or, at any rate, of considerably reducing its incidence.

The totals of cases treated in the past five years are:—

1919	639
1920	657
1921	7,401
1922	24,233
1923	64,344

II.—SYPHILIS

The total number of cases treated in 1923 shows a large increase over that of 1922 which in itself was considerably larger than in preceding years.

The figures are:—

1923	6,532.
1922	2,896.
1921	1,914.
1920	1,614.

The much larger total is, at any rate, partly accounted for by the increased numbers of cases treated owing to increased travelling by Medical Officers through the Native Reserves, and partly by the increasing faith in injections.

Comparison of the figures of attendances at the hospitals themselves only shows an increase of 859, and this has occurred mainly at the hospitals in the larger townships. The matter is further confused by the difficulty, already alluded to, in diagnosis between yaws and syphilis. It is probable that syphilis is increasing, due in great measure probably to the large numbers who are employed on railway construction and other work; they become infected outside the Reserves and return to spread the disease.

The report from the Fort-Hall district is that "syphilis is extremely rare among the inhabitants of the Reserve. The few cases that have been seen were among boys who had been recently working on the plantations."

The Central Kavirondo report indicates that syphilis is on the increase, that it is being introduced by men returning from work, and that it is being spread by promiscuous intercourse between the unmarried members of the community.

The South and North Kavirondo reports also indicate that syphilis is on the increase.

At Mombasa the Senior Medical Officer in charge of the Native Hospital is not of opinion that the increased number of cases treated for syphilis indicates an increase in the amount of disease; he considers that such is merely the result of increased confidence in European methods of treatment.

The line of treatment adopted for syphilis during the year has been by the intramuscular injection of the bismutho-tartrate of sodium and potassium. Novarsenobillon has been used only for cases presenting special features. The reports as to the results of the use of the bismuth salt in cases of syphilis indicate that such is satisfactory as regards clearing up external lesions, though, as with yaws, it has not been possible to follow the cases up and obtain information with regard to the Wassermann reaction.

III.—LEPROSY.

A large increase in the number of cases which have applied for treatment is recorded for 1923. There is no reason however to consider that there has been an increase in the incidence of the disease; the correct explanation is that a more accurate knowledge is being obtained as to the conditions which exist in the Reserves. The increased confidence in Government Medical Officers and the closer contact with the natives which exists, is gradually bringing about a correct picture of the presence and incidence not only of leprosy but of other diseases. Just as the successful treatment of yaws patients by novarsenobillon led to a much larger general attendance, so the more widely extended treatment by bismuth has produced a further increase in the total number of native patients.

Leprosy and yaws are, to the uneducated native, somewhat similar diseases, and it is a common experience for lepers to arrive at a hospital requesting the treatment which they have seen to be so successful with their friends.

The following table shows the number of lepers reported during the last seven years ; for comparison the number of yaw cases treated is shown in a parallel column :—

Year.	Number of Lepers Reported.	Number of Yaws Patients Treated.
1917	25	334
1918	19	325
1919	18	639
1920	25	657
1921	42	7,401
1922	81	24,223
1923	236	64,344

The bulk of the increase in leper patients occurred at Chuka, Kisii and Kakamega.

At Chuka and Kisii accommodation has been provided for lepers, and this and the systematic treatment adopted at these and other stations has been followed, as was only to be expected, by an increase of patients. At Kakamega the Leper Camp, which formerly existed only for those lepers coming from the immediate neighbourhood, has now been extended to accommodate lepers from the whole of the North Kavirondo district, and active measures have been taken both by administrative officials and native chiefs to induce patients to come for treatment. Consequently the number of patients under treatment has risen during the year from 17 to 77, and Kakamega now has the biggest leper settlement in the Colony.

At Chuka the line of treatment adopted and the results attained, as extracted from he report of the Medical Officer, are as follows :—

Treatment of Lepers.—

The following drugs are used for the routine treatment of Lepers at Chuka:—

(1) Sodium Hydnocarpate (gr. 1 in 2 ccs) intravenously.

(2) Sodium Morrhuate (2 ccs of a 3% solution) intramuscularly.

(3) Sodium Hydnocarpate "A" (2 grain tablets) by mouth.

	Day of Treatment.	*Drug.*	*Dose.*
	1st	No. 1	gr. 1
	2nd	No. 2	2 ccs.
	3rd	No. 3	2 tablets.
1st week	4th	No. 3	2 tablets.
	5th	No. 2	2 ccs.
	6th		
	7th	No. 1	gr. 1
2nd week	8th to 14th	(same as in 1st week).	
	15th	No. 1	gr. 2
	16th	No. 3	3 tablets.
	17th.	No. 2	2 ccs.
3rd week	18th	No. 3	3 tablets.
	19th.	No. 2	2 ccs.
	20th		
	21st	No. 1	gr. 2
4th week	22nd to 28th	(same as 3rd week).	
5th week	29th to 35th	(same as 3rd week) but 4 ccs. of sodium morrhuate.	
6th week		(same as 1st week).	
7th week		(same as 2nd week).	

The foregoing is not rigidly adhered to in view of the varying susceptibility of different individuals to the drugs used. Temporary giddiness is rarely complained of after injection with sodium hydnocarpate. No cases have had diarrhoea or dysentery-like motions during treatment. A marked febrile reaction is taken as an indication to defer treatment until the temperature becomes normal, whereupon a smaller dose than that which caused the reaction is given.

Treatment is temporarily withheld when disturbance of digestion arises. Severe itching occurs occasionally during the course of treatment. This also is met by withholding treatment in any form until all irritation ceases. The local reaction with intramuscular injections has been very slight in all cases.

FEBRILE REACTIONS DURING TREATMENT.

No.	No. of days under Observation.	No. of days with temperature below.				Total days with Pyrexia.
		Normal	99	100	101	
3094	29	10	8	11	-	19
3227	14	-	9	5	-	14
3081	30	15	6	8	1	15
3185	27	-	13	14	-	27
3255	3	2	-	1	-	1
3078	28	8	14	6	-	20
3163	28	7	10	10	1	21
3118	21	7	4	8	2	14
3124	25	10	10	5	-	15
3065	25	5	10	9	1	20
3082	25	7	14	4	-	18

The foregoing cases are taken at random from the temperature charts of lepers, and they show the frequency of pyrexia during the course of injections, and the rarity of a temperature of 101 of over. Treatment was not suspended with reactions of 100 or under. A rise of temperature of over 101 was treated as a sign for the inhibition of all drugs until the temperature was again normal.

Patients suffering from leprosy will, as a rule, remain about a month in hospital, so it is impossible to judge the effects of treatment with any degree of accuracy, but there is no doubt that lepers are benefited by even one month's treatment, as is evinced both by the signs of improvement in the nodules and macules, and subjectively by the statements of the lepers themselves.

The fact that so many lepers came for treatment this year is of itself an indication that they regard treatment as being beneficial.

The Senior Medical Officer, Fort-Hall, records his disappointment in the results of treatment by intravenous injections of chaulmoogra oil.

At Kakamega good results have been obtained by the combination of ethyl esters of chaulmoogra oil with intravenous injections of the oil according to Harper's method.

At Kisii intramuscular injections of Moogrol 1 cc or 2 cc weekly with chaulmoogra oil mx internally is the method of treatment adopted. The report indicates that improvement follows.

In no case has a cure by any method been reported. The difficulty mentioned in last year's Report, viz. that patients cannot be persuaded to stay sufficiently long for a proper course of treatment, still persists.

The two leper settlements at Lamu and Malindi are still in existence, and at the close of the year 8 and 48 inmates respectively were accommodated therein. Renewed search has been made for Government land near Mombasa suitable for a leper settlement but with no result; such land as is available is waterless or unsuitable for cultivation. It is evident that money will require to be provided for the purchase of land suitable for a leper settlement near enough to Mombasa to allow of frequent visits by the extra Medical Officer who, when staff is available, it is intended shall be stationed there for the purpose of coping in the Reserves with the yaws and other diseases which urgently require attention. If money is forthcoming and is sufficient not only to buy the land but to erect suitable dwellings, it is proposed that the present unsatisfactory leper settlements at Lamu and Malindi be closed and their inhabitants transferred to the new location, where they will be better looked after and receive better medical attention than is now possible. A measure of segregation of lepers exists among the Coast peoples, by whom the disease is regarded with loathing, and a properly-equipped and efficient leper settlement would probably result in a large number of patients receiving the attention and treatment they now lack.

IV.—TUBERCULOSIS.

The number of cases reported as treated at hospitals and dispensaries during the year, viz 298, with 67 deaths, is approximately the same as the numbers reported for each of the last two years, which were 310, with 70 deaths, in 1922, and 280 cases, with 68 deaths, in 1921. That there is a slight decrease in the number reported for 1923 cannot be taken as an indication that the disease is any less prevalent. The number of deaths reported as due to tuberculosis in Mombasa township alone was 85 and this was the most common cause of death during the year. While certainly more prevalent in the larger towns than in other parts, yet there is reason to think that tuberculosis is common even in the Native Reserves, most of the cases escaping notification.

Moreover it is probable that many deaths otherwise described are due to tuberculosis. The pulmonary form appears often to run a most acute course in native patients, and in such cases the illness and death is very liable to be ascribed to pneumonia. It is surprising how often, when a post-mortem examination is made, that acute tuberculosis is discovered which had not been suspected during life.

With further opportunity for more thorough clinical and bacteriological examination of native patients it is to be feared that the disease will be found to be frequent and widespread. There is evidence to show that some native patients offer a certain degree of resistance, but in the majority of cases pulmonary tuberculosis in the native appears to be very rapidly fatal.

Cases of surgical tuberculosis are by no means uncommon.

Housing conditions, both in and out of the Reserves, would appear to favour the spread of tuberculosis. Without an amelioration in the general conditions of life it is to be feared that tuberculosis will before long become a very serious problem among the native inhabitants.

V.-PLAGUE.

I.—INCIDENCE OF THE DISEASE.

NYANZA PROVINCE.

South Kavirondo District.—A number of small outbreaks occurred during the year, and though the disease at no time assumed epidemic proportions, it would appear that the total number of cases was probably somewhat greater than in 1922. The ordinary measures of rat-destruction, evacuation and inoculation were carried out in places where the disease occurred. No general rat-destruction campaign on a large scale has yet been possible in this district.

Central Kavirondo District.—A serious outbreak occurred in Central Kavirondo and lasted from May till August.

A limited outbreak had previously occurred in the Kadimu Location in January, which was confined to that location, and though nineteen bomas were affected only about fifty deaths were reported. At the end of May reports of plague were received almost simultaneously from many locations and, with the exception of the Nyangori, Kano and Nyakatch Locations, the epidemic spread throughout the district. This outbreak lasted until the end of August, when it gradually subsided. It is impossible to estimate the number of deaths with accuracy, but many more occurred than in 1922.

North Kavirondo District.—In this district also the incidence was greater than in 1922. Cases occurred chiefly in June, July, August and December. The incidence from June to August was greatest in the locations bordering on Central Kavirondo.

The numbers of cases estimated to have occurred during each of the previous four years in this district are as follows:—

1920	.. .. ..	between 1,500 and 2,000 cases.
1921	.. .. ..	about 1,028 cases.
1922	.. .. ..	about 61 cases.
1923	.. .. ..	about 411 cases.

Kisumu District.—No cases occurred.

Kisumu Township.—No cases occurred.

UKAMBA PROVINCE.

Nairobi.—During 1922, no case of plague occurred within the Municipal Area, in spite of the fact that throughout the year such had occurred from time to time in some of the surrounding districts. In 1923, though plague continued present in surrounding districts, it was not till the 28th of September that any cases occurred in Nairobi. The first cases detected were two which presented themselves at the Native Hospital, while at the same

time the body of a native dead of plague was discovered in the town. All three cases were traced to a hut in the native village of Pangani, which lies just within the Municipal boundary. The hut was a wattle-and-daub structure with a tin roof, but though numerous possible rat holes were seen and dug out, no rats were found either alive or dead, and no evidence with regard to antecedent rat mortality could be obtained from the neighbours.

The village contains 339 huts and probably about 1,600 inhabitants. The area was systematically trapped, and poison baits were set over the period 28th September to 23rd October, as follows:—

Poison baits (barium carbonate) set	12,899.
Poison baits removed after 24 hours	9,874.
Poison baits presumably consumed	3,025.
Number of Rats found dead, presumably poisoned ..	40.
Number of Trap settings (break-back)	4,365.
Number of rats caught in traps	210.

All rats caught or found dead were examined microscopically, but none was found to be infected.

Two further cases occurred in this village on the 5th October and one on the 17th.

On the 29th October a case occurred in an African living in a room in the Railway labour lines. These lines were old and of unsatisfactory construction, and on digging up the floor, which was by no means rat-proof, large numbers of dead rats were found. It is of interest to note that it was not till this date, i.e. a month after the first human case had occurred in the town, that any evidence of rodent mortality was forthcoming.

Arrangements were at once made for the evacuation of the Railway lines, and within a few days the whole of the inhabitants, some 3,000 in number, were removed and housed in some large workshops which were fortunately available. The floors of the old lines were then dug up, and the remains of several hundreds of dead rats were found. Only six live rats were obtained.

In all, fourteen cases occurred among the 3,000 Africans who had been living in these lines, and when the conditions which prevailed are taken into consideration there can be but little doubt that the prompt manner in which the Railway Authorities effected the evacuation was responsible for a considerable saving of life.

During November and December cases continued to occur but were confined to the native and commercial areas of the town; in the better class residential areas no cases occurred.

All through the outbreak an intensive rat campaign was carried on, over 4,000 traps being set daily and barium carbonate baits laid in large numbers where such could be done without danger. At the close of the year, nevertheless, cases were still occurring. It would appear therefore that, under the conditions which prevail in Nairobi, trapping and poisoning, while they may prevent an epidemic from assuming serious proportions, are not, even when carried out on a fairly large scale, efficient in bringing it to an end within a short period, and that till the general sanitary conditions of the town have considerably improved Nairobi will remain liable to outbreaks of plague which, if not severe in character, are likely to be long drawn out. That considerable improvement is taking place in these conditions now, and particularly with respect to African housing, is a matter for satisfaction.

The total number of cases up to the end of the year was 93. Of these cases 11, 10 males and 1 female, occurred among Asiatics and 82, 73 males and 9 females, among Africans.

Of the 93 cases reported 53 were only diagnosed after death. The remaining 40 were admitted for treatment to the Infectious Diseases Hospital, and of these 15 recovered. With the exception of three or four cases which showed lung symptoms, the type was bubonic.

KIKUYU PROVINCE.

Kyambu District.—As in 1922, cases occurred in a sporadic fashion from time to time throughout the year. The total number would appear, as usual, to have been inconsiderable. The presence of the infection in the Kyambu district is nevertheless of considerable importance in that the district marches with the boundaries of the Municipality of Nairobi and renders that town liable to outbreaks of the disease.

Fort-Hall District.—The incidence of the disease in this district was much greater than in 1922, and in the opinion of the Senior Medical Officer there has also been a considerable extension of the area of infection. The following is extracted from the Senior Medical Officer's Report for the year:—

> "Plague has occurred in epidemic form during the year. The first case was reported in May at Muchuri's Location through which the main Fort-Hall-Thika road passes. The neighbouring locations soon became infected and the disease appeared on the left bank of the Maragua River. By August it had reached Fort-Hall Township. In nearly every location, with the exception of the higher ones and those near the Nyeri Reserve boundary, cases have been reported.

Occasional cases of human plague have been reported for years past in the southern locations near the main road, but, as far as I have been able to ascertain, no cases have occurred on the left bank of the Maragua until this year. The rains have been exceptionally good and the crops correspondingly profuse and hence more trading has been done.

At the present time cases are occurring in the Ndia Sub-District of the Nyeri Reserve in the neighbourhood of Kajio.

Apart from vaccination little can be done to prevent the spread of the disease in the Native Reserves. Several rat campaigns have been started, but the native has shown no enthusiasm in the matter except at Ndia, where, thanks to the keenness of the Assistant District Commissioner in charge, 44,000 rats have been killed.

Living in unhygienic surroundings as the native does, with the ground round his village littered with garbage and filth of every description, it is surprising that more cases have not occurred.

Over 17,000 inoculations have been performed. Several cases have occurred among those recently inoculated. This, however, is no reflection on the efficacy of the vaccine, as one does not know how many more cases would have died if inoculation had not been carried out on a large scale. When inoculation was started the natives showed great desire to be inoculated. When a few cases occurred among the inoculated their ardour was rather damped. Latterly the pendulum has swung the other way again, and their keenness has returned. It would appear, therefore, that they have decided that the vaccine does confer partial immunity."

NAIVASHA PROVINCE.

Nakuru District.—In October 3 cases of plague occurred in natives at a camp on the Uasin Gishu Railway Construction about five miles from Nakuru Township and about two miles from a farm on which there had been a small outbreak of bubonic plague in September, 1922.

The natives affected had been working in the camp ration stores, and when these stores were turned out a number of dead rats were found. The origin of this outbreak is obscure. It is to be noted that this is the third year in succession in which a small outbreak has occurred in the Nakuru District.

SEYIDIE PROVINCE.

Mombasa †.—After the epidemic of plague which lasted throughout 1920, and ended in January 1921, there followed a period of two and a half years in which no case of human plague occurred in Mombasa, and in which there was no evidence of the existence of plague among rodents.

The period of immunity from this disease terminated in August 1923, when rats were found to be dying from plague in the Kilindini Wharf area. There followed a fairly general rodent infection throughout the Island, and a small epidemic of human plague involving twenty-two cases.

By the end of October, the epizootic and epidemic appeared to have come to an end, and from that time until the end of the year, no further evidence of rodent infection was obtained, and no more cases of human plague had occurred.

(In the interval between the close of the year and the writing of this report—

January 1924—one sporadic case of human plague has been discovered.)

The Epizootic.—Rats were first found dying of plague on August 9th, in and about the import and export sheds at Kilindini Harbour Wharves. The infected focus was immediately traced to the "New Export Shed", a corrugated iron building without any pretensions whatsoever to rat proofing, which was almost completely filled with cotton seed, maize, cotton and sisal.

The floors of the building consisted of beaten coral; they were in a broken condition, and riddled with rat runs, and it was from these runs that rats were observed to issue forth sick and dying from plague.

Some inch or two of spilled maize and cotton seed added unlimited food supply to the rodent population, which already enjoyed the best of housing. Conditions for rat harbourage and breeding were ideal. A considerable number of dead rats were found in this shed, some infected and some too decomposed for examination.

Efforts were made to prevent migration of infected rats from this area, but without avail.

† *An account extracted from the Annual Report of the M.O.H., Mombasa.*

On 23rd August, rats at Mbaraki sheds were found infected; and in the course of another 7 to 10 days infected rats were obtained at Messrs. Pauling's Labour Camp, Magadi Soda Co.'s premises, Sheriffbhai Street, Makupa, Tanaland Catholic Mission Shamba, and Piggot Market. That is to say the infection was fairly generalised throughout the Island.

By the 18th of September infection among rodents appeared to have died out in the Kilindini Port areas, and infected rats from the town were not found after the middle of October (16th).

In all forty-six rats caught or found dead showed B. pestis on examination. In addition a large number were by reason of decomposition impossible of examination. Further there is overwhelming evidence to the effect that dead rats, many of which were probably plague infected, were deliberately destroyed or hidden by the inhabitants of the town, whose mentality is such that they prefer to conceal evidence of plague in rats and run the risk of contracting the disease themselves, rather than submit to the inconvenience of anti-plague measures.

It is, therefore, quite impossible to obtain any true index of the extent of rodent plague during the period under review.

The Epidemic.—The first human case occurred on August 16th, a week after the rodent infection was discovered. This case occurred in a rat boy on the Health Office staff, who had been engaged in anti-plague measures in the Kilindini sheds.

Thereafter, cases occurred at intervals until October 17th : Six in the latter half of August, 13 in September, and 3 in the first half of October.

In two thirds of the cases it was possible to trace with a considerable degree of probability the source from which infection was obtained.

The cases occurred in all parts of the Island.

Of the total 22 cases, two were Arabs, two Indians and the remainder Africans. In ten cases the sufferers were by reason of their employment specially liable to contract infection.

In type, 18 were bubonic, two septicaemic and two pneumonic. Sixteen of the twenty-two cases were fatal, five of which were not discovered until after death.

Anti-plague measures. Rat destruction, inoculation, etc.—As previously stated it was discovered at the outset of the epizootic that the main source of supply of infected rats was the "New Export Shed" in the Kilindini Harbour area. Anti-plague measures were directed to this place with a view to eradicating infection. At the time this shed was completely filled with merchandise and it was impossible to deal with it in a radical manner at once.

Several days were occupied in emptying the shed ; all goods were examined for rat harbourage, and any sack or other article which suggested any possibility of having been rat broached was dealt with by sulphur fumigation. When the shed was finally cleared, the floors were soaked with izal and paraffin and afterwards swept up and the sweepings burnt.

The floor was then dug up and all rat burrows dealt with. The floor was afterwards relaid with coral and rammed hard. Around the edges of the floor close to the wooden sills, where the majority of rat burrows existed, tar was liberally applied. A considerable number of dead rats and rats nests were discovered during the operations. This shed gave no further trouble.

At the same time some hundreds of wire rat traps were set daily in all the import and export sheds and a steadily increasing number of barium carbonate poison baits ($BaCO_3$ gr. 3—maize flour gr. 12, dry weights) were scattered in the sheds, along the coral sea wall and throughout the area.

In order to assist in the trapping and poisoning the Railway Authorities endeavoured to maintain the floors of the sheds, etc., as far as possible free from spilled maize and cotton seed.

Even so the amount of available food for rats in the area remained so great, and access thereto on the part of rats so easy, that trapping met with but little success.

Efforts to derat by rat-hunting sheds stacked full of various types of bags and bales, were abandoned as being impossible and useless.

While anti-rat work was in progress in the Kilindini area an attempt was made to prevent as far as possible migration of rodents by intensive trapping and poisoning in the surrounding districts. Rat hunts were organised in the Railway area and labour camps surrounding the port area. Very little co-operation was obtained in these places and results were disappointing.

The spread of infection to other areas made it impossible to concentrate any longer on Kilindini Harbour area, and a general intensive rat campaign was instituted throughout the town. Two European Sanitary Overseers were placed in charge of this work. A large consignment of break-back traps was obtained and these were substituted for the wire cage traps which had met with such little success.

Two thousand traps were set daily in various districts, special attention being given to known rodent plague infected areas. Between five and six thousand poison baits were set daily in Port areas at Mbaraki, Kilindini and Mombasa, and godowns and similar premises in the town. The setting of poison in houses was considered too dangerous and was not attempted.

The number of rats destroyed during the period August 9th to October 31st when the campaign was at its height was 6,791.

In view of the time and money expended, and the traps set, this result cannot be said to be encouraging.

It appears a matter of considerable difficulty to catch large numbers of rats for any length of time in this town. In addition it must be recorded that so far from receiving the co-operation of the inhabitants these rat destruction measures met with the greatest opposition from the majority of Native and Indian house holders.

It is difficult to arrive at the real reason for this attitude. As little inconvenience as possible was caused to persons in whose houses cases of plague had occurred, and in the event of infected rats being found in an area the only inconvenience caused to residents was that for some days afterwards rat traps were set in their premises. No deroofing, beating of roofs or digging up of floors, etc., was attempted as a routine measure.

On the occurrence of a case of plague in a house, the patient if alive, was removed to hospital, the contacts were inoculated and the house disinfected and deratted as far as possible. No quarantining of contacts nor shutting up of houses, measures which had given rise to the greatest irritation during the last epidemic, was attempted.

Inoculation with anti-plague vaccine was offered to the inhabitants at large. From August until the close of the year 8,705 persons availed themselves of these facilities.

Precautions taken to prevent migration of infected rodent from shore to ships in harbour are stated in the Section dealing with Port Sanitation.

Conclusion.—This out-break was too small and extended over too short a period of time to furnish much information as to the epidemiology and general characteristics of the disease as met with on the coast of this Colony. Such information, as was obtained, was largely of a negative character.

The source of the out-break is undetermined. That it was imported from overseas is unlikely seeing that such infection would probably have been introduced from Bombay, in which case the epizootic might have been expected to show itself first in Mombasa, to which place the majority of cargo from Bombay is lightered direct.

That plague is always endemic among rodents in Mombasa is possible. Against this are the facts that during 1921 and 1922 a certain number of rats were examined daily for evidence of B. pestis infection without such being discovered, and, secondly if Mombasa were constantly an endemic centre of rodent plague it is to be expected that epizootics would from time to time occur in neighbouring districts on the mainland. There is no evidence that this has ever occurred.

There remains the possibility of the infection having been introduced from up-country, where plague had been prevalent for some time prior to the out-break in Mombasa. If ths be the case, what is the mechanism of introduction?

All grain arriving at Mombasa from Kisumu and surrounding districts is fumigated before despatch from Kisumu. It should, therefore, be rat free. Was the source of infection at Mombasa, a plague infected rat which had escaped destruction, or is it possible that grain or the bags containing it can retain infection by fleas or other means and infect rats which obtain access to it at its destination?

It appears, that in the present state of our knowledge of the epidemiology of the disease, no definite statement can be made as to the relative possibility of the two mechanisms.

The out-break of plague in Mombasa suggests that the relation between a mortality from plague among rats and resulting human cases is not as close as is sometimes assumed. At least three of the cases of human plague occurred in individuals living in areas in which at no time was there any evidence of rat plague, who were not as far as is known by reason of their employment brought into contact with rat infection. In this connection the infection at the Tanaland Catholic Mission "shamba" is interesting. This shamba comprises a collection of some 30 mud huts. It is isolated from any other huts by a distance of several hundred yards.

In all, five cases occurred in this collection of houses. The first case occurred on 26th August in House No. 3091. The house and area were dealt with in the usual way, but no rats were caught or found until August 30, 31 and September 1st, on each of which

days infected rats were found there. On August 31st, a second case occurred in the same house as the first case. On September 3rd, a third case occurred in House No. 3083 some 200 yards from the previous house. A thorough rat hunt throughout the shamba yielded no rats although each house in turn was completely turned out and examined.

On September 10th a fourth case occurred in a boy who had slept the night of September 2nd, in House 3094, some little distance from the first house infected, and on September 11th, the fifth and last case was discovered in House 3085 close to the house in which the third case had occurred, that is to say on the farther side of the shamba from the house in which the first case occurred. Another rat hunt showed the houses and shamba to be rat free.

Thus, infected rats were obtained on August 30th, 31st and September 1st. On September 3rd and thereafter the shamba was found rat free and two cases occurred one on September 10th, and the other on September 11th, the maximum incubation period of seven days dating back to September 3rd and 4th respectively, when the shamba and houses were free of infected rats.

This evidence suggests that the infected flea is considerably more virile and tenacious than is sometimes supposed.

With regard to prophylactic inoculation, four cases occurred in which death resulted in spite of inoculation at least 10 days previously. At that time the vaccine was prepared from Bombay strains. It was afterwards possible to procure a culture from a Mombasa case. This was used for the preparation of vaccine thereafter.

It has not been possible to arrive at any conclusion as regards its protective power here owing to the termination of the epidemic.

As mentioned above, in type the disease was predominantly bubonic.

Of the twenty-two cases, sixteen were definitely bubonic. Two cases showed no buboes and no pneumonia lesions but spleen smears demonstrated presence of B. pestis in large numbers.

The remaining two cases have been shown as pneumonic in type for the reason that both were suffering from pulmonary lesions, were coughing up bloody sputum containing swarms of B. pestis, and this did not conform to the septicaemic picture.

2.—NOTE ON RODENTS.

In the fortnightly Health Report for the second half of August the Medical Officer, North Kavirondo, makes the following note:—

> "It may be mentioned that the northern limit of the distribution of Rattus rattus kijabius (the black rat), as demarcated in 1921 by the late Mr. W. N. van Someren, has now undergone extension. In Wamia no other variety than Rattus rattus is now being caught in the houses. In the Malakisi area of N. Kitosh Rattus rattus began to appear seven months ago and was first seen in Kimilili area three months ago." (Vide the Annual Medical Report for 1921).

In his fortnightly Report for the first half of November the same Medical Officer notes with regard to the neighbouring district of Nandi, in which plague has not yet been recorded:—

> "A small investigation was made into the distribution of rats in the Nandi Reserve and the following information was elicited:—
>
> (1) The black rat first appeared in the Aldai Locations (S.W. of the district) two or three years ago.
> (2) In the southern and central portions of the Reserve, including Kapsabet itself, it is now the only variety seen in the houses.
> (3) It has not yet spread to the Kapiet (N.) or Ol-Lessos (E.) areas."

For the Fort-Hall district no detailed observations with regard to the distribution of small mammals are yet available.

Through the courtesy of the Secretary for Health, Pretoria, the Department was provided with a map of South Africa from which it appeared that the areas in which plague occurs are coincident with the areas in which Gerbilles occur. It is of interest to note that in Kenya the distribution would appear to be the reverse, plague, so far as we know, occurring only in those areas where, generally speaking, the conditions of soil and climate are unsuitable for Gerbilles, and that, with one exception, the areas from which Gerbilles have been recorded are free from plague.

The Medical Officer, Mombasa, notes that of 14,536 rats trapped in that town during the year 9,466 were Rattus rattus kijabius and 5,070 Rattus norvegicus, and that the majority of the latter are obtained from the wharves and godowns near the port areas of Kilindini and Mombasa, while in the remainder of the town and island the rat caught is almost always Rattus rattus kijabius. A few specimens of Rattus rattus frugivorus were also seen.

3.—FLEAS.

Numerous collections were made in various parts of the country during the year. As these collections have not yet in all cases been worked out, the records are being held over for publication at a later date.

4.—ANTI-PLAGUE MEASURES.

(a) METHODS ADOPTED IN TOWNSHIPS.

Kisumu.—The methods adopted were in nowise different from those used in previous years. 7,911 rats were destroyed as against 7,652 in the previous year.

Nairobi.—Further progress was made with the removal of grass-roofed mud huts from the township area, and it is pleasing to record that the Municipal Council has decided to forbid the erection of any further mud-and-wattle structures within the area under its control. A large scheme for the housing of the native population in buildings of a permanent and rat-proof character is at present receiving consideration. Routine trapping and poisoning were continued throughout the year, but less reliance was placed on poisoning, while resort was had to trapping on a much larger scale than had formerly been tried. An innovation of importance was the replacement of the old type of wire cage traps by traps of the "break-back" variety. The latter in our experience are very much more efficient and, on account of their small cost, very much larger numbers can be used. The old cage trap, partly on account of its bulk, costs about Shgs. 10/- landed in Nairobi, while the small "break-back" trap works out at not more than 6d. each. Recourse has therefore again been had to trapping, and during the recent outbreaks in Nairobi and Mombasa it was possible to carry out this procedure on a large scale and in an intensive manner. The method adopted was to set about three or four thousand traps nightly in a comparatively circumscribed area for three or four nights in succession. Afterwards neighbouring areas were dealt with, and in ten days or a fortnight the original locality was again trapped and so on.

In using "break-back" traps it has been found that much better results are obtained by setting about four traps in each room of a house (i.e., say about 20 traps in a house of two rooms with a kitchen, yard and store) for a few nights than by setting a few traps in each house over a longer period. As a rule also it serves little purpose to continue trapping with many traps over a longer period than about three days, but if after an interval of say ten days or a fortnight the house is again trapped a few more rats may be caught.

The rat-destruction returns for Nairobi for the past two years were as follows:—

1922.	1923.
12,745	*12,458

*Trapping chiefly carried out during last three months of the year.

The rats caught were determined as follows:—

Rattus rattus kijabius	8,707
„ „ frugivorus.	560
Arvicanthus	466
Lemniscomys	82
Mole rat.	2
Unknown.	2,641
Total	12,458

In addition 70,642 barium carbonate baits were laid during the year, and 584 dead rats were recovered. Of these rats, only three were found to be infected with plague on microscopical examination, and it is therefore presumed that the remainder died of poisoning.

Mombasa.—The total numbers of rats of each species caught during the year are as follows:—

	Male.	Female.	Total.
Rattus rattus kijabius.	3,010	6,456	9,466
Rattus norvegicus.	1,509	3,561	5,070
	4,519	10,017	14,536

An account of the methods of rat-destruction adopted is given in the account of the outbreak which occurred in the town.

(b) METHODS ADOPTED IN NATIVE RESERVES.

(1) *Poisoning.*—Barium carbonate has been used from time to time as described in last year's Report. On account of shortage of staff no experiments have yet been carried out on a very large scale.

(2) *Measures carried out by the Native Populations.*—

RAT DESTRUCTION RETURN: CENTRAL KAVIRONDO DISTRICT, 1923.

Location.	Chief.	Huts.	January.		February.		March.		April.		May.		June.		July.		August & September.		October.		November.		December.	
			Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.
Alego.	Ngonga.	14,777	11,710	0.79	14,960	1.01	—	—	10,575	0.71	23,430	1.58	—	—	5,630	0.38	9,020	0.61	7,810	0.52	17,189	1.16	21,070	1.42
Asembo.	Odindo.	5,405	3,720	0.68	6,210	1.15	6,736	1.24	—	—	—	—	—	—	4,710	0.87	5,530	1.02	3,248	0.59	—	—	10,140	1.87
North Gem.	Ogada.	9,077	—	—	12,450	1.37	6,364	0.70	8,350	0.91	7,419	0.81	2,260	0.24	8,861	0.97	4,500	0.49	4,020	0.44	10,610	1.16	—	—
South Gem.	Ndeda.	6,380	5,220	0.82	8,460	1.33	—	—	13,560	2.12	6,500	1.01	—	—	6,780	1.06	5,000	0.78	2,360	0.36	1,160	0.18	11,030	1.72
Kadimu.	Okello.	2,224	1,317	0.59	—	—	6,310	2.83	1,760	0.83	2,840	1.27	—	—	2,460	1.10	2,100	0.94	—	—	—	—	—	—
Kajilu.	Awuor.	2,055	—	—	—	—	—	—	—	—	540	0.26	—	—	—	—	480	0.23	—	—	1,300	0.63	—	—
Kano.	Aminno.	15,484	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,510	0.09	—	—	1,355	0.08	—	—
Kisumu.	Johanna.	5,800	5,990	1.3	5,910	1.02	—	—	8,260	1.42	4,510	0.77	—	—	6,652	1.14	4,780	0.82	—	—	7,510	1.29	—	—
Nyakatch.	Kere.	7,647	—	—	1,830	0.24	2,200	0.28	2,090	0.27	460	0.06	400	0.05	437	0.05	290	0.03	2,944	0.38	—	—	3,840	0.50
Nyangori.	Sonono.	1,927	—	—	—	—	—	—	2,270	1.17	—	—	—	—	—	—	—	—	1,360	0.70	670	0.34	—	—
Sagam.	Orao.	1,840	2,210	1.21	1,460	0.80	1,250	0.67	1,430	0.77	3,673	1.99	1,076	0.52	—	—	1,800	0.96	2,900	1.57	1,990	1.08	—	—
Sakwa.	Ohulo.	4,724	1,330	0.29	4,920	1.04	—	—	—	—	—	—	—	—	1,090	0.23	4,310	0.91	—	—	—	—	3,110	0.65
Samia.	Kadimu.	10,630	5,630	0.53	19,340	1.82	3,050	0.28	13,280	1.24	—	—	8,440	0.79	13,030	1.22	30,530	2.87	10,530	0.99	31,270	2.95	17,000	1.59
Seme.	Nyawara.	10,145	3,300	0.32	—	—	4,500	0.44	—	—	—	—	—	—	—	—	3,080	0.30	2,766	0.27	4,650	0.45	—	—
N. Ngenya.	Mganda.	8,311	7,270	0.87	10,520	1.26	9,520	1.14	6,930	0.83	20,800	2.50	17,260	2.07	5,070	0.61	10,330	1.24	15,030	1.80	11,730	1.41	—	—
S. Ngenya.	Donji.	2,172	1,610	0.79	3,400	1.57	1,960	0.90	2,660	1.22	—	—	4,560	2.09	989	0.45	5,960	2.74	3,532	1.62	4,109	1.89	—	—
Nyoma.	Nathan.	4,288	—	—	6,530	1.50	—	—	2,368	0.57	2,160	0.50	—	—	3,750	0.87	2,090	0.46	6,250	1.45	—	—	1,590	0.37
Total.		112,886	49,307	—	95,990	—	41,890	—	73,533	—	72,332	—	33,996	—	59,459	—	101,310	—	62,780	—	93,543	—	67,780	—

GRAND TOTAL. 751,920.

RAT DESTRUCTION RETURN:—NORTH KAVIRONDO AND NANDI RESERVES, 1923.

Location.	Chief.	Huts.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
			Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.	Number of Rats.	Number per hut.
Wanga.	Mumia.	7,399	7,566	1.02	1,100	0.1	6,219	0.83	4,075	0.55	10,293	1.4	10,020	1.35	4,960	0.67	—	—	3,903	0.53	14,865	2.0	—	—	5,000	0.67
Marama.	Mulama.	8,579	8,769	1.02	5,395	0.7	1,400	0.16	2,628	0.3	20,964	2.5	21,823	2.55	7,101	0.82	6,581	0.76	12,758	1.49	12,550	1.5	9,452	1.1	8,660	1.009
E. Kakamega.	Oscore.	2,745	7,078	2.57	1,807	0.7	3,235	1.17	3,521	1.2	4,264	1.6	3,556	1.29	3,099	1.12	2,330	0.84	3,480	1.27	7,800	2.9	3,800	1.38	2,900	1.06
Watsetso.	Wanshani.	1,635	4,700	2.87	—	—	—	—	7,169	4.38	817	0.5	790	0.45	300	0.18	—	—	3,227	1.97	13,601	8.3	1,379	0.8	1,366	0.8
W. Kakamega.	Muliino.	5,235	17,348	3.31	10,501	2.0	1,304	0.24	15,451	2.95	16,019	3.1	7,981	1.52	3,285	0.62	4,538	0.86	6,683	1.28	—	—	5,500	1.05	5,800	1.1
Muktsh.	Ropando.	1,456	860	0.58	—	—	—	—	8,718	5.98	1,140	0.8	1,100	0.75	1,062	0.73	—	—	1,200	0.83	2,490	1.7	1,150	0.7	1,100	0.75
Kakalelwa.	N'dombi.	1,699	1,200	0.70	—	—	—	—	2,490	1.46	1,832	1.1	1,490	0.87	1,060	0.62	159	0.09	4,670	2.74	2,300	1.4	1,550	0.9	—	—
Kabarsa.	Mwanza.	2,438	4,150	1.70	5,476	2.3	3,385	1.38	5,140	2.1	1,820	0.8	2,390	0.98	1,286	0.52	—	—	5,133	2.10	—	—	2,800	1.1	—	—
N. Kitosh.	Muranga.	8,672	11,655	1.34	2,283	0.3	3,140	0.36	—	—	3,300	0.4	11,285	1.30	20,370	2.34	—	—	—	—	8,240	0.9	8,830	1.01	7,510	0.86
S. Kitosh.	Sudi.	6,550	24,117	3.68	7,965	1.2	2,128	0.32	11,031	1.68	10,749	1.6	27,984	4.12	1,880	0.28	5,639	0.86	15,757	2.40	21,691	3.3	28,250	4.3	16,350	2.49
Wanga.	Elikula.	5,700	9,280	1.62	—	—	—	—	5,334	0.93	16,605	2.8	12,457	2.19	12,682	2.22	—	—	7,420	1.30	18,807	3.2	—	—	5,971	1.04
Matuach.	Odaya.	4,699	3,940	0.83	—	—	—	—	5,955	1.26	3,970	0.8	—	—	11,670	2.48	1,900	0.42	3,730	0.80	6,480	1.4	7,066	1.5	7,520	1.59
Ohuyo.	Okwara.	4,873	11,100	2.27	—	—	140	0.02	1,893	0.38	22,815	4.7	18,734	3.87	7,676	1.57	8,000	1.64	7,870	1.62	14,396	2.9	1,900	0.39	3,108	0.63
Wabala.	Were.	2,721	—	—	3,300	1.2	1,170	0.42	—	—	3,012	1.1	3,014	1.10	175	0.06	1,456	0.53	1,763	0.65	2,380	0.9	—	—	1,700	0.62
Teiki.	Amani.	4,800	5,990	1.24	7,440	1.5	—	—	20,580	4.2	12,400	2.6	12,839	2.67	4,913	1.02	3,651	0.76	—	—	—	—	41,782	8.7	—	—
S. Maragoli.	M'mbi.	5,727	23,057	4.02	13,773	2.5	—	—	20,800	3.5	24,557	4.1	20,442	3.45	5,140	0.86	4,487	0.75	22,420	3.79	35,310	5.9	13,340	2.2	16,230	2.73
Kisa.	Kuta.	1,678	5,480	3.26	2,175	1.3	1,010	0.60	4,000	2.3	8,102	4.9	4,780	2.85	2,017	1.2	1,780	1.05	4,423	2.64	4,270	2.5	2,010	1.2	2,800	1.07
N. Maragoli.	Shivachi.	9,205	33,997	3.69	7,260	0.8	16,225	1.76	44,425	4.8	13,974	1.5	28,378	3.10	1,200	0.13	3,370	0.36	23,315	2.53	14,550	1.6	12,150	1.3	13,900	1.51
Bunyore.	Songoro.	9,359	28,293	3.02	11,200	1.2	8,400	0.89	35,437	3.7	27,881	2.9	36,736	3.92	45,387	4.87	2,553	0.27	43,234	4.72	34,400	3.8	24,000	2.5	20,000	2.13
Kakamega Township.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	115	—	72	—	86	—
Total.	—	95,170	208,580	—	79,875	—	47,756	—	198,619	—	204,724	—	225,019	—	135,463	—	46,534	—	171,006	—	213,845	—	165,031	—	120,011	—

Grand Total. 1,816,495.

Rat-destruction campaign in the Central and North Kavirondo Districts.

This campaign, of which very full accounts were given in the Annual Reports for the years 1921 and 1922, was continued during 1923. The campaign has not been maintained without some difficulty, however, and the results obtained were much less satisfactory than in previous years. The falling off was particularly marked in the Central Kavirondo district. As recounted above there was a very considerable outbreak of plague during the year in Central Kavirondo, and a smaller one in North Kavirondo. In both districts the incidence of the disease was greater than in 1922. That this greater incidence was due to the slackening of the campaign is possible, though such is not necessarily the case since the year was one in which the incidence of the disease was greater throughout the whole country than in 1922. That the incidence of the disease would have been greater in North and Central Kavirondo than it actually was, had there been no campaign, is also a possibility. A detailed analysis of the results of the campaign is being held over till the returns for 1924 may be available, when the results of the campaign over the longer period of four years—1921 to 1924—in relation to the incidence of the disease will be available.

The totals for the past three years are as follows:—

RATS DESTROYED.

	1921. Six months only.	1922. Twelve months.	1923. Twelve months.
Central Kavirondo.	983,387 ..	1,456,586 ..	751,920
North Kavirondo.	1,085,704 ..	2,118,616 ..	1,816,493

(c) INOCULATION WITH ANTI-PLAGUE VACCINE.

Towards the end of 1922, the manufacture of anti-plague vaccine was undertaken at the Bacteriological Laboratory in Nairobi, and during the year 1923 no other vaccine was used. Altogether 122,460 persons have been inoculated during the year and no untoward results have been experienced. No useful figures are yet available with regard to the degree of immunity which may be conferred, but there is no reason to suppose that the Nairobi vaccine is less efficacious than that previously obtained from Bombay.

Owing to the elimination of the foreign proteins during the process of manufacture, the reaction after a dose of the Nairobi vaccine is much less marked than that resulting from the use of Haffkines prophylactic.

The cost of the production of plague vaccine at Nairobi is very considerably less than the cost of procuring the Haffkines prophylactic from Bombay.

Note with regard to the incidence and spread of Plague in Kenya, the economic importance of the disease, the measures hitherto adopted for its prevention and the necessity for Research.

For many years now plague has never been absent from the territory comprised by the Colony and Protectorate of Kenya, and whatever may formerly have been the case the incidence in recent years has been considerable and the loss of life by no means negligible.

Between the years 1913 and 1921 a very considerable extension of the area of endemicity occurred towards the north in the Nyanza Province. During the year 1923 an extension of the area of endemicity would appear to have occurred to the north and west in the Kikuyu Province in the Highlands. In the case of the Nyanza area extension would appear to have resulted from, or followed on, a spread of the black rat, Rattus rattus kijabius. Both the Kikuyu and the Nyanza Provinces are thickly inhabited by natives, and both grow much agricultural produce, particularly in the nature of grain; one, the Nyanza Province, is being actively developed as a cotton-growing district, and through both new railway construction is rapidly proceeding.

In each of the past three years small outbreaks of plague have occurred in the neighbourhood of Nakuru, a township in the centre of one of the largest European maize-producing districts in the country, but whether the disease is endemic in this area is not known.

The importance of the Colony as a maize-producing country has recently greatly increased.

Since 1913 there have been outbreaks at Mombasa, the chief seaport of the Colony, as follows:—

1913.
1917.
1920.
1923.

Whether the infection reached Mombasa in any of these cases by sea or by rail is undetermined. Mombasa is not only the chief seaport of the Colony but is also the chief outlet for produce from a large part of Eastern and Central Africa and one of the most important ports on the sea-board of the Continent. Up to the present all cargo work has been carried out by lighters. Now, however, the character of the port is changing and deep water wharves are being constructed, and in the near future overseas vessels will come alongside. Again a considerable amount of railway construction is at present in progress and more is likely to take place in the near future: both internal communications and communications with neighbouring territories such as Uganda and Tanganyika are being rapidly developed or improved.

Closer settlement is continually taking place in the areas in European occupation, while with the development of native agriculture an increase of prosperity is to be expected in the native areas, which can hardly but be accompanied by an increase of the native population.

The conditions which appear to be favourable for the harbourage and propagation of the black rat are everywhere increasing, except in those towns where the erection of permanent buildings, with some measure of sanitary control over these buildings, is an economic possibility. There would appear to be no reason as far as we know why the black rat should not ultimately become the common domestic rat in all parts of the country, and thereafter why plague should not, sooner or later, become enzootic in all parts and at times result in outbreaks of the disease among the human population. The importance of the possibility of such an extension of the disease in a large grain producing and exporting country can hardly be overestimated. It is important not only in that lives may be lost but in that the losses from the dislocation of internal overseas traffic may on occasions be considerable.

It is desirable therefore that measures should be adopted to limit, if possible, not only the geographical distribution of the disease and its incidence in various localities but also the expense which may have to be incurred from time to time in order to allow of the free movement of merchandise.

Are the measures at present at our disposal effective? Unfortunately, it cannot be said that any of them are wholly effective, while it can without doubt be stated that no measure yet taken has limited the spread of the black rat, that it is exceedingly doubtful whether the measures usually adopted for the disinfection of merchandise are efficacious under all the varying conditions in which such have to be carried out, or whether measures which have been devised in other countries can be usefully adopted in a country where climatic conditions are dis-similar and the flea involved possibly of a different species.

The number of undetermined factors is too great to allow of effective prevenfive work. The biology of the rat and the flea and the bacillus have still to be worked out for this country. The conditions under which the disease is "carried over" and under which the infection may be conveyed from place to place are unknown. The period for which merchandise, more particularly grain, may remain infective is unknown, while suitable methods of disinfecting merchandise in bulk have still to be devised and standardised.

Research work with regard to this disease is urgently required and the matter is obviously one of more than local interest, as it would appear possible that plague might readily become one of the most important diseases in Eastern and Central Africa. The lines along which research is required are many and can only be effectively pursued by a number of whole-time investigators working together as a team. A bacteriologist and an entomologist are essential parts of such a team, and if results are to be obtained which can be utilised by the executive sanitarian there should be added also an officer who has had practical experience of the difficulties of dealing with an epidemic and with infected merchandise, and who will have always clearly before him the various circumstances under which in the past the correct course of action has been obscure. If also the services of a chemist can be enrolled the team should be fairly complete.

It is hoped that towards the end of 1924, it may be possible to organise such a team, as the services of a bacteriologist, an entomologist, an experienced sanitary officer, and a chemist may be available, but if these officers are to devote the requisite amount of attention to the matter for a sufficient period of time it will be essential that the ordinary staff of bacteriologist and of sanitary officers should be increased by at least one each in 1925, as the work is one which should be prosecuted over at least a period of two years.

VI.—SMALL-POX.

As far as is known no case of small-pox occurred in the Colony and Protectorate during 1922, and up till March of the year under review the country was apparently free from the disease. In that month, however, a few cases were reported from the Vanga district situated on the coast south of Mombasa and marching with a part of the Tanganyika Territory where the disease had been present for a considerable period. The area was toured by an Assistant Surgeon for some weeks, and as many people as possible were vaccinated. In all probably not more than 100 cases occurred over a very large district.

In April a case of small-pox was discovered at large in the town of Mombasa. The attack was of the severe confluent type and the patient did not recover. Where the man had been living immediately previous to the development of the disease was never discovered, nor whether he had been in Mombasa for some time or had recently travelled in from the infected district referred to above. No further cases followed the introduction of the disease.

On two occasions cases of small-pox were removed from vessels arriving from Bombay.

In May, the infection was introduced into Lamu, a small seaport north of Mombasa. The case occurred in a member of the crew of a dhow which had been trading towards the south. Three further cases occurred among the contacts who were isolated, but no further cases occurred in the town.

In April, a case of small-pox occurred in Nairobi the first since 1920. The patient, an Indian, had arrived from Bombay and landed at Mombasa on the 31st March. Although one of the European engineers on the ship by which this case had travelled developed small-pox on the voyage between Bombay and Mombasa, it would appear from the incubation period that the Indian patient did not contract the disease from the European engineer but that he must have been infected in Bombay before leaving. The fact that the patient had arrived in Nairobi on the 2nd of April, and had spent the night in Railway quarters before being discovered gave rise to considerable anxiety. All the contacts including the other occupants of the Railway carriage in which he had travelled from Mombasa were traced and kept under observation. Vaccination of the whole of the Asiatic and African Railway staff, together with their wives and families, was commenced immediately after the discovery of the case and was completed in about three days. No further cases resulted. With the exception of the cases described above, the Colony and Protectorate would appear to have remained free from small-pox throughout the year.

VACCINATION.

56,345 vaccinations were performed during the year as against 57,246 in 1922. The lymph produced at the Laboratory in Nairobi proved as usual to be exceedingly satisfactory. A small vaccination campaign was carried out in the Native district of North Kavirondo when several thousand persons were vaccinated. That the measure apparently met with no opposition is satisfactory and would suggest that we are probably approaching a time, when, as a result of the increased confidence of the Natives which has attended curative campaigns such as that against yaws, it may be possible to carry out a prophylactic campaign against small-pox on a large scale.

Full details with regard to the results of the vaccinations performed are given in the Annual Report of the Bacteriological Laboratory.

VII.—CEREBRO-SPINAL FEVER.

Fifty cases with 27 deaths were recorded during the year, as compared with 28 cases and 19 deaths in 1922. Twenty-nine of the cases and 15 deaths occurred in Nairobi.

Nothing approaching a definite epidemic of the disease was observed.

It is suggested by the Medical Officer of Health, Mombasa, that pneumococcal meningitis is responsible for a certain number of cases returned as cerebro-spinal fever. Cases of pneumococcal meningitis with negligible chest symptoms have come under notice.

VIII.—ANTHRAX

A total number of 39 cases was returned in 1923, of which 29 are reported from Nairobi. Of the Nairobi cases 19 were admitted from outside the Township.

Only three deaths are recorded.

An outbreak occurred amongst the Somalis in the neighbourhood of Wajir in the Northern Frontier District, but exact details of the number of cases were not obtainable, and the figures have not therefore been included in the total; it is probable that there were at least 24 cases with 3 deaths.

It is probable that anthrax in the Reserves is a fairly common disease, owing to the fact that a diseased beast, or a beast recently dead, is at once eaten.

The cases have, as usual, pursued a mild course.

IX.—INFUENZA.

Mild outbreaks of influenza have occurred during the year and have affected all sections of the community. The reports indicate that the disease has been of a mild type only. Machakos is the only station which has not returned cases of the disease.

X.—PNEUMONIA.

There is no doubt that pneumonia must be considered one of the most important factors in the death-rate of Kenya. In Nairobi out of a total of 405 deaths 163 were due to pneumonia. The number of cases admitted to the Native Hospitals throughout the Colony, and the mortality amongst these, afford some indication of the incidence of the disease in the population generally.

For the three years preceding the 1923, the admissions to Hospitals and deaths were:—

	Cases.	Deaths.	Death-rate per 100 cases.
1920 ..	1,230 ..	286 ..	23.25
1921 ..	1,233 ..	254 ..	20.51
1922 ..	986 ..	241 ..	24.44

The figures for all Hospitals for the year 1923 are:—

	Cases.	Deaths.	Death-rate per 100 cases.
..	1,095 ..	262 ..	14.8

There seemed to be during the months August to October a widespread outbreak of pneumonia with an exceptionally high death-rate. This is reflected in the monthly returns from Native Hospitals, and quoted below are the figures from five different sources, which may be taken to represent the comparative incidence of the disease in the several classes of the community which these Hospitals served:—

Month.	Uasin Gishu Railway.			Nairobi Native Hospital.			Nairobi Prison.			Mombasa Native Hospital.			Kisumu Native Hospital.			Total.		
	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.
January. ..	24	8	33.3	18	2	11.1	3	—	—	5	1	20.0	6	—	—	56	11	19.8
February. ..	31	19	61.3	14	2	14.3	2	—	—	7	—	—	1	—	—	55	21	38.1
March. ..	32	16	50.0	25	5	20.0	7	1	14.3	10	4	40.0	4	1	25.0	78	27	34.6
April. ..	58	33	56.0	15	3	20.0	1	—	—	6	2	33.0	2	1	50.0	82	39	47.5
May. ..	66	24	36.4	23	2	8.7	5	—	—	7	3	43.0	6	1	16.6	107	30	28.0
June. ..	42	27	64.3	37	6	16.2	2	—	—	8	5	62.0	8	3	37.5	97	41	42.2
July. ..	54	13	24.0	71	19	26.8	6	1	16.6	7	2	29.0	11	2	18.2	149	37	24.8
August. ..	49	16	32.6	59	17	28.8	31	6	19.3	9	3	33.0	12	2	16.6	160	44	27.5
September. ..	37	14	37.8	64	23	35.9	23	8	34.8	5	3	60.0	6	2	33.3	135	50	37.0
October. ..	66	17	25.7	36	11	30.6	20	5	25.0	9	2	22.0	4	1	25.0	135	36	26.6
November. ..	38	11	28.9	30	9	30.0	4	—	—	14	2	14.0	3	1	33.3	89	23	25.8
December. ..	8	5	62.5	46	20	46.1	17	1	5.9	7	—	—	2	—	—	80	26	32.5

The Medical Officer of the Native Hospital, Nairobi, points out that pneumonia among the well-fed and well-clothed askari of the King's African Rifles is a much less fatal disease than in the frequently underfed native from the Reserve or town.

The incidence of pneumonia on the Uasin Gishu Railway Construction and in the Gaols will be found in the relative sections.

XI.—THE ENTERIC GROUP.

Only 27 cases of this group of diseases came under notice in 1923. The incidence was spread over the year and was not confined to any particular area or section of the population.

Four cases occurred in the year among the occupants of the Nairobi Y.W.C.A., but no definite cause could be traced. A carrier was suspected but none found.

The results of Widal tests made at the Laboratory during the year show that the grouping of the cases was as follows:—

Typhosus.	15
Paratyphosus A	2
Paratyphosus B	2
Paratyphosus C	1

In addition to the above the bacillus typhosus was detected in three cases by cultural methods from the faeces or urine.

The case of paratyphosus C is the first time this organism has been detected in the country.

XII.—TYPHUS.

Three cases, all in Europeans, of the typhus-like disease of the country were reported from Nairobi; all recovered.

The Laboratory return shows that a positive reaction with Bacillus Proteus X19 was obtained on four occasions.

XIII.—DYSENTERY.

The outbreak of dysentery which existed at Kilindini at the end of 1922, ceased somewhat abruptly at the beginning of the new year. No outbreak of any magnitude has come under notice in 1923. A total of 652 cases with 50 deaths was returned from all stations. Again there is no report of any outbreak of magnitude in the Reserves, though the Medical Officer, Central Kavirondo, reports that dysentery was common after the commencement of the rains in February.

The bacillary type of disease has been, as in 1922, far more commonly met with than the amoebic. At the Native Hospital, Nairobi, only four cases of amoebic infection came under notice out of a total of 82, while at Mombasa none of the 99 cases which were treated showed amoebae. At Chuka, however, in contradistinction to other stations, the total number of cases of dysentery, 16 only, were found to be amoebic in origin; of these cases 14 were chronic, and the majority of them came from Meru.

At the Laboratory amoebae were discovered on 18 occasions only during the microscopic examination of 189 specimens of faeces. The Shiga bacillus was isolated on two occasions.

XIV.—UNDULANT FEVER.

After the definite proof last year that undulant fever existed in the country, more cases have come to light in 1923. In all 13 cases have been reported during the year under review. The distribution of the cases has been as follows:—

Nairobi.	5	(one European under the care of a private practitioner).
Fort-Hall.	2	
Machakos.	3	
Mombasa.	3	

No deaths occurred. The cases have varied in degree of intensity; one ran a protracted course of eight months and presented joint complications. The Senior Medical Officer, Fort-Hall, reported that one case on admission was suggestive clinically of beri-beri.

Three of the cases appear to have originated from Thika, Masongoleni and Makindu. It would seem therefore, as suggested in the 1922 Report, that the disease is in reality wide-spread over the country, and that its detection is not a matter for alarm.

The Laboratory returns show that positive reactions for undulant fever were obtained in 13 instances, and that of these 8 were infections with the M. melitensis and 5 were infections with the M. paramelitensis. One case had a double infection of Micrococcus melitensis and paramelitensis.

XV.—MALARIA.

The rainfall of 1923, though greater than that registered for 1922, was heavier in quality and was not accompanied by the extension of malaria which was noted as occurring during the year.

The number of cases returned as malaria in 1923, totalled 18,330 with 37 deaths. The comparative table for the past five years is as follows:—

	Cases.	Deaths.
1923.	18,330	37
1922.	20,581	46
1921.	17,253	27
1920.	18,195	42
1919.	20,778	42

The cases admitted to Hospital, and in whom diagnoses as to the particular infection have been made, fall into the following categories:—

Sub-tertian.	433
Benign tertian.	197
Quartan.	14

The Laboratory figures which of course mainly concern Nairobi and District are:—

Sub-tertian.	187
Benign tertian.	39
Quartan.	22

From the figures submitted the relative larger proportion of benign tertian which as a rule occurs on the Coast has not been apparent during the year under reference.

The anti-malarial works at Kisumu which were outlined in the 1922 Report have been continued and extended during 1923. The steps which have been taken are described by the Medical Officer of Health, Kisumu, as follows:—

"In addition to the locating of springs and the drainage of areas liable to become swamped, two important works carried out by the Health Office for the extermination of mosquitoes should here be mentioned, viz., the clearing of papyrus along the lake shore, and the maintenance of Partington's Dyke. Unfortunately, owing to lack of funds for the employment of labour, both these works have had to remain in partial abeyance during this year.

Two gangs of 25 men in all were employed for one month at papyrus clearing, one gang at the north-eastern end of the foreshore, and the other at the south-western end. Approximately 700 sq. yds. of fresh clearing has been done, and the length of foreshore already cleared has been kept free from papyrus. It is estimated that approximately 800 acres of papyrus still remain within the township boundaries. A gang of 30 men could be kept constantly employed at papyrus clearing, and maintaing the entire extent of township foreshore free from this mosquito-harbouring plant.

In this connection one should also refer to the floating islands of papyrus, detached by winds or currents from other parts of the shores of the Kavirondo Gulf, and frequently carried ashore at some point along the Kisumu water front. These islands are found to liberate swarms of mosquitoes when they come close to land. There are two methods of dealing with them:—

(a) One is to break up the island, if of small size, and haul it ashore piecemeal.

(b) If that method is impossible the Marine Department has hitherto lent a tug, and disposed of the islands by towing them away to some other part of the Gulf.

With regard to Partington's Dyke this office has endeavoured to maintain it clear from silt and weeds realising what an important factor it is in draining the plains around Kisumu and in guarding the township against mosquito infection."

The Sanitary Inspector in his report points out one valuable economic result which has attended the drainage operations at Kisumu; he says.—"I would like to point out that an area of over 1,900 acres has been reclaimed in Kisumu by anti-malarial drainage works during the last two years; presuming one third of that area was capable of being planted before the area was drained, 1,250 acres of land are still left which two years ago were useless owing to the water logged condition of the soil or the liability of flooding for five months of the year. This land is now being put under cotton, mwimbi, matama, muhogo, maize, sweet potatoes, etc., and one of the officers of the Agricultural Department has informed me that it is some of the finest soil he has seen in Nyanza. Taking the value of 1,250 acres at £5 an acre the economic value of the reclaimed land is £6,250. It is urged therefore that not only on health grounds, but also in reclaiming a valuable planting area, has the expense of construction and maintenance of anti-malarial drainage in Kisumu been more than justified."

The Senior Medical Officer, Kisumu, indicates the value of the work which has been performed when he says : "The anopheles is now comparatively rare, while mosquitoes in general are very much less in evidence" and again : "The majority of cases of malaria occurring in Kisumu are relapses, personally during the last five months I have met with no case of clear infection in Kisumu itself."

The deaths from malaria in Kisumu have risen in 1923 from 2 to 11 but, as indicated above, this does not mean that the incidence of malaria in Kisumu itself is greater than in the past year.

In Nairobi a preliminary investigation, necessary before an organised campaign against malaria can be undertaken, has been commenced. As pointed out by the Medical Officer of Health, certain data are necessary before a scheme is formulated, and in his own words : "Amongst the data necessary are :—

1. The species of mosquitoes occurring in Nairobi, their habits, seasonal prevalence and all possible information that could be collected bearing on them.

2. The existing breeding grounds, their source and all factors tending to produce them.

3. Species of anopheline mosquitoes occurring capable of spreading malaria in nature.

4. The existing reservoirs of malaria in humans and the incidence of the disease in the various sections of the township.

"These last could possibly be best obtained as follows :—

1. By systematic palpations of the spleens of children in the various districts and recording carefully findings.

2. By making malaria a notifiable disease within the township and requiring the Medical Officer notifying to state possible place of infection.

"During the last three months of the year a start has been made to obtain some of the data necessary. A native boy trained in the finding of mosquito larvae and the breeding out and mounting of mosquitoes has been employed in making a collection of mosquitoes from various sections of the township. For giving further value to the collection made, Nairobi has been divided artificially on a map into various districts, each district given a number and care taken to label every specimen mounted with the number of the area it is collected from and date on which collected. The mosquitoes collected have been provisionally identified with the kind assistance of Dr. van Someren, to whom this Department's thanks are due, and type specimens have already been despatched to the Entomological Section of the British Museum for further confirmation." It is proposed to continue the investigation until information over at least a year has been collected.

In Mombasa an important piece of anti-malarial work was accomplished during the year in the construction of a system of earth drains for the drainage of the "Rice Swamp" at Makupa. This swamp was referred to in the 1922 Report as the most important anopheline-breeding ground in the Island.

On the recommendation of the Central Board of Health the growing of rice on the "Rice Swamp" on Mombasa Island was prohibited by Government. The area involved is small, and no hardship will result to the inhabitants. The deaths from malaria and death-rates per 1,000 of the population recorded in 1923 for the townships of Mombasa, Nairobi and Kisumu are :—

Mombasa	74	1.8 per 1,000
Nairobi	28	1.2 per 1,000
Kisumu	11	1.9 per 1,000

The figures for the population are, as already indicated, not strictly accurate, and no attempt has been made to deduct from the total deaths such cases as contracted the disease elsewhere.

XVI.—BLACKWATER FEVER.

The returns show that a total of twenty-seven cases of blackwater fever came under the notice of Government Medical Officers ; of these, 8 patients were Europeans. Six deaths occurred in all.

The comparative table for the past three years is as follows:—

	Cases	Deaths
1923	27	6
1922	39	10
1921	28	5

The Coast area returned more cases than any other locality.

XVII.—TRYPANOSOMIASIS.

The hospital returns for 1923 show a large increase in the number of cases of trypanosomiasis which were under treatment during the year. There is no suspicion however that the incidence of the disease has increased to any extent. Such increase as may have occurred is confined to a few small areas and under present circumstances is not a cause for alarm. At the same time the position requires watching. The attendances at Hospital are merely the result of an effort having been made to provide adequate treatment for the sufferers from the disease.

The total of hospital cases for 1923 is 103 as against 25 in 1922, and these are returned from :—

Kisii	..	98
Kakamega	..	4
Kisumu	..	1

In addition to the above mentioned, 253 others were given treatment by the Medical Officer, South Kavirondo, during the course of a special trip made to Asodo Bay, where trypanosomiasis was known to exist. The trip was undertaken with the object of treating all such cases as might be suspected, on clinical or other grounds, of harbouring trypanosomes, irrespective of whether such was discovered or not, and with a view to possibly rendering these cases non-infectious.

Out of the total number of cases, in hospital or otherwise, trypanosomes were only detected in four.

The form of treatment adopted at the hospital at Kisii was by intravenous injection of tartar emetic grs. 1 to grs. 3 daily, with novarsenobillon 6 grm. on the 7th and 14th days. Marshall's treatment was also given in some cases, but the Medical Officer states that the results thereof were no better than with the procedure described above. The majority of the cases treated in Hospital have been kept under observation and have remained well until the end of the year.

The cases treated in the district received intravenous injections of tartar emetic every day for eight days, the dosage varying from gr. ½ up to grs. 4 or less according to the symptoms produced. In addition each patient was given intramuscular injections of soamin gr. 1 or grs. 2 every other day according to weight. The patients expressed themselves as being improved after the treatment.

The four cases exhibiting trypanosomes, and one other case with nervous symptoms and in the sleeping sickness stage, though trypanosomes were not detected, received Bayer 205 in grm. 1 doses every five to seven days. The results were very satisfactory in the cases in which nervous symptoms had existed but were difficult to gauge in the absence of such, though the patients expressed themselves as being better.

In August Dr. H. Lyndhurst Duke, Bacteriologist, Uganda Protectorate, carried out a month's tour along the lake shores of South Kavirondo to study the distribution of the disease and the factors determining its persistence and spread ; the most interesting report and valuable suggestions which were afterwards submitted appear as an Appendix hereto. (Appendix C).

No scheme of clearing or removal of inhabitants has been undertaken or put forward pending the arrival of an entomologist.

XVIII.—RELAPSING FEVER.

Sixty-five cases have been reported as against 42 in the preceding year ; the distribution, as shown in the table, closely follows that indicated in the Annual Report for 1922 :—

Fort-Hall	..	38
Chuka	..	17
Machakos	..	1
Nairobi	..	4
Kilindini	..	1
Kismayu	..	4
		65

The Kismayu cases were not verified microscopically. The Kilindini case was probably imported. Kismayu is not an ornithodorus area.

The Medical Officer, Chuka, remarks on the virulence of the disease and the small number of cases which come under notice considering the wide-spread distribution of the tick.

At Fort-Hall the cases of relapsing fever have proved very intractable to treatment, and the results of the administration of novarsenobillon have been disappointing.

XIX.—LEISHMANIASIS.

No cases either of Kala Azar or dermal leishmaniasis have been reported during the year.

XX.—WHOOPING COUGH.

Cases of whooping cough totalling 41 in number have been reported from eight stations distributed throughout the Colony and Protectorate.

XXI.—HELMINTHIASIS.

Nothing has come to light to modify the conclusion that the great majority of the native population suffers from one or more helminthic infections, and though usually no symptoms are produced it is probable that a loss of resistance to other and especially intestinal diseases is a result.

Without a revolution in the sanitary habits of the population in the Reserves it is difficult to see how the incidence of helminthiasis is to be reduced. Incidentally, were a meat export trade to be inaugurated, the matter would be of importance with regard to measles in meat.

IV.-NATIVE LABOUR.

(a)—CONTRACT LABOUR.

(1) *Recruiting, Inspection and Housing of Recruits.*—The legal obligations which affect the Medical Department in connection with the business of labour recruiting were set forth at some length in the 1922 Report. Now as previously the Nyanza Province supplies the large bulk of recruited labour, though there are indications that sources hitherto untapped are beginning to provide their quota, while members of tribes which were formerly of little importance as regards the labour supply are coming out with increased frequency.

The description below, quoted from the Annual Report of the Medical Officer of Health, gives a picture of the routine employed at Kisumu in the examination of labour recruits:—

"Medical inspection of labour recruits has been held during the year on Tuesday and Friday afternoons at the Health Office."

"The recruits, after assembling, are required to bathe themselves thoroughly under showers provided in the compound. They then pass into the vaccination room, and after being vaccinated they remain in the shade until the hour fixed for inspection."

"The following table shows the number of recruits examined during 1923, for comparison with the figures of 1922."

MEDICAL INSPECTION OF LABOUR RECRUITS.

Month.	1922.		1923.	
	Passed.	Rejected.	Passed.	Rejected.
January. ..	1,876	623	852	178
February. ..	1,815	491	968	190
March. ..	2,682	674	1,152	150
April. ..	1,541	555	1,051	131
May. ..	1,149	568	1,159	121
June. ..	278	138	1,565	94
July. ..	479	173	1,038	93
August. ..	753	269	1,414	125
September. ..	848	234	2,108	124
October. ..	728	211	1,275	118
November. ..	605	134	1,198	119
December. ..	864	185	662	64
Total. ..	13,619	4,255	14,442	1,507

The report goes on to state. "The standard of physical fitness in recruits presented for examination appears to have improved during this year, and it is gratifying to note, from a register kept of causes of rejection, that non-pathological causes, such as extremes of age and youth and poor physique, preponderate. Skin diseases, chiefly scabies and ulcers, also account for a large number of rejections."

It must not be concluded from the foregoing that the standard of health in the Kavirondo Reserve has improved. The lessened number of rejects may be due to one of two causes, either the recruiters have become more careful in the type of individual enlisted, or the standard adopted during examination has been less stringent. In a matter which has no definite rules of guidance the standard required by Medical Officers must necessarily vary with the individual.

(2) *Inspection of the sanitary conditions under which Native Labour is employed*:—It has not been possible for the Department to undertake any but the smallest amount of inspection of camps and conditions generally under which labour is employed on farms and plantations. The Inspectors of the Department of Native Affairs do valuable work, but it is most desirable that their efforts should be backed up by inspections carried out by Medical Officers. Though undoubtedly a steady improvement is taking place with regard to the housing and feeding of labour, yet at the same time lassitude and ignorance remain. The whole question of the feeding and housing of labour is one of considerable difficulty and requires investigation which, with the present staff, it is impossible to undertake.

(b)—CASUAL LABOUR:

LABOUR EMPLOYED IN TOWNSHIPS.

It is satisfactory to note that the Nairobi Municipality is seriously considering the adoption of a scheme of municipal housing for that section of the native population which is unable to provide satisfactory accommodation for itself. The scheme has been prepared at the Health Office, Nairobi, and takes due account of the economic factors. There is little doubt that suitable housing can be erected and let to natives at a sum within their means which will allow a reasonable profit for interest, sinking fund and up-keep.

The Uganda Railway is in process of erecting a good type of housing for their employees, who up to the present have been accommodated in buildings as insanitary as any in the township.

The Government also has under consideration the provision of a scheme for housing its own native employees, who under existing circumstances have to find accommodation as best they can. It has been little realised in the past that the rents charged for housing even of the poorest description are so high that over-crowding necessarily results. Provision of decent and sanitary housing is a prime necessity and an all important step in the education of the native.

(c)—LABOUR EMPLOYED ON RAILWAY CONSTRUCTION.

Railway construction will, during the next few years, take an important place in the activities of the Colony, and the medical aspect thereof will have to receive considerable attention from the Department.

At the close of the year the only line actually under construction was the Uasin Gishu Railway, but the medical scheme for the Thika-Nyeri extension had been drawn up and the preliminary arrangements completed.

A full report on the medical aspect of the Uasin Gishu Railway is appended.

UASIN GISHU RAILWAY.

The construction of this Railway, begun in January 1922, continued throughout the whole of 1923.

The topographical features of this new Railway, the climatic conditions of the different areas traversed, the incidence of disease during the first year of construction, and the organisation of the medical services, were described in some detail in last year's Annual Report.

The number of Natives employed continued high during the first nine months of the year, the average number being in the neighbourhood of sixteen thousand. During the last three months, the greater part of the engineering work having been completed, the number rapidly decreased.

At the beginning of the year three Medical Officers were engaged on the Railway; of these, two were seconded from the Government Service, one was in the employ of the Contractors, but was under the direction of the Senior Medical Officer. By June it was considered that the services of one of the seconded officers could be dispensed with, and the work was left in the charge of the two remaining. By December the construction was so near completion, and the number of Natives employed was so much reduced, that it was decided to leave only the Contractors' Medical Officer to carry on.

The following extract from a report, prepared in November, by Dr. V. M. Fisher, who was in charge from June to December, represents the condition of medical organisation during that period:—

"The problem has been twofold. In the first place to provide adequate medical attendance for a maximum of 17,000 Natives, most of them recently recruited from the Reserves, who are spread out over 150 miles of construction, and thousands of whom are constantly being moved from point to point, or are suddenly concentrated at any one spot without warning. In the second place, to see that the conditions of housing, feeding, clothing and sanitation for the Native labourers are as good as circumstances permit.

It should be remembered that the Railway goes up to 9,200 feet and that where Main Hospital is located it has rained for over 90% of the days since last spring, and that hail storms are common on the Construction.

In solving this problem the principle to be kept in mind is to make a hospital service that is as flexible as possible, so that, while being kept down to the lowest limits in normal times, it may be capable of expansion and lend itself to improvisation at any point where an epidemic may occur.

Owing to the weather conditions and the consequent state of the roads, transport of the sick for any distance is out of the question for the greater part of the year; they must be treated on the spot. On the main road ox wagons have lately been taking 6 weeks to travel less than 70 miles.

Hospital accommodation has been supplied only to the extent of actual requirements. In case of necessity hospitals can be and have been expanded rapidly to meet any sudden increase in sickness. Labour is always available in any required quantity and so are materials for building, although, in settled areas like the Plateau, these are much harder to get than in the forest and bamboo country. If a really serious epidemic occurred, involving a large percentage of the population of a camp, part of the camp itself would become the hospital and an improvised staff would be sent to run it. This staff would be drawn in the first place from the nearest hospitals, and these in turn would recoup themselves from the dressers who are attached to Labour Camps; these could in many cases be withdrawn temporarily without any serious results; in fact, they are largely there to form a reserve supply of trained men, who can be called upon in any emergency.

The hospital accommodation in September, 1923, when work was in progress over the whole 147 miles of the Railway, and when the number of labour exceeded 16,000, was as follows:—

Main Hospital, Mile 53½, in charge of an European Hospital Assistant, with a European Storekeeper, a Goan Compounder and an Indian Clerk.

This Hospital is also the headquarters for the Medical Department. All medical stores are issued from it to all the other Hospitals and to the Camps, and all administrative work is done there. The buildings comprise the Administrative Block, the Hospital proper with its Offices, and the Staff quarters. The Administrative Block consists of two wood-and-iron buildings, one containing the drug store, the out-patient department, the dispensary and the general office, and the other the Medical Officer's Office, the Laboratory, the operating room and the preparation room. The Hospital proper includes 5 wards containing 100 beds and a grass-and-mud isolation ward. In addition there are a general store, staff quarters, latrines, bathing house, dhobi's washing place, mortuary and tool store. The native staff consists of 15 dressers, 20 other staff and 20 porters.

Mile 118: a 72-bedded hospital composed of grass huts, and including 4 wards, each of 15 beds, 2 isolation wards and usual offices. It is in charge of an Indian Compounder, and has a staff of 10 dressers, 7 other staff and 10 porters.

Sabatia, Mile 37: a European Medical Officer is in charge of Sabatia and Enarosura, the headquarters respectively of the Contractors and of the Government Staff, containing a considerable population of Europeans, including women and children, and Natives.

Here is a 30-bedded hospital with a staff of one European Hospital Assistant, 8 dressers and 6 other staff.

Lake Narasha, Mile 72: a 50-bedded Hospital of wattle-and-daub huts, under an European Hospital Assistant, with 7 dressers and 8 other staff.

Mile 27, 94, 111 and 126: at each of these points is a small hospital of six beds, in charge of a Native Dresser.

In addition to the hospitals almost every large Labour Camp has a Native Dresser attached to it. There are 19 Dressers so disposed, and in addition to their valuable work at the Camp they act as a reserve which can be drawn on in any emergency. The duty of a Dresser attached to a Labour Camp is to take sick parade every morning, and to treat and dispose of the sick; to go round the camp with the camp headman to see that no sick are left in the huts; and to keep a general supervision over the cleanliness and sanitation of the camp. These men have been a great success. No complaints have been received about any of them, and the employers invariably testify to their good work and reliability.

In camps which are not large enough to justify a Dresser, visits by a Dresser from a neighbouring camp can usually be arranged, failing which the supervisor or sub-contractor is issued with stock mixtures and dressings and treats his own men."

The actual figures for the number of Natives employed during the several months of the year are difficult to state with absolute accuracy, as the totals for each month depend on the returns from the numerous sub-contractors. These of course varied widely from month to month. The following may be taken as approximately the correct figures; the figures for the corresponding months of 1922 are given for the sake of comparison:—

Month.	1922.	1923.
January.	1,500	13,750
February.	7,800	15,450
March.	7,300	16,320
April.	11,100	16,500
May.	12,700	16,260
June.	13,100	16,270
July.	12,400	14,580
August.	12,600	15,680
September.	13,600	15,650
October .	13,400	13,460
November.	14,600	10,790
December.	14,500	8,560
Average.	11,200	14,440

Admissions to Hospital, month by month, were as under:—

Month.	Number admitted.	Percentage of admissions to Labour employed.
January.	580	4.22
February	398	2.58
March.	550	3.37
April.	530	3.21
May.	676	4.14
June.	488	3.00
July.	431	2.95
August.	498	3.17
September.	341	2.18
October.	345	2.55
November.	307	2.84
December.	187	2.17

The total number of patients admitted to hospital during the year was 5,331, and the average monthly admission was 2.97 per cent. of Labour employed.

The number of patients in hospital on the last day of each month was as under:—

Month.	Number in Hospital.	Percentage of Patients to Labour.
January	244	1.67
February.	253	1.58
March.	347	2.11
April.	355	2.16
May.	314	1.93
June.	197	1.28
July.	191	1.26
August.	165	1.06
September.	147	1.01
October.	166	1.37
November.	143	1.47
December.	84	1.05

Over the whole year the average daily number in hospital per cent. of Labour was 1.49.

The cases admitted to hospital included the following:—

	Pneumonia.	Influenza.	Bronchitis.	Dysentery.
January.	24	131	107	22
February.	31	93	66	18
March.	32	138	106	12
April.	58	81	142	14
May.	66	100	180	12
June.	42	89	122	43
July.	54	61	108	11
August.	49	152	70	9
September.	37	113	32	2
October.	66	33	70	1
November.	38	38	55	4
December.	8	14	42	4
Total.	505	1,043	1,100	152

It will be noticed that of 5,331 cases admitted to Hospital 505, or 9.47 per cent. were pneumonia. It cannot be taken for certain that all the cases shown as "Influenza" were in reality cases of this disease, as not all of them were examined by a qualified Medical Officer. It should rather be assumed that the great majority of them were cases of pulmonary complaint associated with pyrexia. If we add together the totals shown under pneumonia, influenza and bronchitis, and classify these as respiratory disease, it then appears that 2,648 of the total of patients admitted, or very nearly 50 per cent. would come under this heading.

Considering next the mortality, we find the monthly number of deaths, and the death-rate, to be as set out below. For the sake of comparison the corresponding figures for 1922 are also given. These figures are not compiled from Hospital records alone, but include all deaths which occurred amongst the Natives employed, whether in Hospital or Labour Camp, whether from sickness or accident:—

	1923.		1922.	
Month.	Number of Deaths.	Death-rate per 1,000 per annum excluding deaths by accident.	Deaths.	Death-rate.
January.	44	33.1	5	40.0
February.	48	34.9	4	6.0
March.	47	33.1	28	46.0
April.	80	57.4	42	45.2
May.	60	43.4	89	83.8
June.	52	37.5	56	51.3
July.	29	23.8	69	65.8
August.	44	30.6	57	54.3
September.	40	29.8	70	61.8
October.	38	33.8	49	43.9
November.	20	22.2	43	33.7
December.	9	12.6	48	38.4
Total.	511		560	

Taking the average labour strength for 1923 as 14,440, with a total of 511 deaths, the death-rate for the year is 35.4 per thousand; the corresponding figure for 1922, viz. 560 deaths in an average labour strength of 11,200, is exactly 50 per thousand.

Considering the particular causes of death, we may summarise the figures supplied from Hospitals thus:—

Month.	All causes.	Pneumonia.	Influenza.	Bronchitis.	Dysentery.	C.S.M.
January.	32	8	5	2	5	3
February.	42	19	5	2	2	2
March.	36	16	1	1	2	11
April.	64	33	1	2	5	8
May.	56	24	—	1	7	8
June.	44	27	1	1	4	4
July.	23	13	3	2	2	1
August.	36	16	10	1	4	1
September.	32	14	13	—	1	—
October.	21	17	—	1	1	1
November.	18	11	1	2	1	2
December.	9	5	—	—	3	—
Total.	413	203	40	15	37	41

It is fairly safe to assume that practically all the deaths shown as being due to influenza and bronchitis were in reality cases of pneumonia; this being so, we see that out of 413 deaths occurring in hospital no less than 258 were due to pneumonia, a percentage of 62.5.

Taking now the figures supplied by the Native Affairs Department, which include deaths occurring in Labour Camps as well as those in hospital, the analysis is as under:—

Month.	All causes.	Accident.	Pneumonia, etc.	Dysentery.
January.	44	6	21	5
February.	48	3	32	3
March.	47	2	25	2
April.	80	1	43	7
May.	60	1	31	7
June.	52	1	34	4
July.	29	—	19	4
August.	44	4	32	4
September.	40	1	31	4
October.	38	—	33	1
November.	20	—	15	1
December.	9	—	4	3
Total.	511	19	320	45

It must be remembered that in most cases of deaths occurring in Labour Camps the diagnosis of the disease is quite uncertain. For this reason all cases described as pneumonia, pleurisy, bronchitis and tuberculosis, whether reported from Hospital or Camp, have, in this table, been grouped together under the heading "pneumonia, etc." Excluding accidental deaths the percentage of deaths from these causes is, according to these figures, 65.00.

A further analysis of the mortality may be made to show the death-rate per cent. of cases admitted to hospital, as under:—

Month.	Patients admitted.	Deaths.	Death-rate per cent.	Cases of Pneumonia, etc., admitted.	Deaths from Pneumonia, etc.	Death-rate per cent.
January.	580	32	5.52	262	15	5.72
February	398	42	10.55	190	26	13.68
March.	550	36	6.54	276	18	6.52
April.	530	64	12.04	281	36	12.81
May.	676	56	8.28	346	25	7.23
June.	488	44	9.01	253	29	11.46
July.	431	23	5.33	223	18	8.07
August.	498	36	7.23	271	27	10.00
September.	341	32	9.38	182	27	14.83
October.	345	21	6.09	169	18	10.65
November.	307	18	5.86	131	14	10.69
December.	187	9	4.81	64	5	7.81
Total.	5,331	413	7.75	2,648	258	9.74

Considering separately the cases diagnosed specifically as pneumonia, and excluding bronchitis, influenza, etc., the figures are:—

Month.	Pneumonia Cases.	Deaths.	Percentage.
January.	24	8	33.3
February.	31	19	61.3
March.	32	16	50.0
April.	58	33	56.0
May.	66	24	36.4
June.	42	27	64.3
July.	54	13	24.0
August.	49	16	32.6
September.	37	14	37.8
October.	66	17	25.7
November.	38	11	28.9
December.	8	5	62.5
Total.	505	203	40.2

It will be noted that the total death-rate is considerably lower than the rate for 1922. The figure would undoubtedly have been very much lower if it had not been for a virulent form of pneumonia throughout the Colony during part of the year. The large number of deaths in April coincided with exceptionally heavy rains over the whole line of construction, the effect of which was not only to increase directly the deaths from pneumonia and allied diseases, but also to impede the medical service by hindering transport of sick to hospital and generally to disorganise movement of labour and supply of food. Fairly heavy rain continued during the greater part of the year, but the pneumonia which still exacted its toll of deaths cannot be ascribed solely to climatic conditions, as the high figures in August, September and October corresponded with an exceptional mortality from this disease in other parts of the Colony. There was also at this period an undoubted epidemic of influenza in several of the Labour Camps.

But for this fatal form of pneumonia the death-rate would have been surprisingly low. Intestinal disease was gratifyingly infrequent, and there was a fortunate freedom from the peculiarly tropical epidemic diseases. Cerebro-spinal menengitis is reported to have been responsible for 47 deaths, but it is more than probable that some at least of these were in reality pneumococcal in origin.

The progressive improvement in the sickness and mortality rate during the course of the year, and the general improvement for the whole year in comparison with 1922, can be ascribed to the following factors:—

(1) More efficient sanitary supervision of Labour Camps.

(2) Systematic and supervised treatment of casual sick. During 1922 the system of trained Native Dressers in Labour Camps was only being organised; in 1923 it was in full swing and proving very effective.

(3) A better organised system of Hospitals. During 1922 there was continual difficulty in obtaining sufficient hospital accommodation; in 1923 this difficulty was surmounted.

(4) Education of the employers of labour in the art of caring for their native labourers. Many sub-contractors who, during 1923, showed by the sickness and death returns of their labour that their employees were suffering unduly, dropped out of competition; there was a survival of the fittest not only on the part of the employees but of the employers; that is to say the employers who were the most fitted by temperament or experience to care for their labour were selected to carry out new contracts in the later stages of construction. To take the question of food alone: although the official authorised ration was not altered, yet most sub-contractors learned by experience that the well-fed native makes the better workman, and the greater part of the labour employed was receiving a more generous diet than that laid down. This particularly applies to the issue of meat.

(5) "Acclimatisation" of the natives. The real significance of this term needs a word of explanation. Apart from individual natives becoming accustomed to the conditions of work, there was also a process of selection. Those who were thriving on the work remained, those who were unfitted for hard work dropped out, repatriated to their Reserves.

(6) The largely increased supply of temporarily engaged natives. Instead of large gangs of labour, recruited from remote districts for a period of six months, the labour during the later stages of the construction consisted in great part of men who were individually engaged, on monthly or even shorter contract. This labour was of course entirely voluntary, and as a rule only comparatively strong and healthy

natives volunteered. Moreover any native proving unfit for the task, or becoming sick, was immediately released, as being unprofitable to his employer, whereas the Native recruited at considerable expense for a period of six months would have been retained until his repatriation was ordered by a Medical Officer. It speaks highly for the generally satisfactory conditions prevailing that there was no lack of willing labour during the latter part of the construction.

(7) More settled conditions of work. Camps were already established ; there was not so much movement of labour to inaccessible points without previous provision of housing. Most camps were extremely well built, and during 1923 the average Labour Camp was in reality a well-kept village.

Reverting to the unfortunate prevalence of pneumonia, it is worth while considering whether it would have been possible to have prevented this by carrying out general inoculation with anti-pneumococcal serum of all Natives employed. The suggestion was put forward by the Medical Department in October 1922, and after lengthy correspondence on the subject of the great expense involved the proposal was finally abandoned in February 1923, by which time it was realised that the Labour then being recruited was almost all casual labour on short terms of service, for which preventive inoculation was in practice impossible. Had the system of six months' contracts continued it would probably have been necessary to have insisted on anti-pneumococcal inoculation.

One further question suggests itself. Was the Labour adequately fed? The authorised ration was almost certainly inadequate. On the other hand most employers made arrangements for a more liberal issue. There were those who confined themselves to the strict scale, and some possibly who on occasions gave even less than this. At all events definite cases of food deficiency disease occurred. A few cases of beri-beri were reported. In another case there were symptoms of the disease described as Rand scurvy; this case terminated fatally. There was also a series of interesting cases in which the most noticeable symptom was a very firm induration of the tissues at the back of the knee. The patient, otherwise apparently healthy, would be admitted to Hospital with the leg fixed in a position of semi-flexion, owing to a painful and tender induration of the calf muscles and popliteal tissues. Before the cause of this affection was guessed, several of the cases ended fatally. It was then realised that this was a food deficiency disease, and with a full anti-scorbutic diet recovery was the rule.

Apart however from these definitely recognised cases of food deficiency disease, it is arguable that inadequate diet may have been responsible for other sickness and mortality. The fact that symptoms of beri-beri and scurvy were recognised proves that in the case of some Natives at least there actually was food deficiency. The assumption must be that many others were suffering from the same defect, and that in them the results may have appeared as pneumonia, dysentery, or other manifestations not at the time attributed to faulty diet. It is also probable that a regrettable number whose death or disability was described as "debility" may have suffered from food deficiency.

V.—MEAT AND FOOD INSPECTION AND CONTROL.

(a) SLAUGHTER HOUSES.

At Kisumu and Nairobi all beasts are examined both before and after slaughter. At Mombasa the latter examination is not at present feasible except at the market, a proceeding which is by no means satisfactory. Improved slaughtering accommodation is required at all three of the above towns.

A certain improvement had been hoped for at Mombasa as the result of the erection of a pig slaughter-house. Unfortunately as the result of objections raised by the Mohamedan section of the country to the effect that it was too near the cattle slaughter-house, it has not so far been put into use.

It is to be hoped that the objections raised may soon be overcome ; as the two slaughter-houses are at least 70 yards apart, these would hardly appear to rest on any strong foundation.

(b) MILK.

Regulations for the more complete control of dairies and milk supplies were published for comment early in the year. Very few objections were raised by the trade, and it is expected that the Regulations will at an early date become law.

In Nairobi 235 samples of milk were submitted by the Medical Officer of Health to the Analyst for examination. Of these 48 or 20.4% contained added water and one was skimmed. The percentage of added water varied from 6 to 60 with an average of 16.7. The corresponding figures for the previous year were : total samples 345, adulterated 151 or 43.7% and the average percentage of added water 18.0 The percentage of adulterated samples has therefore been reduced by about half.

In all cases of adulteration prosecutions were undertaken and convictions obtained, fines totalling Shgs. 2,260/- being imposed.

(c) CONTROL OF FOOD AT PORTS.

The following articles were condemned at the port of Mombasa:—

Condensed milk	570	tins.
Marmalade	148	one lb. tins.
Jam	322	one lb. tins.
Tinned herrings	50	two lb. tins.
Tinned fruit	9	two lb. tins.
Tinned vegetables	13	one lb. tins.
Vegetables and fruit	19	lbs.
Onions.	105	lbs.
Oranges	30	baskets.

By the Public Health (Port Health) Regulations, 1923, which became law during the year, power is given to the Medical Officer of Health to inspect and to remove for examination samples of any consignment of articles of food deposited in port areas for purposes of sale. These powers are most necessary and constitute a considerable advance in food control legislation.

VI.–SANITATION.

IN NATIVE RESERVES.

A general account of the conditions which pertain in the Native Reserves of the Colony was given in the Annual Report for 1922. These conditions are not such as are readily altered, and though there has doubtless been progress during the year, no measurable change has taken place. It had been hoped that it might have been possible to have established in one of the districts of the Nyanza Province a small model village in which the buildings, while of simple construction and within the limits of the purse of a well-to-do native, would have been of a more hygienic nature and less likely to harbour rats than those at present in use; unfortunately, it was not possible to carry the scheme into effect. If possible the erection of such a village should be undertaken in 1924. The matter is one of importance, more particularly as with the development of the Nyanza Province as a cotton-growing area the possibility of more serious outbreaks of plague is not unlikely to be increased. As, however, the Kavirondo are by no means unreceptive of new ideas, it should not be impossible to induce them to devote some portion of the profits which they should derive from the new industry to the betterment of their housing, and so to some extent at least reduce any risks which may attend the development of the cotton-growing industry in an area where plague is endemic.

An activity of Government which in the long run should have great effect in promoting hygienic conditions in the Reserves has been the holding in these Reserves of Agricultural Shows for native produce. Great success attended such a show recently held in the Nyanza Province, and sooner or later a considerable improvement in native produce should follow; such improvement will in the long run result in better and more regular food supplies being available, and should considerably affect the health and physique of the people. Further, good stock cannot be produced under grossly insanitary conditions, and there will be an additional stimulus to improve these conditions to the benefit not only of the stock but of the human inhabitants of the villages.

SANITATION IN THE SETTLED AREAS AND TOWNSHIPS.

A notable feature of the year has been the success which has attended agriculture generally and the development of the maize-growing industry in particular; it would appear probable that in the near future the production of maize will be largely increased. At the same time communications, both by road and rail, have been greatly improved and further improvements are projected. This development is not unattended with risk in a country, in many parts of which plague is endemic, and it has become increasingly obvious during the year that the present small sanitary staff is insufficient to deal with the situation. When outbreaks of plague have occurred it has not been possible either adequately to investigate the circumstances or to carry out in an efficient manner even those measures of prevention with which we are acquainted. *Equally important is the fact that we are not at present able to take full advantage of the opportunities which now present to ensure the development of growing townships on sanitary lines.* Some relief will be afforded if the increases which are proposed in the Estimates for 1924 are sanctioned, but still further strengthening of the staff of Sanitary Inspectors and Health Officers will shortly be required, if the development in growing townships of conditions similar to those which to-day make the eradication of plague in Nairobi a difficult matter is to be avoided.

The need for such additional staff is urgent, for not only is there the prevention of the occurrence of insanitary conditions to be undertaken but there is an extensive field of work in the direction of the improvement and remodelling of the many insanitary areas which already exist in most of the townships of the Colony.

SANITARY ADMINISTRATION.

A notable achievement of the year has been the acceptance by the Legislature of a proposal to make provision for the appointment of a Chief Sanitary Inspector, who will be posted to the Administrative Division of the Department. This appointment, if sanctioned, will enable to be undertaken not only much more inspectional work than is at present performed but will allow of progress being made in the drafting, redrafting and codification of sanitary by-laws and regulations, the need for which was fully detailed in the Report for 1922. During the year under review it is to be regretted that owing to the pressure of routine work but little progress was made in this direction.

In the smaller Townships of the Settled Areas, Eldoret, Nakuru, etc.—

The sanitary administration of these townships cannot be regarded as satisfactory. Situated as they are in the centres of areas where active development is now taking place, it is a matter of some urgency that steps should be taken to ensure that the development of the towns themselves should be on sanitary lines. The improvement of the many insanitary buildings which already exist in these towns has also to be undertaken. For supervision it is hoped that it will be possible to supply an European Sanitary Inspector during the present year, but to ensure that these places become the pleasant and well-managed country towns which they should be, the whole question of their sanitary administration and the provision of funds for public purposes should at an early date be investigated.

In the larger Townships: Kisumu, Nairobi, Mombasa.—

(1) *Kisumu.*—The sanitary administration of Kisumu has as usual been carried on in a very satisfactory manner. Very largely this is due to the fact that there is an Administrative Officer, the Superintendent of Inland Revenue and Conservancy, possessed of technical experience, in a position to give adequate supervision to all township matters. The creation of similar posts in the townships of Eldoret and Nakuru, which have previously been referred to above, should receive consideration.

Though Kisumu is maintained to all appearance in a very pleasing and tidy condition, there is a number of matters which require attention. Unfortunately these matters are such as will involve the expenditure of considerable sums of money. They are in order of importance as follows:—

The improvement of the Water Supply.
The provision of improved public latrines.
The installation of some form of drainage system more particularly in the commercial area.
The provision of a new slaughter-house.

The total number of inspections carried out by the European Sanitary Inspector was as follows:—

Nuisance and general Inspections	4,553
Licensed premises Inspections	398
Native market Inspections	317
Slaughter-house Inspections	634
Total.	5,902

The total is 1,600 less than in the previous year. This is due to the frequent absence of the Inspector on inspection of various small townships on the Railway line, an important work which was taken up during the year.

(2) *Nairobi.*—Though the amount of work which remains to be done, both by the Municipal Council and by private owners, before Nairobi becomes a town which might be held up as an example of the result of sound sanitary administration is very considerable, it is pleasing to be able to record that many advances have been made during the year, and that not the least of these is the advance which there has been in public opinion with regard to several matters of fundamental importance.

Of the latter perhaps the most important is the increased realisation by the public of the necessity for the institution of an adequate housing scheme for the native population. Plans for a variety of types of permanent native housing have been prepared by the Medical Department, and there would seem to be a fair prospect that some considerable scheme will at no distant date be adopted and carried into effect.

A further matter of importance has been the acceptance by the Corporation of the principle of the limitation of the number of dwellings which may be allowed to the acre in all portions of the town. Legislation to give effect to this principle has been drafted and should shortly become law.

Of works of importance which have been carried out the improvement of the water supply, both in regard to collection and distribution, should be mentioned, and though it cannot be said that the supply is such that contamination is impossible, the conditions are now such that if it be proved, as is likely to be the case, that some form of treatment is necessary or advisable, it will be a matter of no great difficulty to install the necessary apparatus.

As regards native housing a great improvement has been effected by the Corporation by demolishing the insanitary premises in which their native cleansing staff was housed, and the replacement of the same by a number of well-built ranges of dormitories of permanent construction.

During the year also considerable progress has been made in securing the demolition of insanitary native quarters on private premises, and the replacement of the same by adequate and well-built boys' quarters.

Considerable progress has also been made in the matter of providing at least the more crowded areas in the centre of the town with a water-borne sewage system. The pipes are now in the country, and before the end of 1924 the system should be in operation.

Details of the routine sanitary work carried out at the instance of the Health Office are given below:—

House to House and General Inspections.

First inspection	2,177
Subsequent Inspection	3,548
Trade Inspection	13,363
Drainage Inspection	103
Total	19,191

Sanitary and Other Notices served.

Outstanding from previous year	67
Served during the year	417
Not proceeded with	23
Complied with	419
Outstanding	42

Results of Notices and Informations.

Premises demolished	49
Premises closed	128
Premises limewashed or painted	92
Premises cleaned	99
Premises floors relaid.	38
Premises floors repaired	42
Premises yards or plots cleared of rubbish	27
Deposit of refuse, stones, etc., removed	26
Deposit of refuse, stones, etc., stopped	28
Areas cleared of long grass, bush, etc., approx. 299 acres.	129
Yards paved	25
Passages and open areas cleaned	10
Yards cleaned	39
New latrines provided	77
Latrines condemned	84
Latrines cleansed	6
Latrines re-constructed	25
Latrines repaired	75
Sanitary buckets provided	47
Masonry or concrete trays provided to standpipe	8
Dustbin provided	62
Dustbin lids provided	47
Masonry or concrete drains provided 370½ yards	59
Masonry or concrete drains relaid or repaired 142 yards.	46
Masonry or concrete drains cleansed 215 yards.	21
Trestle for stacking foodstuffs provided	21
Trestle for stacking firewood provided	9
Huts burned	24
Huts removed	193
Kitchens provided	23
Kitchens repaired	5
Store rooms provided	4
Earth drains cut	yds. 208
Earth drains cleansed	„ 6,459
Borrow pits and hollows filled in	74
Down-pipes and eaves gutters provided	36
Waste-pipes provided	37
Waste-pipes repaired	56
Soakaway pits provided	21
Soakaway pits cleansed	16
Soakaway pits filled in	3

Cattle sheds and bomas cleansed	62
Cattle sheds and bomas closed	8
Overcrowding stopped	18
Sleeping in the kitchen and stores stopped	41
Mosquito breeding places dealt with	38
Unspecified nuisance abated	73
Glazed windows provided	70
Glazed windows repaired	52
Kaustin tanks cleansed	4
New native quarters erected to plans	12
Roofs of dwellings repaired	3
Excavations on Crown land stopped	3
Baths trapped with 2½ inch water seal	3
Sinks trapped with 2½ inch water seal	2
New drains tested	5
Culverts cleansed	31
Culverts repaired	2
Culverts oiled	27
Swampy areas oiled (about 23 acres)	4

Disinfections.

Premises	75
Number of articles (approx.)	8,298
Number of articles destroyed	185

LICENSED PREMISES.

Description.	Number of Premises.	Number of Inspections.	Applied for.	Approved.	Not approved.
Bakeries.	8	136	9	8	1
Aerated water factories.	1	30	2	2	1 closed since.
Butchers.	22	477	32	25	7
Cattle sheds and stables.	54	895	57	54	3 Since Jan. 8 closed.
Eating houses.	30	845	43	36	7
Fish mongers.	8	216	10	8	2
Dhobies.	21	547	32	24	8
Laundries.	6	163	7	6	1
Trade premises.	428	9,326	502	428	74
Vegetable sellers.	15	385	24	18	6
Sweetmeat sellers.	8	191	13	8	5
Lodging houses.	—	—	1	—	1
Total.	601	13,211	732	617	115

PROSECUTIONS.

Number of Cases.	Convictions.	Withdrawn.	Cases lost.	Penalties.
Under Township Rules, 50	50	Nil.	Nil.	(1) Shgs. 2,260/- (2) Two juveniles discharged with a caution. (3) Five strokes with a cane.
Under Infectious Diseases Public Health Ordinance, 1921. 14	14	Nil.	Nil.	4 Magistrate's orders complied with. 6 premises closed. 4 premises to be demolished. 1 fine Shgs.69/-.
Indian Penal Code, 1	1	Nil.	Nil.	Fine Shgs. 150/- and costs.

(3) *Mombasa.*—In Mombasa no notable developments have taken place during the year, nor will any marked improvement of sanitary conditions be possible until more land can be set free for the erection of further housing.

Housing and Town-planning.—The conditions under which the general population is housed have remained almost unchanged during the year.

Little building development has taken place, only seven stone buildings and forty-seven huts having been newly erected during the year.

Except in a few cases where extensive alterations have taken place building has been confined to repairs, additions and alterations of minor nature.

This state of affairs is determined by two main causes: first financial stringency and secondly the fact that development has been made almost impossible by the uncertainty which has existed as to the adoption or otherwise of the Town-planning Scheme.

This scheme, if approved, will very considerably alter conditions under which land can be developed and buildings erected, and it follows that development must be delayed until these conditions are definitely settled.

In addition it has been impossible for theTownship Authority to approve private schemes of sub-division until the Town-planning Scheme submitted has been approved or rejected.

The provision of additional housing for natives is a most urgent necessity. There appears to be little tendency to private enterprise in this respect, and even if such existed it would have been impossible of accomplishment for the reasons stated above.

At present it is impossible to give effect to any Government Housing Scheme for the reason that it is necessary to reserve all available crown land for purposes of exchange and compensation in connection with the Town-planning Scheme.

The amount of land which will be required for these purposes is at present unknown, and the execution of any housing scheme must therefore be withheld until such time as will permit of definite allocation of land for the purpose.

It is to be hoped that when the rearrangement of plots and the alignments of roads under the proposed Town-planning Scheme have been accomplished, private owners will use their land for the provision of native houses, and that it will be possible to give effect to a Government or Municipal Housing Scheme for natives, particularly the floating labour population, which is gradually becoming greater and which is in ever increasing need for some such provision.

In the event of development in these directions it will be possible to control the type of house erected, and the layout adopted, etc., in such a manner as to obtain good sanitary housing and to avoid the overcrowding which is to be seen in any portion of the town which has hitherto been used for the erection of native houses.

The housing conditions existing in the "old stone town" or bazaar area, in which the majority of the Indian and Arab populations live are appalling.

Internal rooms are the rule rather than the exception, and in a very large number of houses light never penetrates and ventilation is unknown.

Unfortunately the construction of the houses and the manner in which they are crowded together make it impossible to carry out any great degree of improvement on a large scale although in some cases by alteration and reconstruction it is possible to ameliorate to a varying extent the existing insanitary and unhealthy conditions.

To the evils of insanitary construction are added those of gross overcrowding, and the latter is accentuated by the fact that many of these buildings are used as combined business and dwelling premises, with the result that most of the available accommodation is devoted to the shop and to stores, while the occupier and his family herd in dark holes and corners at the rear of the premises—living rooms, sleeping rooms, kitchens and latrines being intermingled with and often indistinguishable from one another.

To deal adequately with large portions of this part of the town it will be necessary to treat them as insanitary areas in some such manner as that provided for by the English Housing and Town-planning Acts.

For the control of the erection of new buildings and of alterations and additions to existing buildings new and comprehensive buildings regulations are required. The preparation of these cannot be attempted until a decision is come to with regard to the Town-planning Scheme submitted.

This scheme contains many principles affecting the conditions, subject to which buildings may be erected, as regards number per acre, height, area of plot covered, etc.

Any building regulations adopted would be governed largely by these principles, and until a decision in this matter is made it follows that the preparation of any regulations would be premature.

Considerable opposition has been raised to the fact that no distinction in favour of care-takers in premises exists or is proposed.

The law as at present existing takes no cognisance of the care-taker as distinct from any other person, and a building in which a care-taker resides is therefore a dwelling

and such building must conform to the regulations prescribed for dwellings notably the restriction of the building to half the plot. Under the Town-planning Scheme a concession is made to the effect that only such storey as is occupied by one or more persons shall be subject to the regulations prescribed for dwellings.

No further concession should be made, and no distinction made between a care-taker and other person.

The provision of care-takers' quarters in premises covering the whole plot would strike at the root of the principle which discountenances the use for human habitation of buildings covering more than half the plot—a most necessary restriction. Further, the definition of a care-taker's or care-takers' premises is a matter of the greatest difficulty and impossible of administration.

To permit care-takers' quarters in nominally commercial premises would result in construction of residential flats in buildings covering the whole area of the plot—a most retrograde step.

It is essential that at all costs overcrowding be avoided, and one of the most useful instruments with which to prevent this is the rule that no human habitation by any person, be he caretaker or otherwise, shall be permitted in a building covering more than one half of the plot on which it stands.

Details of the routine sanitary work carried out at the instance of the Health Office are given below:—

ROUTINE WORK OF SANITARY INSPECTORS.

Inspections made.

Nuisance and general Inspections	3,670
Licensed premises Inspections	2,463
Food Inspections	381
Water Inspections	42
Building application Inspection of Premises	701
Plan Inspections	28
	7,285

Plans and Building Applications.

Number of plans submitted	25
Number of plans approved	22
Number of plans disapproved	3
Number of building applications submitted	519
Number of building applications approved	393
Number of building applications disapproved	124

Food.

Class of Food.	Quantity examined.	Quantity condemned.
Beef.		4,189 lbs.
Mutton.		826 lbs.
Fresh Vegetables and Fruit.		19 lbs.
Fat.		2 lbs.
Kidneys.		4
Fruit, Tins		9 2 lb tins
Ox Tongues.		6
Livers.		29
Marmalade.	148 1 lb tins.	148 1 lb tins.
Jam.	322 1 lb tins.	322 1 lb tins.
Tinned Herrings.	50 1 lb tins.	50 1 lb tins.
Condensed Milk.	31,327 tins.	570 tins.
Tinned Vegetables.	13 1 lb tins.	13 1 lb tins
Onions.	105 lbs.	105 lbs.
Oranges.	30 baskets.	30 baskets.

Licensed Premises.

Class of Premises	Number of Premises.
Aerated Water Factories	3
Bakeries	9
Butcheries	1
Cattle Sheds	22
Dhobies	18
Eating Houses	55
Hotels	4
Ice Factory	1
Lodging Houses	5
Milk shop	1
Tembo shops and bars	15
Milk Sellers	22

Sanitary and General Notices Served.

Notices served	345
Notices cancelled	5
Notices outstanding	12
Notices compiled with	328

Complaints.

Complaints received	25
Premises inspected re complaints	29

Water Applications.

Number of applications for Pipe Water Supply submitted.	42
Number of applications for Pipe Water Supply approved.	34
Number of applications for Pipe Water Supply not approved.	8

Disinfection.

Number of Houses disinfected	25
Number of Rooms disinfected	126
Number of Articles disinfected	27,179
Number of Articles destroyed	—

Also 329 bags of cotton seed have been disinfected.

Prosecutions.

Class.	Number.	Convictions.	Fines.
			Shgs. Cts.
Township Rules.	2	2	10 00
Nuisance Rules	—	—	—
Licensed Premises.	2	2	120 00
Mosquito Rules.	10	10	57 50
	14	14	187 50

MATERNITY AND CHILD WELFARE.

At Nairobi two health centres have been opened and are visited twice weekly by the Nursing Sister attached to the Health Office. The dispensaries are situated one at the new native location and the other on the edge of the Kikuyu Native Reserve eight miles out of Nairobi. The number of patients treated totalled 596 and 714. At the second of the dispensaries mentioned above a native dresser is stationed, so that the institution closely approximates the sub-dispensaries situated in the Reserves, as have been described previously. A certain number of cases attends the Nursing Sister at her Office. The work performed cannot be described as consisting entirely of maternity and child welfare; a number of men are seen, but useful ground work is being performed.

The Government Indian School has been visited once every week, and Mission Schools have been attended by arrangement with those in charge.

At Mombasa it is most satisfactory to note that the efforts made to promote the welfare of mothers and children are meeting with increased success as time goes on.

The following figures are useful as an index of work done during the year:—

New cases dealt with	1,441
Attendances at Clinic.	5,863
Visits made by Health Sister	2,244
Cases sent to Hospital for treatment.	55

This is a considerable increase on that accomplished during 1922, in spite of the fact that the work has suffered interruption on account of ill-health on the part of the Health Sister, and also that during the epidemic of plague her time was largely devoted to the prophylactic inoculation of women and children, which is not included in the above figures.

At the Clinic and in the home visitation instruction is given in the care and treatment of infants and children, in their feeding, prevention of spread of infectious diseases, and in simple hygiene.

A certain amount of ante and post natal work is also attempted.

Results have been encouraging and the number of attendances is ample proof of the fact that the efforts made are appreciated.

This branch of public health work can with advantage be extended.

PORT SANITATION.

(A) MOVEMENT OF SHIPPING.

The following vessels entered Mombasa and Kilindini harbours during the year:—

Foreign going steamships.	263	
Coastal steamships	117	
Foreign going dhows.	105	
Coastal dhows.	1,107	
Total vessels all descriptions	1,592	as against 1,773 during 1922.

Information as to the number of passengers embarking and disembarking at the port is not available.

Bills of Health issued to out-going vessels:—

Steamships, etc.,	343	
Dhows.	142	
Total	485	as against 567 during 1922.

(B) BOARDING OF VESSELS BY PORT HEALTH OFFICER.

The following Vessels were boarded on arrival by the Port Health Officer or Assistant Surgeon in connection with the granting of pratique:—

Steamships, etc.	380	
Dhows.	558	
Total.	938	as against 706 during 1922.

(C) INFECTIOUS DISEASE IN VESSELS.

No case of infectious disease was notified as occurring in Vessels while in port.

The undermentioned Vessels were specially dealt with on arrival at this port owing to presence of infectious disease on board:—

1. S.S. Karagola, B. I. S. N. Co., from Bombay arrived in Kilindini on 30th March. One case of Small-pox—2nd Engineer—was declared.

   Restricted pratique was given, all Mombasa passengers were landed under medical surveillance after vaccination. The patient was landed and taken to hospital. Vaccinated Stevedores were allowed to board and handle cargo.

   N.B.—The patient who afterwards recovered had never been vaccinated being a conscientious objector. The attention of the Shipping Company was called to the necessity for insisting in their own interests on the vaccination of all members of the crews of ships in the Bombay—Durban service.

2. S.S. Karagola, B. I. S. N. Co., from Bombay arrived in Kilindini on 25th May. She had on board one deck passenger suffering from Small-pox. The ship was given restricted pratique.

   First and second class passengers for Mombasa were landed under medical surveillance after vaccination. Deck passengers were not allowed to land and proceeded with the ship to Zanzibar where they underwent quarantine for 16 days from the date of isolation of the case.

   Cargo was handled by vaccinated Stevedores. Visitors were not allowed to board the ship. The case was removed to Hospital and ultimately recovered.

3. S.S. General Duchense, Messageries Maritimes Cie., from Mauritius arrived in Kilindini on 11th December.

She had on board four cases of bubonic plague among the crew and there was evidence of rodent plague on board.

The ship was given restricted pratique.

First and second class passengers were allowed to land direct under medical surveillance. Deck passengers were removed to the Infectious Diseases Hospital for disinfection and inoculation with anti-plague vaccine. They were then released under surveillance.

No cargo was landed.

The four cases—One European and 3 natives—were removed to Hospital where the diagnosis was confirmed bacteriologically in each case.

The European and one native afterwards died, the other two natives recovered.

4. S.S. Khandalla, B. I. S. N. Co., from Bombay arrived in Kilindini on 22nd December. She had been infected with Small-pox among the deck passengers and had proceeded to Zanzibar prior to her arrival in Mombasa.

At Zanzibar, the case had been removed and the ship disinfected and the deck passengers for all East African Ports removed and placed in quarantine.

On arrival at Mombasa the 1st and 2nd class passengers were landed under surveillance. The ship was given pratique.

(D) PRECAUTIONARY MEASURES AGAINST TRANSFERENCE OF INFECTIOUS DISEASE BETWEEN SHORE AND SHIPPING.

Up to the present time the means of preventing the introduction of infectious disease from ships to the town have consisted of the routine boarding of ships by the Port Health Officer with a view to examination of the state of the health of those on board and by the restriction of communication with the shore in such cases as appeared to demand it. Added to this is the natural protection afforded by the fact that in almost all cases ships lie at anchor in the stream instead of lying alongside wharves.

Such measures and conditions do not afford complete protection and it is doubtful if such can ever be obtained no matter what steps are taken.

In the case of Small-pox, Mombasa is in constant communication with infected ports the voyage from which occupies a shorter time than the incubation period of the disease. Cases of small-pox are therefore likely to be imported in which at the time of landing no evidence of the disease is to be seen.

With regard to plague, there remains always the possibility of plague infected rats making their way from ship to shore in cargo, or passing from ship to lighters by means of hawsers, gangways, etc., and thence to the shore.

This risk is probably less than might naturally be assumed, owing to the fact that it is by no means easy for a rat having once got into a lighter to get out again, particularly at the time when he is most likely to try, viz. when most of the "cover" has been removed in the process of unloading.

The risk will be very greatly increased when the deep water pier is completed and it becomes a general practice for ships to lie alongside.

The institution of further precautionary measures will then be necessary.

During the recent epidemic of plague, attention was directed to the necessity for taking steps to prevent the migration of infected rats from the port areas into ships.

With this end in view, as far as possible all export cargo was examined immediately prior to lightering. Any package, bag, etc., which was suspected of having been rat broached was put aside for closer investigation and if necessary fumigation. In addition, lighters were not allowed to lie alongside the wharves except when actually in process of loading and unloading.

No restrictions were placed upon the loading of ships by night. Such a measure would have caused very considerable dislocation in the import and export trade of the port and the time at which ships load is entirely secondary to the conditions under which the lighters are loaded in the first place.

The possibility of rats making their way into lighters from the wharf when the lighter is being worked—be it by day or night—is small.

It was, therefore, considered that the precautions taken with regard to loading of lighters reduced risk of migration of rodents to a minimum and that restrictions as to the working of ships at night were undesirable and unnecessary.

The state of affairs to be aimed at is to maintain the port areas free from infection.

Conditions at present are favourable to rat breeding and rat harbourage. Grain and other rat foods are stored in sheds by no means rat proof and until recently the floors of several sheds so used were of rammed earth and coral.

As a result of representations made to the Hon'ble General Manager, Uganda Railway, concrete floors were provided for these sheds.

At present the storage room is insufficient and bags of maize are stacked outside the sheds. Until ample rat proof accommodation is available, the rat population will flourish in spite of all efforts in the direction of rat destruction.

(E) QUARANTINE STATION.

Zanzibar remains the Quarantine Station for the Port.

The necessity for the provision of a Quarantine Station at Mombasa was again urged by various persons during the year. If the port is to be complete and the principle of quarantine retained doubtless such a station will ultimately be necessary.

It should be noted, however, that on only two occasions during the year was the Zanzibar Station made use of on behalf of this port. The establishment of a Quarantine Station is an expensive undertaking and under the circumstances such expenditure would appear unjustifiable at present.

VII.–HOSPITALS, DISPENSARIES AND INSTITUTIONS.

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(1) GENERAL REMARKS.

Analysis of the figures of admissions to hospital throughout the country for the year reveals the following:—

	In-patients.			Deaths.		
	1923.	1922.	1921.	1923.	1922.	1921.
European Officials. ..	596	635	592	4	5	4
Non-European Officials. ..	2,603	3,337	3,951	2	6	10
General European Population.	629	1,106	728	13	21	31
General Native Population.	33,229	37,384	23,634	830	820	809

Note.—For the purpose of statistics, in-patients include all patients confined to quarters.

The drop in the number of native in-patients is accounted for by:—(1) Closing down of eleven small native hospitals at out-stations, as the result of the retrenchment which took place in 1922. (2) A large decrease in the number treated as in-patients at Kisii, owing to the frequent absence of the Medical Officer on tour through the District. At most other native hospitals there was a substantial increase in the number of in-patients; in the section on "Native Hospitals and Dispensaries" it will be noticed that the total number of native patients treated has very largely increased.

The fact that native laboratory assistants have been in training for some time for ultimate posting to the various hospitals has already been commented on in the "Administration" section.

(2) EUROPEAN HOSPITALS.

No structural improvement of any magnitude has taken place during the year with regard to the European Hospitals. The arrangement by which the Eldoret European Hospital was handed over at the end of 1922 to the local community has worked well and the efficiency and usefulness of the institution has been maintained.

During the year it was found possible to provide funds for a new X-ray apparatus; this will be installed at Nairobi, and the present one moved down to Mombasa, where the need for such has been felt for a long time past.

The comparative table of cases treated in the three European Hospitals is shown below:—

	1923.	1922.	1921.
Total number treated.	490	748	667
Total number discharged.	464	709	618
Total number of deaths.	12	22	27
Total number remaining.	14	17	22

The fact that the European Hospital, Eldoret, is no longer a Government institution accounts partly for the drop in the total number of admissions, but the decrease was general throughout the country. The total number of cases of malaria alone falls short of the figure for 1922, by more than a hundred.

In the various hospitals 133 admissions were of officials and 340 of non-officials, as against 162 and 585 in the preceding year. Two officials died, and 10 non-officials, as against 5 and 17 in 1922.

The distribution of the various cases was as follows:—

	Officials.	Non-Officials.
Mombasa	48 ..	151
Nairobi	62 ..	143
Kisumu	23 ..	46

Malaria was as usual the chief cause (30.6 per cent.) of admission to hospital, but the totals were considerably less than last year being 145 as against 259.

The cases of surgical disease, and the operations performed, have decreased very largely, and account for a considerable proportion of the drop in the total numbers of admissions.

Only 93 operations were performed as against 178 in 1922, and were distributed as follows:—

Mombasa.	27
Nairobi.	66
Kisumu.	—

Only one death occurred after operation, a case of hernia which developed malaria.

(3) NATIVE HOSPITALS AND DISPENSARIES.

It was found possible at the end of April to re-open the dispensary at Nyeri, which had been closed down in 1922, as a result of retrenchment, and to put a Sub-Assistant Surgeon in charge. The relief to the Medical Officer stationed at Fort-Hall has been considerable in that the call on his time necessitated by visits to Nyeri has been much lessened.

The increased confidence in the Government Hospitals has shown itself in increasing demands for admission, with the result that accommodation at Mombasa, Nairobi and Kisumu has been severely strained, and the question of extension, especially at Mombasa, is becoming urgent. The Senior Medical Officer in charge of the Native Hospital, Mombasa, reports.—"During the year 1923, the great difficulty has been to keep the in-patients at a reasonable number and prevent overcrowding of the Hospital; if accommodation were available hundreds more patients could have been admitted, and, daily, cases that should really be in Hospital have to be turned away with a promise that as soon as a bed may be available they would be considered. The Hospital can take 96 patients comfortably, any more than this means overcrowding, but for months past it has been well above this number."

At Nairobi an additional ward for dysentery cases has been erected. The ward is fly-proof, has a proper fly-lock in the shape of an entrance of two doors with a fly-proof passage between, and its own fly-proof latrine. There should, with the new ward, be no fear now of an outbreak of dysentery being started in the Hospital on account of the admission of dysentery cases. The total accommodation at Nairobi is now in the neighbourhood of 190 cases, and this even is not more than is required.

The increased number of patients in Hospital since the new arrangements detailed in the 1922 Report came into being, which now amounts to over 50 per cent, has rendered it apparent that one Medical Officer, even though part of the surgical work has been undertaken by the Resident Surgical Officer of the European Hospital, is unable to cope with the work offering at the Hospital, the Out-patient Department and the other institutions in Nairobi. Arrangements have been made by which an extra Medical Officer will be posted in 1924.

The amount of work offering and the limited staff available at Nairobi has rendered it impossible to proceed with any syllabus for education of the hospital dressers, nevertheless a large amount of instruction is being given, chiefly in the wards.

Further accommodation for the native staff and a school room, with a native teacher in charge, have been provided; new stores for food and equipment have been erected.

The native teacher gives instruction in general education every evening from 6 to 8, and the dressers and attendants in training attend daily. Without a certain measure of general education it is impossible to impart medical knowledge beyond an elementary stage, and difficulty is experienced in obtaining candidates with the requisite attainments.

At Kisumu, the accommodation available has been increased by the erection of a new ward constructed of wood and iron to accommodate 20 patients. There is need of a new kitchen, increased latrine accommodation, and an operating theatre; at present a small ward, quite unsuitable for the purpose, is used for operations.

It is hoped that before long provision will be made to enable an European Nursing Sister to be attached to the Kisumu Native Hospital. The experiment of posting a Nursing Sister to the Mombasa and Nairobi Native Hospitals has proved so successful that it should be followed at Kisumu.

The replacing of the temporary buildings, constructed of wattle and daub, at Kakamega and other stations will have to be seriously considered. A temporary building is expensive to maintain, as it requires frequent renewal, and the conditions inseparable from such are not conducive to the best interests of the patients or encouragement of the Medical Officers.

The record of cases treated and deaths at the various Native Hospitals is as follows:-

	1923.		1922.		1921.	
	In.	Out.	In.	Out.	In.	Out.
Admissions. ..	33,229	245,554	37,384	165,538	23,634	154,198
Deaths. ..	830	—	821	—	809	—
Death rate per 1,000 of admissions. ..	24.97	—	21.96	—	34.23	—

Of the total number of out-patients 110,509 were treated at sub-dispensaries by the dressers in charge or by Medical Officers when touring their districts.

(4) NATIVE RESERVES.

Under the remarks on yaws some indication has already been given of the extent of the work which has been carried out in the Native Reserves. The economic effect is impossible of calculation, but it may be said that the results already achieved cannot fail to increase both the available labour supply and the production of the country.

Not the least important result of the medical activities in the Reserves is that every year a more correct appreciation of the conditions which obtain with regard to disease is gained, and public health activities can be directed with a proper regard to circumstances. In addition an acquaintance with the more intimate life of the people, without which it is difficult to suggest sanitary reforms, is being acquired.

The work in connection with the yaws campaign has already been detailed, and though this constitutes a large part of the activities, yet it by no means comprises the whole, and natives are applying more and more for treatment on account of other diseases.

The system of out-dispensaries in connection with medical centres has been continued and extended, and at the end of the year the following were in existence:—

Fort-Hall	8
South Kavirondo	7
Chuka	3
North Kavirondo	15
Central Kavirondo	7
Machakos	6

It has already been recorded that in the Fort-Hall area the functions of the out-dispensaries have been extended by the posting of attendants specially trained to give injections for yaws, and that valuable work has been performed in this direction.

The figures of cases treated in 1923, at the three essentially Native Reserve stations which were specially referred to in the 1922 Report, are of interest as showing the extent to which the work has expanded:—

	In-patients.	Out-patients.	Out-dispensaries and treated by Medical Officer on tour.
Chuka. ..	3,757 ..	1,775	5,672
Kisii. ..	2,796 ..	8,306	22,811
Kakamega. ..	1,105 ..	9,271	28,017
Total. ..	7,658 ..	19,352	56,500

Before extensions are made, or permanent buildings erected, at Chuka, the question will have to be seriously considered as to whether this shall remain a permanent headquarter centre. The bulk of the work at Chuka has always consisted in the treatment of yaws, and the cases from the near neighbourhood have considerably fallen off in number owing to the vigour with which the anti-yaws campaign has been pushed. Under recent arrangements a Medical Officer will in future be stationed at Meru, and on account of this the cases at present treated at Chuka will be further diminished. A mission hospital exists in the neighbourhood, and it is a matter of consideration whether the Medical Officer at present stationed at Chuka could not carry out more work were the centre moved, and Chuka to become a sub-dispensary in charge of a dresser.

The question of the suitability of Fort-Hall as a medical centre also requires consideration. The station is situated in what is probably the most unhealthy locality in the district, and as a result there is considerable reluctance in attending there on the part of the inhabitants of the Reserve. No steps have been taken to decide on a more suitable site for a central Hospital, and any question with regard to this must be considered with due consideration to its possible loneliness and isolation.

(5) LUNATIC ASYLUM.

The following table shows the number of admissions and deaths during the past three years.

	Admissions.			Deaths.		
	1923.	1922.	1921. ..	1923.	1922.	1921.
Males.	69	67	70 ..	9	35	22
Females.	11	19	18 ..	5	4	1

During the year the total number of patients treated was again 168.

The varieties of insanity for which patients were admitted were:—

Mania	53
Melancholia	1
Dementia	2
Delusional Insanity	12
Other Mental Diseases	12

Fourteen deaths occurred, two among Europeans, and the percentage of deaths to the total number of cases treated was 8.33.

Forty-eight cases were discharged.

The percentage ratio of discharges to admissions was 72.5.

Ninety-six patients remained at the close of the year.

During the year 7 Europeans were admitted, 5 of whom were suffering from delirium tremens; there were two deaths, one due to melancholia and the other to mania and pernicious anaemia.

No new buildings have been erected at the Asylum during the year. The accommodation available is sufficient for present needs, but there is no margin.

During the year the crops resulting from cultivation in the Asylum grounds amounted to:—

Maize	lbs.	15,197.
Potatoes	lbs.	1,660.
Beans	lbs.	7,397.

(6) GAOLS.

Reference was made last year to the Report submitted in the latter part of 1922 by the Committee specially appointed, at the direction of the Secretary of State for the Colonies, to enquire into all matters affecting the Prisons and prison population of the Colony.

This report formed the subject of correspondence between the Secretary of State and the Colony, and in a despatch, dated February 7th, the Secretary of State requested that in future a section might be included in the Annual Medical Report "dealing with the health of the prisoners and the condition in which they live, together with an account of any improvements made in the accommodation, diet, sanitation, etc., during the year under review, and a list of recommendations for future improvements."

The following are the more important conclusions from the point of view of the health of the prisoners, at which the Committee arrived:—

(1) That the total prison capacity of the Colony was insufficient, that in many prisons overcrowding commonly occurred, and that in Nairobi Gaol overcrowding might be considered constant.

(2) That a definite allowance of floor and cubic space for each prisoner should be established for all prisons.

(3) That beds, preferably in the form of raised wooden platforms should be provided.

(4) That an improved diet scale for the African prisoners should be instituted.

With regard to the first conclusion it is to be regretted that the state of overcrowding still continues. The constant overcrowding of Nairobi Gaol, by far the biggest prison in the Colony, was particularly condemned by the Committee; unfortunately the state of affairs in this Gaol during 1923 has been no better than when reported by the Committee.

The building of this Gaol has never been completed. The portion completed has accommodation only for 347. The average number of African prisoners during 1923 was 794, and the excess has been accommodated in tents. This is of course undesirable in principle, and in practice has proved most unsatisfactory. Nairobi Gaol is situated on black cotton soil, and the nature of the site makes drainage difficult; consequently during the heavy rains the area occupied by these tents is little better than a swamp.

Moreover during certain months of the year there was difficulty in obtaining the requisite number of tents; in August, for example, the number of prisoners was over 900. Of these about 500 were accommodated in the permanent building; this represents an excess of 150 over the number permissible at the rate of 300 cubic feet of space per man. There were at that time 30 tents, each tent supposed to contain 10 men; yet at least 400 men were sleeping in these tents.

Nairobi Gaol serves as the overflow reservoir for other gaols. It is therefore essential that there should be not only sufficient, but surplus accommodation, instead of, as at present, barely half the accommodation required for its normal number of prisoners.

The second recommendation of the Committee has been carried out, and the principle has been laid down that 300 cubic feet and 27 superficial feet of space shall be allowed to each prisoner. Professor Sir William Simpson has expressed the opinion that 300 cubic feet is not sufficient, and this Department has advised at least 33 superficial feet instead of 27; however until additional prison buildings are provided it is impossible to insist on a higher standard than that at present recognised, which, as has been seen, is not in practice attained. To quote another example besides that of Nairobi: at Kisumu Gaol, with a capacity for 95 prisoners, the average number of prisoners during the year was 200.

The third recommendation, with regard to beds, has been carried out in the permanent portion of Nairobi Gaol. Raised wooden platforms, composed of detachable planks have been erected, and are proving quite satisfactory. Not the least advantage of these beds it that it is now impossible to confine more than the authorised number of prisoners in each cell so equipped.

The question of a suitable diet has proved very difficult to answer. There could be no doubt that the diet in use at the time of the Committee's Report was inadequate, and the diet suggested by the Committee was certainly an improvement. On further consideration of this suggested diet however it was realised that the physiological quality of the diet was not above criticism; in particular it was deficient in protein of biological value.

Consequently there was devised an experimental ration which, while being comparatively simple in composition, was theoretically adequate in biological value. This daily ration was made up of the following:—

Mealies	18 oz.
Beans	6 oz.
Potatoes	8 oz.
Meat	8 oz.
Ghee	¾ oz.
Lemon	one half.
Salt	½ oz.

In April a gang of 117 prisoners in the Nairobi Gaol was selected for the test, and to these men the experimental diet was issued; it was hoped to obtain some indication of the comparative value of this diet in practice. The weekly weighing to which every prisoner is subjected seemed to offer a simple test of the practical value of the diet; unfortunately the record of individual weights proved quite unreliable. At the outset the scales used for weighing were found to be inaccurate, and even when the instrument was adjusted the results recorded varied according to the operator. It was the custom then to carry out this weekly weighing on Saturday afternoon and Sunday, during hours when the staff concerned were supposed to be off duty; as the pattern of weighing machine in use made the accurate estimation of each prisoner's weight quite a lengthy process, and as the number of prisoners was eight hundred or more, there was not unnaturally a certain carelessness in the records. By the time that a better system of weighing had been instituted it was realised that the diet was proving sufficiently satisfactory, from the point of view of health and economy, to recommend its use on a larger scale. It was felt that no further time should be lost before the old inadequate ration was abolished. Therefore in May the issue of this ration was recommended for all prisoners serving terms of over six months, throughout the Colony.

At the same time, as there was a doubt whether sufficient evidence had been produced that meat was a necessary article for the average African, an alternative ration, to be issued to all short term prisoners, i.e., those serving sentence of six months or less, was advised. This ration consisted of:—

Mealies	2 lbs. daily.
Beans	5 ozs. „
Ghee	4 ozs. weekly.
Lemons	2 „
Salt	2 ozs. „

It will be noticed that this diet shows an excessive quantity of carbohydrate; there is a comparative deficiency of protien of biological value. In this it resembles the habitual and traditional food of the African Native, but it remains to be proved that it is an adequate diet.

It is to be regretted that though these two diets were introduced into all prisons in July, it is as yet impossible to base any definite conclusions on the results of their use. If the sick rate of the prison population be taken as a test of the suitability of the diet, many accidental factors enter into the problem. For example the sick rate for Nairobi Gaol would be entirely misleading, for the reason that at the time of introduction of the new diets there was prevalent a very virulent form of pneumonia, which affected the prison population along with the rest of the Colony. Again at that time the Gaol was unusually overcrowded, a factor which undoubtedly affected the sick rate. There is always also the disturbing element of minor infectious diseases, not perhaps in themselves of great significance, but very disturbing elements in any calculations made from records of hospital admissions. During 1923, chicken-pox was scarcely absent from the Nairobi Gaol, while measles and mumps appeared in succession. It is obvious that a case of any one of these diseases, involving as it does prolonged detention of the patient in hospital, would invalidate any deductions that might be made, from a consideration of hospital statistics, as to the general physical condition of the prison population.

There remains the test of the weekly variation in weight of the individual prisoners, and for the reasons already mentioned this test has not been so easy to apply. The following figures are given without any claim being made for their absolute accuracy. Of 382 long-term prisoners, resident in Nairobi Gaol at the time the experimental diet for long-term prisoners was introduced, whose weights were recorded over a period of six months, the entries of weights on June 30th and December 29th show that:—

183 or 47.9 per cent, had gained in weight, the average gain being 5.525 lbs.

167 or 43.7 per cent, had lost in weight, the average loss being 4.54 lbs.

32 or 8.4 per cent, had not altered. It would represent the result more fairly to state that the average gain of the total number was .662 lbs.

No figures from the other prisons of the Colony since the introduction of the new diets have yet been analysed. New weighing machines, with dial register, are being introduced into the three principal prisons, Nairobi, Mombasa and Kisumu. During the coming year it should be possible to make an exhaustive study of a great number of accurate records of individual weights, and so throw some light on the vexed question of the most suitable diet for an African. It must be recorded that the Commissioner of Prisons and his Staff have taken the greatest interest in all these enquiries; they have taken the greatest trouble to assist the Medical Department in obtaining reliable statistics, and without their help it would be impossible to carry out these investigations.

It may be said that the general opinion of the staff of the Prisons Department is that both the new diets are satisfactory and an improvement on the old diets, and that they appear to be appreciated by the prisoners themselves. Certainly the appearance of the long-term prisoners, in the Nairobi Gaol at any rate, does not suggest any deficiency in feeding, and even with the continued disadvantages of insufficient accommodation and liability to infectious disease the hospital records show an improvement on those of previous years.

The figures for the average daily number of prisoners, average daily number sick, and the death-rate are shown in the following Table. The figures for the three preceding years are given for comparison:—

	NAIROBI.				MOMBASA.				KISUMU.				All Other Prisons.	Total.
	1920.	1921.	1922.	1923.	1920.	1921.	1922.	1923.	1920.	1921.	1922.	1923.	1923.	1923.
Average daily number in Gaol. ..	737	760	738	794	308	274	333	286	118	93	145	201	805 ..	2,086
Average daily number on sick list.	44.7	47.87	41.1	38.3	7.0	8.02	8.3	3.0	3.76	1.23	2.43	3.5	33.7 ..	78.5
Percentage of average daily sick to average number in Gaol ..	6.1	6.3	5.6	4.8	2.3	2.9	2.5	1.0	3.1	1.3	1.7	1.5	4.2 ..	3.7
Total Deaths.	23	43	23	35	1	1	4	1	—	—	6	1	13 ..	60
Percentage of deaths to average daily number in Gaol. ..	3.1	5.6	3.1	4.4	.32	.36	1.2	.3	—	—	4.1	.5	1.6 ..	2.4

The most noticeable feature of this table is the contrast between the figures for Nairobi Gaol and the other prisons; both as regards sick rate and death rate Nairobi Gaol compares very unfavourably with the others. There was a sick rate of 4.8 per cent, as against 1.0 and 1.5 for the two other large gaols at Mombasa and Kisumu; it should be explained that the figures 4.2 for "other prisons" is possibly unreliable for comparison with the larger prisons, as returns from some of the smaller prisons may have included cases of minor injury or sickness which in a larger prison would have been shown only as dispensary attendances.

The death rate for Nairobi was 4.4 per cent, as against .3 and .5 for Mombasa and Kisumu, and 1.6 for the smaller prisons.

On the other hand it is satisfactory to note a general improvement in the figures as compared with previous years.

An analysis of the causes of deaths shows that of the total number of 50, pneumonia accounted for 24, and tuberculosis for 7. Both these diseases are directly connected with overcrowding.

A summary of the report received from Nairobi Gaol is as follows:—

Pneumonia.—121 cases were admitted, with 22 deaths. The incidence of pneumonia was so grave that a special investigation was made into the statistics of these cases, and the following results were elicited:—

Tribe.	Approx. Average No. during year.	Number of Cases.	Comparative Incidence.	Prolonged Convalescence.	Deaths.
Kikuyu	.. 360	27	17	7	3
Kavirondo.	.. 100	11	24	3	1
Masai.	.. 60	27	90	10	7
Akamba.	.. 40	7	35	5	1
Nandi.	.. 40	6	30	1	1
Meru.	.. 35	5	28	2	2
Lumbwa.	.. 25	4	32	3	1
Baganda.	.. 15	7	93	2	2
Others.	.. 115	20	35	4	4

Note.—7 cases out of the total of 1921 cases described in this Report were re-admissions, and so are not shown in this table.

Kikuyu form by far the major part of the Gaol population; in proportion they have suffered least. The Masai have proved the most liable to be attacked and the least able to resist the consequences.

Considering the period of imprisonment which had elapsed previous to sickness we find:—

Period passed in Prison.	Estimated average number of Prisoners.	Number of Cases.	Deaths.
Admitted to Prison sick. ..	—	2	—
Under 1 week.	24	—	—
1 — 2 weeks.	4	4	—
2 — 3 weeks.	11	6	1
3 — 4 weeks.	18	8	—
1 — 3 months.	99	39	13
3 — 6 months.	117	29	5
6 —12 months.	283	24	1
1 — 2 years.	215	6	2
2 — 5 years.	82	1	—
Over 5 years.	17	2	—

The relative frequency from month to month was:—

Month.	Rainfall.	Minimum Temperature.	Number of Admissions.	Number of Deaths.	Admission for "Influenzal Cold".*
January.	0.62	55	3	—	25
February.	3.86	56	2	—	14
March.	9.97	54	7	1	13
April.	16.23	59	1	—	4
May.	12.76	62	5	—	—
June.	2.15	54	2	—	2
July.	0.58	54	6	1	19
August.	0.09	53	31	6	32
September.	1.16	51	23	8	15
October.	1.60	56	20	5	14
November.	5.64	57	4	—	20
December.	1.54	56	17	1	19
			121	22	177

**Note.*—The term "Influenzal Cold" is used to designate a class of cases where no cause could be assigned other than exposure to cold. The symptoms were vague pains in different parts of body; headache most constantly, rise of temperature 99° to 101° lasting from 24 to 60 hours; dirty tongue; sore throat and cough, generally slight; nasal catarrh practically nil.

It will be noticed that the pneumonia was at its worst during the driest months of the year.

The comparative incidence amongst prisoners sleeping in the permanent buildings of the Gaol and those sleeping in tents is shown as under:—

	Number.	No. of Pneumonia Cases.	Percentage.
Prisoners sleeping in Stone Buildings.	630	91	14.44
Prisoners sleeping in Tents. ..	160	30	18.75

Chicken-pox.—This disease was present in Nairobi Gaol practically throughout the year, 256 cases being reported; the monthly incidence being as under:—

January	3
February	32
March	25
April	9
May	2
June	4
July	10
August	85
September	84
October	2
November	—
December	—

Though only a trivial complaint, chicken-pox seriously hampers both prison discipline and hospital management, and also greatly aggravates the sick rate, on account of the large number of cases admitted. It may be remarked that many of the pneumonia patients had previously suffered from an attack of chicken-pox, though it may be only a coincidence that the monthly admission for pneumonia and chicken-pox show a marked correspondence.

Measles.—This disease appeared in the prison in October; in two months 21 cases were admitted to hospital, and the epidemic then stopped abruptly.

As regards recommendations for improving the state of health of the prisoners confined in the Gaols of the Colony, it can be said that the following measures are urgently necessary:—

(1) Increase of prison accommodation. The overcrowding which has existed for years, and becomes worse as time goes on, is undoubtedly responsible for an increased sick rate and mortality. Overcrowding directly affects the incidence of pneumonia and other respiratory diseases; it increases the incidence of such infectious diseases as chicken-pox, and renders the control of an epidemic extremely difficult.

(2) Segregation of long-term from short-term and remand prisoners. So long as the large population of long-term prisoners is subjected to possible infection from continual entry of new admissions, so long will the sick rate remain high. If a penal settlement could be established, where only prisoners serving a long sentence would be admitted, after preliminary detention elsewhere of such a period as to eliminate cases of infectious disease, the health statistics of such an institution would certainly compare most favourably with those obtaining at present.

RETURNS.

TABLE I.

ADMINISTRATIVE DIVISION.

	Dr. J. L. Gilks	Principal Medical Officer.
(1)	Dr. C. L. Chevallier	Deputy Principal Medical Officer
(2)	Dr. C. J. Wilson, M.C.	" " "
	Dr. A. R. Paterson	Chief Sanitation Officer.
	Mr. H. Ogden	Office Superintendent.
(3)	Mr. D. S. Wardle	Accountant.
(4)	Mr. G. E. Scattergood	"
	Mr. T. R. Wilson, D.C.M.	Clerk.
	Mr. G. E. Scattergood	"
	Mr. J. S. Robertson, M.B.E.	Medical Storekeeper.
(5)	Miss G. C. Brown	Stenographer.
	Miss J. S. Wishart	"

MEDICAL DIVISION.

(6)	Dr. F. L. Henderson	Senior Medical Officer.
(7)	Dr. G. R. H. Chell	" " "
	Dr. J. Pugh	" " "
	Dr. C. J. Wilson, M.C.	" " "
	Dr. N. P. Jewell, M.C.	" " "
(8)	Dr. A. D. J. B. Williams, O.B.E.	" " "
(9)	Dr. T. H. Massey, M.C.	" " "
	Dr. H. H. V. Welch	Resident Surgical Officer.
	Dr. A. D. J. B. Williams, O.B.E.	Medical Officer.
(27)	Dr. T. F. Lumb	" "
	Dr. T. H. Massey, M.C.	" "
(10)	Dr. P. F. Nunan	" "
(11)	Dr. J. H. Thomson	" "
	Dr. V. M. Fisher	" "
	Dr. A. S. Mackie	" "
	Dr. R. C. Briscoe	" "
	Dr. B. W. Dakers	" "
	Dr. C. V. Braimbridge	" "
	Dr. G. W. Pope	" "
(12)	Dr. F. C. J. Johnstone	" "
	Dr. K. T. K. Wallington	" "
	Dr. E. A. Davison	" "
	Dr. J. O. Beven	" "
	Dr. R. A. W. Procter, M.C.	" "
	Dr. R. J. Harley-Mason	" "
	Dr. J. C. J. Callanan	" "
	Dr. C. H. Brennan, M.C.	" "
(13)	Dr. R. N. Hunter	" "
	Dr. J. A. Ross	" "
	Dr. P. Milne	" "
	Dr. J. McP. Campbell	" "
	Dr. W. H. Kauntze, M.B.E.	Bacteriologist.
	Dr. P. A. Clearkin	1st Asst. Bacteriologist.
	Dr. G. V. Allen	2nd " "
	Mr. F. A. Bailey	Laboratory Assistant.
	Dr. J. Forbes	District Surgeon.
	Dr. C. J. Caddick	" "
(14)	Dr. F. L. Henderson	" "
(15)	Mr. E. R. Edmonds	Dispenser.
	Mr. F. W. Day	"
(16)	Mrs. E. R. Barrett	Matron.
(17)	Miss E. B. Wishart	"
	Miss I. Wilson	Nursing Sister.
	Mrs. S. J. Harrison	" "
	Miss M. I. Rhind	" "
	Miss A. B. Wharin	" "

TABLE I. *Continued.*

MEDICAL DIVISION—*Continued.*

(18)	Miss F. O'Neill	Nursing Sister.
	Miss H. M. Friedricks	" "
	Miss R. Anderson	" "
	Miss P. S. Joubert	" "
(19)	Miss A. G. Leary	" "
	Miss V. B. Painter	" "
	Miss H. Masters	" "
(20)	Miss M. Edwards	" "
(21)	Miss H. Hayward.	" "
(22)	Miss M. Aitken	" "
(23)	Miss G. M. Buckley	" "
	Miss D. M. Kenny	" "
	Miss F. M. Biggar	" "
	Mr. W. Henfrey	Superintendent, Lunatic Asylum.
	Mrs. L. A. Henfrey	Matron, Lunatic Asylum.
	Miss E. Hamilton	Asst. Matron, Lunatic Asylum.
	Mr. S. J. Bosch	Warder, Lunatic Asylum.
	Mr. F. J. B. Jordan	" " "

SANITATION DIVISION.

	Dr. H. S. de Boer, M.C.	Medical Officer of Health.
	Dr. F. J. C. Johnstone	" " "
	Dr. R. N. Hunter	" " "
	Mr. F. Strawbridge	Senior Sanitary Inspector.
	Mr. J. P. Cook	" " "
	Mr. A. F. Dennett	Sanitary Inspector, 1st Grade.
(24)	Mr. B. E. F. Wetkin	" " " "
	Mr. E. E. Williams	" " " "
(25)	Mr. P. Cairns	" " " "
	Mr. D. P. Broad	" " " "
	Mr. R. C. Mills	Sanitary Inspector, 2nd Grade.
	Mr. A. P. Ling	" " " "
	Mr. H. E. Taylor	" " " "
	Mr. A. Bunker	" " " "
	Mr. G. W. Barnes	Sanitary Overseer.
	Miss M. A. Perkin	Nurse.
	Miss R. K. Sharp	"
(26)	Mr. W. J. Edwards	Supdt., Infectious Diseases Hospital.
	Mr. W. J. Henfrey	" " " "

REMARKS.

(1) Retired on pension, 14.9.1923.
(2) Promoted Deputy Principal Medical Officer, 14.9.23.
(3) Transferred to Treasury, 24.7.1923.
(4) Promoted Accountant, 24.7.1923.
(5) Resigned, 30.11.1923.
(6) Retired on pension, 21.5.1923.
(7) Transferred to Uganda, 30.9.1923.
(8) Promoted Senior Medical Officer, 14.9.23.
(9) Promoted Senior Medical Officer, 1.10.1923.
(10) Promoted Senior Medical Officer, 9.11.1923, and transferred to Tanganyika Territory.
(11) Transferred to Tanganyika Territory.
(12) Appointed Medical Officer of Health.
(13) Appointed Medical Officer of Health.
(14) Appointed District Surgeon.
(15) Services terminated, 6.12.1923.
(16) Retired on pension, 26.8.1923.
(17) Promoted Matron, 27.10.1923.
(18) Resigned, 21.10.1923.
(19) Resigned, 18.8.1923.
(20) Resigned, 14.4.1923.
(21) Appointment terminated 2.3.1923.
(22) Resigned, 23.11.1923.
(23) Resigned, 12.12.1923.
(24) Retrenched, 12.1.1923.
(25) Transferred to Zanzibar.
(26) Services terminated, 9.5.1923.
(27) Retrenched.

TABLE II.

FINANCIAL.

The sanctioned Medical Budget for the year 1923 was a total of £130,177, as compared with £181,270 for the preceding 12 months.

Of the 1923 grand total, £121,782 was expended, leaving an unexpended sum of £8,395.

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

MEDICAL DEPARTMENTS.

Administrative Division.

	Estimates. £	Actual Expenditure. £
Personal Emoluments	11,000	10,609
(Under this heading are included the salaries of the Principal Medical Officer, Deputy Principal Medical Officer, Chief Sanitation Officer, Office Superintendent, Medical Storekeeper, Accountant, Clerical Establishment, Messengers and packers).		

Medical Division.

Personal Emoluments	44,398	44,766
(Under this heading are included the salaries of the Senior Medical Officers, Resident Surgical Officer, Medical Officers, Nurses, Superintendent, Warders, Matron, Assistant Matron Lunatic Asylum, Assistant Surgeons, Sub-Assistant Surgeons, Compounders, Native Hospital Attendants and Lunatic Asylum attendants).		

Sanitation Division.

Personal Emoluments	12,545	10,920
(Under this heading are included the salaries and duty allowances of the Medical Officers of Health, Sanitary Inspectors, Nurses, Vaccinators, Native Attendants for Infectious Diseases Hospitals, Leper Lazaretto and Quarantine Stations, Clerical Establishment, Mechanics for Clayton disinfectors, office boys and messengers).		

Laboratory Division.

Personal Emoluments	4,207	4,080
(Under this heading are included the salaries of the Senior and Assistant Bacteriologists, European and Asiatic Laboratory Assistants and Native attendants).		

Medical Department.

Other Charges	54,093	45,183
(Under this heading are included Medical and Surgical Stores, Contingencies, Transport, Upkeep of Hospitals, Uniforms, Furniture and equipment, Electric Lighting, Water Supplies, Epidemics, Bush clearing, Ambulance and motor services, etc., Medical Mission units and Medical Work in Native Reserves).		
Special Expenditure	3,934	6,224
(Contribution to Nakuru War Memorial Hospital, Contribution to War Office for purchase of salvage stores, Furniture and equipment, Conservancy requirements Mombasa, etc.).		

REVENUE.

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

Hospital fees, sales of medicines and registration fees.	5,871	
Bills of Health	505	
Laboratory Fees	400	6,776
Reimbursement from Uganda Government on account of Zanzibar Sanitary Station.	341	
Reimbursement from Uganda Railway on account of medical services	4,792	5,133
Total ..		£1,199

Last year the total revenue collected amounted to £8,090.

TABLE III.

RETURN OF STATISTICS OF POPULATION FOR THE YEAR 1923.

Kenya Colony and Protectorate.	Europeans and Whites.	Africans and Others.	Asiatics.
Number of Inhabitants in 1923.	9,651‡	2,500,000*	25,880‡
Number of Births registered in 1923.	194	†	†
Number of Deaths registered in 1923.	64	†	†
Number of Immigrants during 1923.	3,430	2,014	7,630
Number of Emigrants during 1923.	(Figures not obtainable).		
Number of Inhabitants during 1922.	9,561	2,500,000	25,880

* Approximately. † Not registered. ‡ 1921 Census.

TABLE IV.

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

FOR THE YEAR ENDING 31ST DECEMBER, 1923.

	Approximate Area.	Number of proclaimed open spaces.
1923		Public Parks.
.. ..		Jeevanjee Garden.
1922	.. .. ..	Arboretum.
		Show Ground, Parklands.
1921		

2.—POPULATION.

	Number of Natives.	Asiatics and Others.	Number of Europeans.	Total Approx.
1923	12,000 est. 1922.	8,530	2,867 est. 1922.	23,597
1922	12,000	8,530	2,867	23,597
1921	12,088	9,449	2,929	24,466

3.—HOUSING.

	Number occupied by Europeans.	Number occupied by Natives and Asiatics.
Number of houses:—		
1923	479 ..	470 Asiatics only.
1922	770 ..	602
1921	743 ..	592
Number of huts:—		
1923	1,007	
1922	1,224	
1921	1,442	

4.—MOSQUITO PROTECTION OF HOUSES.

	1923	1922	1921
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 ..		68	,,
Number rendered during the year partially mosquito-protected. ..		Nil.	,,

5.—ERECTION OF NEW BUILDINGS DURING THE YEAR.

	1923	1922	1921
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	9	8	2
Number of houses erected with sanction as to site, construction, and relation to other buildings	27	34	83
Number of huts erected with sanction as to site, construction and relation to other buildings (including new location)	536	124	5
Number of houses built without sanction	Nil.	Nil.	1
Number of huts built without sanction	Nil.	3	1

ACTION TAKEN.

	Number of Prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1923	Nil.	Nil. ..	Nil.	Nil.
1922	Nil.	Nil. ..	3	Nil.
1921	1	1 ..	1	—

6.—MARKETS.

	Total Number.	Number paved and drained.	Number unpaved.
1923	2	1 paved	1
1922	2	1 paved	1
1921	2	1 paved	1

7.—SLAUGHTERHOUSES.

	Total Number.	Number paved and drained.	Number unpaved.
1923	2	2	
1922	2	2 Extensive alterations carried out on advice of V.O.	
1921	2	2	

One at Mbagathi Township.

8.—LATRINES.

	For Males.		For Females.	
	Number.	Number of seats.	Number.	Number of seats.
Number of public latrines:—				
1923	28	174	—	—
1922	27	199	—	—
1921	9	90	9	54
Number of new public latrines erected during the year:—				
1923	Nil.	—	—	—
1922	7 Native location.	—	—	—
1921	Nil.	—	—	—
Number of public latrines repaired during the year:— (Minor repairs are always being carried out).				
1923	—	—	—	—
1922	1	—	—	—
1921	—	—	—	—
Number of public latrines demolished during the year:—				
1923	Nil.	—	—	—
1922	Nil.	—	—	—
1921	Nil.	—	—	—

	1923	1922	1921
Number of private latrines:—	2,752	2,645	2,538
Average number of pails of nightsoil daily removed.	3,071	—	2,942
Average number of soiled pails removed and clean pails substituted	—	—	—
Number of nightsoil men employed to clean latrines and to remove excreta	81	80	104
Number of cesspools	—	—	1
Number of cesspools cleaned	16	—	1
Number of new cesspools constructed during the year.	21	—	—
Number of old cesspools abolished	—	—	—
Number of old cesspools oiled regularly by Department.	—	—	—

9.—REMOVAL OF REFUSE.

	1923	1922	1921
Number of dustbins	1,859	1,175	1,614
Number of carts at work daily to remove refuse from streets	8	—	—
Amount of refuse removed daily	16 car loads.	—	—
Number of carts at work daily to remove refuse from yards and premises	28	—	—
Amount of refuse removed daily from yards and premises.	42 car loads.	—	—
Number of men employed for removing refuse	48	32	64

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.		
	1923	1922	1921	1923	1922	1921	1923	1922	1921
Buried or trenched	3,071	2,645	342	—	—	—	2	—	3
Burnt	—	—	—	—	61	—	2	5	3
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with	—	—	—	—	—	—	—	—	—

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

1923	1922	1921
Included in refuse removed from yards and premises.	—	31

12.—WATER SUPPLY.

Nature of water supply.	1923	1922	1921
Pipe-borne water:—			
Source (river, lake or spring)	—	Spring	—
Number of linear yards	—	—	—
Number of stand-pipes along roads	—	—	—
Number of stand-pipes in compounds and houses.	1,653	1,617	1,319
Wells:—			
Public:—			
Number	—	—	—
Number with pumps protected against surface water and mosquito-protected	—	—	—
Private:—			
Number	—	—	—
Number with pumps protected against surface water and mosquito-protected	—	—	—
Tanks:—			
Public:—			
Number underground	—	—	—
Number mosquito-protected and served by pumps.	—	—	—
Number above ground	—	—	—
Number mosquito protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Private:—			
Number underground	—	—	—
Number mosquito-protected	—	—	—
Number above ground	—	—	155
Number mosquito-protected	—	—	155
Number of 400 gallons capacity or less	—	—	43
Number above 400 gallons	—	—	112
Nature of tanks:—			
Wood	—	—	—
Iron	—	—	—
Concrete	—	—	—
Barrels:—			
Number	—	—	—
Number mosquito-protected	—	—	—

13.—DRAINAGE.

	Public.	Private.
Masonry drains:—		
Linear yards of masonry drains:—		
1923	40,660	
1922	40,290	
1921	40,009	
Linear yards reconstructed during the year:—		
1923	—	
1922	—	
1921	—	
Linear yards repaired during the year:—		
1923	70	
1922	143	
1921	175	
Linear yards of new drains constructed during the year:—		
1923	370	
1922	281	
1921	3,535	
Earth drains or ditches cleansed:—		
Number of linear yards of ditches cleansed:—		
1923	6,400	
1922	354,457	
1921	354,457	
Number of linear yards of ditches dug and graded:—		
1923	—	
1922	300,584	
1921	300,584	
Average frequency of clearing ditches of grass:—		
1923	Every second week.	
1922	—	
1921	—	

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

	1923	1922	1921
Number of square yards of weeds, grass and vegetation cut and removed	1,447,160	—	—
Average frequency of clearance of rank vegetation on same area	Three times per year.	—	—

15.—EXCAVATIONS OF LOW-LYING LAND.

	1923	1922	1921
Number of pools and excavations	—	—	—
Number of excavations filled up	74	—	—
Amount of low-lying and marsh land raised and drained	—	—	—
Number of pools, marshes, etc., fish-stocked	—	—	—
Number of cubic yards of material used for filling up pools and excavations	—	—	—
Number of persons fined for making new excavations.	—	—	—
Average number of men daily employed in filling up pools, etc.	16	24	20

16.—OILING.

	1923	1922	1921
Number of drains oiled	2	—	—
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	13,000
Average number of men daily employed for oiling drains, pools, and water tank or barrels	—	13	12

17.—INSPECTIONS AND PROSECUTIONS.

	1923	1922	1921
Number of inspectors employed	4	6	5
Number of houses inspected	2,177	9,169	—
Number of houses where larvae were found ..	—	—	—
Number of notices served to remove conditions causing the breeding of larvae	112	—	—
Number of persons fined for having mosquito larvae on premises	—	—	—
Number of notices served to remove insanitary conditions on premises	417	—	—
Number of persons fined for not removing insanitary conditions after notice.	65	—	—
Number of soda and aerated water factories inspected.	2	3	4

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

FOR THE YEAR ENDING 31ST DECEMBER, 1923.

	Approximate Area.	Number of proclaimed open spaces.
	Township Island.	
1923	3,500 acres. ..	1 Public Garden.
1922		1 Public Garden.
1921		1 Public Garden.

2.—POPULATION.

	Native.			Asiatics & Arabs.			Europeans.			Approx. Total
	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.	
1923	Figures for 1923 not yet available.									
1922	11,676	10,253	5,240	5,839	2,854	4,161	499	108	145	40,775
1921	7,438	6,826	3,719	5,537	3,199	4,962	383	175	95	32,334

3.—HOUSING.

	Number occupied by Europeans.	Number occupied by Natives and Asiatics
Number of houses:— Stone and Mud.		
1923	209 approx. ..	5,492 approx.
1922	200 approx. ..	5,100 approx.
1921	190 approx. ..	4,957 approx.
Number of huts:—		
1923	Included in above.	
1922		
1921		

4.—MOSQUITO PROTECTION OF HOUSES.

	1923	1922	1921
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.

	1923	1922	1921
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	7	26	—
Number of huts erected with sanction as to site, construction and relation to other buildings	47	295	—
Number of houses built without sanction	1	—	—
Number of huts built without sanction	—	—	—

ACTION TAKEN.

	Number of Prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1923	Nil.	1 ..	Nil.	Nil.
1922	Nil.	5 ..	Nil.	Nil.
1921	Nil.	Nil. ..	Nil.	Nil.

6.—MARKETS.

	Total Number.	Number paved and drained.	Number unpaved.
1923	4	4	Nil.
1922	4	3	1
1921	3	2	1

7.—SLAUGHTERHOUSES.

	Total Number.	Number paved and drained.	Number unpaved.
1923	2	.. 2 ..	—
1922	1	.. 1 ..	—
1921	1	.. 1 ..	—

8.—LATRINES.

	For Males.		For Females.	
	Number.	Number of seats.	Number.	Number of seats.
Number of public latrines:—				
1923	12	65	—	—
1922	11	64	—	—
1921	7	28	—	—
Number of new public latrines erected during the year:—				
1923	1	1	—	—
1922 (Town. ..	4	36	—	—
(Uganda Railway.	2	4	—	—
1921	4	4	—	—
Number of public latrines repaired during the year:—				
1923	11	—	—	—
1922 (Town. ..	11	—	—	—
(Uganda Railway.	4	—	—	—
1921	—	—	—	—
Number of public latrines demolished during the year:—				
1923	—	—	—	—
1922	—	—	—	—
1921	6	9	—	—

	1923	1922	1921
Number of private latrines	No record.	—	—
Average number of pails of night soil removed daily. (Town. ..	454	449	399
(Uganda Railway.	454	449	—
Average number of soiled pails removed and clean pails substituted. (Town. ..	454	449	28
(Uganda Railway.	—	—	—
Number of nightsoil men employed to clean latrines and to remove excreta. (Town. ..	70	64	62
(Uganda Rly.	36	37	—
Number of cesspools	No record.	—	—
Number of cesspools cleaned	No record.	—	—
Number of new cesspools constructed during the year.	No record.	—	—
Number of old cesspools abolished	No record.	—	—
Number of old cesspools oiled regularly by Department.	No record.	—	—

9.—REMOVAL OF REFUSE.

		1923	1922	1921
Number of dustbins	(Private. ..	No record.	—	—
	(Public. ..	60	60	66
Number of carts at work daily to remove refuse from streets.		19	16	20
Amount of refuse removed daily		57 Loads.	48 Loads.	57 Loads.
Number of carts at work daily to remove refuse from yards and premises		Included. above.	Included above.	Included above.
Amount of refuse removed daily from yards and premises.		Included above.	Included. above.	Included above.
Number of men employed for removing refuse.	(Town. ..	221 Sweepers.	207	236
	(Uganda Rly.	31	36	—

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.		
	1923	1922	1921	1923	1922	1921	1923	1922	1921
Buried or trenched.	Nil.	—	—	—	—	—	—	—	—
Burnt (Town.	Nil.	—	—	57	48	57	3	1	1
(U. Rly.	—	760	—	15	12	—	—	—	—
Thrown into sea.									
Disposal Station.	454	449	399	—	—	—	—	—	—
Otherwise dealt with.	—	—	—	—	—	—	—	—	—

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

1923.	1922.	1921.
Included in Refuse Collection.	Included in Refuse Collection.	Included in Refuse Collection.

12.—WATER SUPPLY.

Nature of water supply.	1923	1922	1921
Pipe-borne water:—			
Source (river, lake or spring)	Springs.	Springs.	Springs.
Number of linear yards	No figures available.		
Number of stand-pipes along roads	23 Water kiosks.	32	13
Number of stand-pipes in compounds and houses.	523	390	266
Wells:—			
Public:—			
Number	No record		
Number with pumps protected against surface water and mosquito-protected	No record		
Private:—			
Number	No record	No record.	
Number with pumps protected against surface water and mosquito-protected	No record		
Tanks:—			
Public:—	Nil.		
Number underground	..		
Number mosquito-protected and served by pumps.	—		
Number above ground	—		
Number mosquito-protected	—		
Number of 400 gallons capacity or less ..	..		
Number above 400 gallons	—		
Private:—	No record.	No record.	
Number underground	..		
Number mosquito-protected	—		
Number above ground	—		
Number mosquito-protected	—		
Number of 400 gallons capacity or less ..	..		
Number above 400 gallons	—		
Nature of tanks:—			
Wood	No record		
Iron	—		
Concrete	—		
Barrels:—	No record.	No record.	
Number	—		
Number mosquito-protected	—		

13.—DRAINAGE.

	Public.	Private.
Masonry drains:—		
Linear yards of masonry drains:—		
1923	No record.	No record.
1922		
1921		
Linear yards reconstructed during the year:—		
1923	No record.	No record.
1922		
1921		
Linear yards repaired during the year:—		
1923	No record.	No record.
1922		
1921		
Linear yards of new drains constructed during the year:—		
1923	300 yards.	1,058 yards.
1922	No record.	No record.
1921		
Earth drains or ditches cleansed:—		
Number of linear yards of ditches cleansed:—		
1923	No record.	No record.
1922		
1921		
Number of linear yards of ditches dug and graded:—		
1923	No record.	No record.
1922		
1921		
Average frequency of clearing ditches of grass:—		
1923	As required.	As required.
1922		
1921		

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

	1923	1922	1921
Number of square yards of weeds, grass and vegetation cut and removed	No record.	300 acres.	1,151 acres.
Average frequency of clearance of rank vegetation on same area	As required.	As required.	

15.—EXCAVATIONS OF LOW-LYING LAND.

	1923	1922	1921
Number of pools and excavations	Varies with rainfall.		
Number of excavations filled up	—	—	—
Amount of low-lying and marsh land raised and drained.	—	—	—
Number of pools, marshes, etc., fish-stocked ..	—	1	—
Number of cubic yards of material used for filling up pools and excavations	No record.	No record.	
Number of persons fined for making new excavations.	—	—	—
Average number of men daily employed in filling up pools, etc., ...	—	—	—

16.—OILING.

	1923	1922	1921
Number of drains oiled	—	—	—
Number of pools and excavations oiled	As required.	As required.	12
Number of tanks and barrels oiled	No record.	No record.	
Average number of men daily employed for oiling drains, pools, and water tank or barrels ..	Employed as required.		

17.—INSPECTIONS AND PROSECUTIONS.

	1923	1922	1921
Number of inspectors employed	3	2	2
Number of houses inspected, House Inspection. ..	7,285	7,860	9,011
Number of houses where larvae were found ..	No record.	No record.	548
Number of notices served to remove conditions causing the breeding of larvae	18	180	662
Number of persons fined for having mosquito larvae on premises.	10	61	30
Number of notices served to remove insanitary conditions on premises	345	677	644
Number of persons fined for not removing insanitary conditions after notice	4	23	15
Number of soda and aerated water factories inspected.	4	4	4

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

For the Year ending 31st December, 1923.

	Approximate Area.	Number of proclaimed open spaces.
1921	19.6	1
1922	19.6	1
1923	15.6	1

2.—POPULATION.

	Number of Natives.		Asiatics.		Number of Europeans.		Total Approx.
	Males.	Females.	Males.	Females.	Males.	Females.	
1921	2,945	998	901	301	96	48	5,289
1922	2,945	998	901	301	96	48	5,289
1923	3,727	1,243	700	288	98	53	6,109

3.—HOUSING.

	Number occupied by Europeans.	Number occupied by Natives and Asiatics.
Number of houses:—		
1921	57 ..	150
1922	57 ..	152
1923	58 ..	152
Number of huts:—		
1921	1,240.	
1922	1,240.	
1923	1,257.	

4.—MOSQUITO PROTECTION OF HOUSES.

	1923	1922	1921
Number of European houses wholly mosquito-protected ..	20	27	30
Number of European houses with mosquito room ..	53	55	58
Number rendered during the year wholly mosquito-protected.	Nil.	7	3
Number rendered during the year partially mosquito-protected.	Nil.	2	5

5.—ERECTION OF NEW BUILDINGS DURING THE YEAR.

	1923	1922	1921
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	—	—	5
Number of houses erected with sanction as to site, construction, and relation to other buildings	2	—	1
Number of huts erected with sanction as to site, construction and relation to other buildings	10	—	5
Number of houses built without sanction	—	—	—
Number of huts built without sanction	3	—	16

ACTION TAKEN.

	Number of Prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.
1921	—	— ..	—	—
1922	1	— ..	1	—
1923	1	— ..	4	—

6.—MARKETS.

	Total Number	Number paved and drained.	Number unpaved.
1921	1	1	Nil.
1922	1	1	Nil.
1923	1	1	Nil.

7.—SLAUGHTERHOUSES.

	Total Number.	Number paved and drained.	Number unpaved.
1921	2 ..	2 ..	—
1922	2 ..	2 ..	—
1923	2 ..	2 ..	—

8.—LATRINES.

	For Males.		For Females.	
	Number.	Number of seats.	Number.	Number of seats.
Number of public latrines:—				
1921	15	101	—	—
1922	17	106	—	—
1923	17	106	—	—
Number of new public latrines erected during the year:—				
1921	1	6	—	—
1922	2	5	—	—
1923	2	4	—	—
Number of public latrines repaired during the year:—				
1921	1	—	—	—
1922	2	—	—	—
1923	8	16	—	—
Number of public latrines demolished during the year:—				
1921	1	—	—	—
1922	—	—	—	—
1923	2	4	—	—

	1923	1922	1921
Number of private latrines.	325	325	329
Average number of pails of nightsoil daily removed.	688	693	701
Average number of soiled pails removed and clean pails substituted	—	196	114
Number of nightsoil men employed to clean latrines and to remove excreta	45	45	45
Number of cesspools	148	156	162
Number of cesspools cleaned	above cleaned daily.		
Number of new cesspools constructed during the year.	2	11	8
Number of old cesspools abolished	—	3	2
Number of old cesspools oiled regularly by Department.	—	—	—

9.—REMOVAL OF REFUSE.

	1923	1922	1921
Number of dustbins	410	420	425
Number of carts at work daily to remove refuse from streets	4	4	4
		—Cart loads.—	
Amount of refuse removed daily	39	40	40
Number of carts at work daily to remove refuse from yards and premises	11	11	11
		—Cart loads.—	
Amount of refuse removed daily from yards and premises.	27	30	30
Number of men employed for removing refuse.	34	36	36

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.		
	1923	1922	1921	1923	1922	1921	1923	1922	1921
Buried or trenched.	688	693	701	—	1	1	1	1	1
Burnt.	—	—	—	27	30	30	—	—	—
Thrown into sea.	—	—	—	—	1	—	—	—	—
Otherwise dealt with.	—	—	—	12	10	—	—	—	—

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

1921.	1922.	1923.
3	3	3

12.—WATER SUPPLY.

Nature of water supply.	1921	1922	1923
Pipe-borne water:—			
Source (river, lake or spring).	Lake.	Lake.	Lake.
Number of linear yards	15,890	16,590	17,007
Number of stand-pipes along roads	14	15	15
Number of stand-pipes in compounds and houses.	85	86	88
Wells:—			
Public:—			
Number	—	—	—
Number with pumps protected against surface water and mosquito-protected	—	—	—
Private:—			
Number	—	—	—
Number with pumps protected against surface water and mosquito-protected	—	—	—
Tanks:—			
Public:—			
Number underground	—	—	—
Number mosquito-protected and served by pumps.			
Number above ground	—	—	—
Number mosquito-protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Private:—			
Number underground	—	—	—
Number mosquito-protected	—	—	—
Number above ground	195	201	208
Number mosquito-protected	195	201	208
Number of 400 gallons capacity or less	64	64	64
Number above 400 gallons	131	137	144
Nature of tanks:—			
Wood	—	—	—
Iron	81	77	56
Concrete	114	124	152
Barrels:—			
Number	—	—	Unknown.
Number mosquito-protected	—	—	Unknown.

13.—DRAINAGE.

	Public.	Private.
Masonry drains:—		
Linear yards of masonry drains:—		
1921	110	—
1922	110	500
1923	5,010	500
Linear yards reconstructed during the year:—		
1921	—	—
1922	—	—
1923	800	—
Linear yards repaired during the year:—		
1921	—	—
1922	—	—
1923	1,200	—
Linear yards of new drains constructed during the year:—		
1921	—	—
1922	—	500
1923	4,900	—
Earth drains or ditches cleansed:—		
Number of linear yards of ditches cleansed:—		
1921	20,000	—
1922	37,600	—
1923	60,600	—
Number of linear yards of ditches dug and graded:—		
1921	—	—
1922	17,600	—
1923	21,800	—
Average frequency of clearing ditches of grass:—		
1921	Monthly.	Monthly.
1922	Monthly.	Monthly.
1923	When necessary.	When necessary.

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

	1921	1922	1923
Number of square yards of weeds, grass and vegetation cut and removed	90,000	90,000	6,198,200
Average frequency of clearance of rank vegetation on same area	When necessary.		When necesesary.

15.—EXCAVATIONS OF LOW-LYING LAND.

	1923	1922	1921
Number of pools and excavations	Numerous.	Numerous.	Numerous.
Number of excavations filled up (including pools drained).	50 approx.	34	116
Amount of low-lying and marsh land raised and drained.	40,000 sq. yards.	6,000,000 sq. yds. approx.	4,840,000 sq. yds. approx.
Number of pools, marshes, etc., fish-stocked ..	—	—	—
Number of cubic yards of material used for filling up pools and excavations	22,000 cu. ft.	20,000 cu. ft.	10,000 cu. ft. approx.
Number of persons fined for making new excavations.	—	—	—
Average number of men daily employed in fiilling up pools, etc.	20	24	52

16.—OILING.

	1923	1922	1921
Number of drains oiled	When necessary.	203	591
Number of pools and excavations oiled	,,	147	826
Number of tanks and barrels oiled, etc., (including ships and boats).	—	—	1,030
Average number of men daily employed for oiling drains, pools, and water tank or barrels ..	3	5	6

17.—INSPECTIONS AND PROSECUTIONS.

C	1921	1922	1923
Number of inspectors employed	1	1	1 (part time).
Number of houses inspected	6,300	6,700 approx.	4,000 approx.
Number of houses where larvae were found ..	1	66	78
Number of notices served to remove conditions causing the breeding of larvae	6	114	10
Number of persons fined for having mosquito larvae on premises	—	—	—
Number of notices served to remove insanitary conditions on premises	167	267	78
Number of persons fined for not removing insanitary conditions after notice	3	—	—
Number of soda and aerated water factories inspected.	1	1	1

METEOROLOGICAL RETURN FOR THE YEAR, 1923.

	NAIROBI.				MOMBASA.				KISUMU.				FORT-HALL.			
	Temperature.			Rainfall.	Temperature.			Rainfall.	Temperature.			Rainfall.	Temperature.			Rainfall.
	Shade Maximum.	Shade Minimum.	Mean.	Inches.	Shade Maximum.	Shade Minimum.	Mean.	Inches.	Shade Maximum.	Shade Minimum.	Mean.	Inches.	Shade Maximum.	Shade Minimum.	Mean.	Inches.
January ..	78	55	66.5	0.62	84	73	78.5	2.56	86	66	76	0.60	78	45	61.5	0.94
February ..	81	56	68.5	3.86	85	73	79	1.59	82	66	74	3.63	78	55	66.5	0.50
March ..	82	54	68	9.97	86	73	79.5	0.81	84	66	75	5.75	75	58	66.5	4.13
April ..	75	59	67	16.23	85	72	78.5	2.71	79	67	73	13.28	78	60	69	15.99
May ..	74	62	68	12.76	83	72	77.5	3.68	79	68	73	6.96	75	59	67	16.74
June ..	72	54	63	2.15	80	69	74.5	5.54	79	66	72.5	7.71	72	55	63.5	1.05
July ..	68	54	61	0.58	79	68	73.5	4.03	80	60	70	7.30	73	53	63	1.30
August ..	70	53	61.5	0.09	79	67	73	4.99	77	62	69.5	0.63	75	51	63	0.55
September ..	77	51	64	1.16	80	67	73.5	3.60	72	61	71.5	3.11	76	53	64.5	0.11
October ..	77	56	66.5	1.60	80	70	75	2.82	81	61	71	2.57	82	51	66.5	4.58
November ..	74	57	65.5	5.64	85	74	79.5	2.74	83	62	72.5	2.06	83	54	68.5	5.13
December ..	76	56	66	1.54	88	70	79	1.02	84	62	73	3.30	81	53	67	0.68
Year Average. ..	75	56	65.5	Total. 56.20	83	71	77	Total. 36.09	81	64	72.5	Total. 56.30	77	54	65.5	Total. 51.70

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	EUROPEAN OFFICIALS.					GENERAL EUROPEAN POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Infective Diseases:—										
Beri-Beri.	—	—	—	—	—	—	—	—	—	—
Cerebro-Spinal Fever.	—	—	—	—	—	—	—	—	—	—
Chicken-pox	—	1	—	1	—	—	—	—	—	—
Cholera	—	—	—	—	—	—	—	—	—	—
Dengue	—	—	—	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—	—	—	—
Dysentery	1	7	—	8	—	—	7	1	7	—
Endocarditis-Infective	—	—	—	—	—	—	—	—	—	—
Enteric	1	5	—	6	—	—	8	—	8	—
Erysipelas	—	—	—	—	—	—	—	—	—	—
Gonorrhoea	—	—	—	—	—	—	—	—	—	—
Influenza	—	106	—	106	—	—	67	—	67	—
Kala Azar	—	—	—	—	—	—	—	—	—	—
Leprosy (a) Nodular	—	—	—	—	—	—	—	—	—	—
(b) Anaesthetic	—	—	—	—	—	—	—	—	—	—
Malaria. (a) Sub-tertian	—	31	1	31	—	—	28	2	28	1
(b) Benign Tertian	6	35	—	41	—	2	12	—	14	2
(c) Quartan	—	1	—	1	—	—	—	—	—	—
(d) Undifferentiated	—	111	1	111	1	1	120	—	121	—
(e) Blackwater	—	3	1	3	—	—	5	1	5	—
Measles	—	2	—	2	—	3	1	—	4	—
Malta Fever	—	—	—	—	—	—	—	—	—	—
Plague	—	—	—	—	—	—	1	1	1	—
Pneumonia	—	2	—	2	—	—	2	—	2	—
Rabies	—	—	—	—	—	—	—	—	—	—
Relapsing Fever	—	—	—	—	—	—	—	—	—	—
Rheumatic Fever	—	3	—	3	—	—	—	—	—	—
Septicaemia	—	—	—	—	—	—	—	—	—	—
Trypanosomiasis (Sl. sickness).	—	—	—	—	—	—	—	—	—	—
Small-pox	—	—	—	—	—	—	1	—	1	—
Syphilis (a) Primary	—	1	—	1	—	—	—	—	—	—
(b) Secondary	—	—	—	—	—	—	1	—	1	—
(c) Inherited	—	—	—	—	—	—	—	—	—	—
Tetanus	—	—	—	—	—	—	—	—	—	—
Tuberculosis	—	4	—	4	—	—	2	—	2	—
Whooping cough	—	—	—	—	—	—	2	—	2	—
Yaws	—	—	—	—	—	—	—	—	—	—
Yellow Fever	—	—	—	—	—	—	—	—	—	—
Mumps	—	—	—	—	—	—	2	—	2	—
Anthrax	—	—	—	—	—	—	—	—	—	—
Typhus	—	2	—	2	—	—	1	—	1	—
Other Infective Diseases	—	2	—	2	—	—	—	—	—	—
Intoxications:—										
Alcoholism	—	—	—	—	—	—	—	—	—	—
Morphinism	—	—	—	—	—	—	—	—	—	—
Others	—	—	—	—	—	—	—	—	—	—
General Diseases:—										
Anaemia	—	8	—	8	—	—	5	—	5	—
Anaemia-Pernicious	—	—	—	—	—	—	—	—	—	—
Diabetes	—	—	—	—	—	—	2	1	2	—
Exophthalmic goitre	—	—	—	—	—	—	2	—	2	—
Gout	—	—	—	—	—	—	—	—	—	—
Leucocythaemia	—	—	—	—	—	—	—	—	—	—
Hodgkin's disease	—	—	—	—	—	—	—	—	—	—
Myxoedema	—	—	—	—	—	—	—	—	—	—

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	EUROPEAN OFFICIALS.					GENERAL EUROPEAN POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Purpura	—	—	—	—	—	—	—	—	—	—
Rickets	—	—	—	—	—	—	—	—	—	—
Scurvy	—	—	—	—	—	—	—	—	—	—
Other General Diseases ..	—	10	—	10	—	—	18	—	18	—
LOCAL DISEASES:—										
Diseases of the Nervous System:—										
Sub-Section 1.—										
Neuritis	—	—	—	—	—	—	2	—	2	—
Meningitis	—	—	—	—	—	—	1	—	1	—
Myelitis	—	—	—	—	—	—	—	—	—	—
Hydrocephalus	—	—	—	—	—	—	—	—	—	—
Encephalitis	—	—	—	—	—	—	1	—	1	—
Abscess of brain	—	—	—	—	—	—	—	—	—	—
Congestion of brain	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	1	—	1	—	—	5	—	5	—
Sub-Section 2.—										
Apoplexy	—	—	—	—	—	—	—	—	—	—
Paralysis	—	2	—	2	—	—	1	—	1	—
Chorea	—	—	—	—	—	—	—	—	—	—
Epilepsy	—	—	—	—	—	—	—	—	—	—
Neuralgia	—	7	—	7	—	—	5	—	5	—
Hysteria	—	—	—	—	—	—	2	—	2	—
Other Nervous Diseases ..	—	2	—	2	—	—	7	—	7	—
Mental Diseases:—										
Sub-Section 3.—										
Idiocy	—	—	—	—	—	—	—	—	—	—
Mania	—	—	—	—	—	—	—	—	—	—
Melancholia	—	—	—	—	—	4	—	1	4	3
Dementia	—	—	—	—	—	3	—	—	3	1
Delusional insanity	—	—	—	—	—	2	—	1	2	—
Other Mental Diseases	—	1	—	1	—	3	9	—	12	2
Diseases of the Eye:—										
Conjunctivitis	—	3	—	3	—	—	3	—	3	—
Keratitis	—	—	—	—	—	—	—	—	—	—
Ulceration of cornea	—	—	—	—	—	—	—	—	—	—
Iritis	—	2	—	2	—	—	1	—	1	—
Optic Neuritis	—	—	—	—	—	—	—	—	—	—
Cataract	—	—	—	—	—	—	—	—	—	—
Other Eye Diseases	—	4	—	4	—	—	—	—	—	—
Diseases of the Ear:—										
Inflammation	—	3	—	3	—	—	—	—	—	—
Other Diseases	—	1	—	1	—	—	3	—	3	—
Diseases of the Nose:—	—	7	—	7	—	—	1	—	1	—
Diseases of the Circulatory System:										
Pericarditis	—	—	—	—	—	—	—	—	—	—
Endocarditis	—	—	—	—	—	—	—	—	—	—
Valvular, Mitral	—	—	—	—	—	—	—	—	—	—
,, Aortic	—	—	—	—	—	—	—	—	—	—
,, Tricuspid	—	—	—	—	—	—	—	—	—	—
,, Pulmonary	—	—	—	—	—	—	—	—	—	—
Arterial sclerosis	—	—	—	—	—	—	—	—	—	—
Aneurism	—	—	—	—	—	—	—	—	—	—
Oher Diseases	—	2	—	2	—	—	5	1	5	—
Diseases of the Respiratory System:										
Laryngitis	—	1	—	1	—	—	—	—	—	—
Bronchitis	1	—	—	1	1	1	3	—	4	—
Broncho-pneumonia	—	20	—	20	—	—	—	—	—	—

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	EUROPEAN OFFICIALS.					GENERAL EUROPEAN POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital
Abscess of lung	—	—	—	—	—	—	—	—	—	—
Gangrene of lung	—	—	—	—	—	—	—	—	—	—
Emphysema	—	—	—	—	—	—	—	—	—	—
Pleurisy	1	2	—	3	1	—	1	—	1	—
Empyema	—	1	—	1	—	—	—	—	—	—
Oher Diseases	—	2	—	2	—	—	8	1	8	—
Diseases of the Digestive System:-										
Stomatitis	—	—	—	—	—	—	—	—	—	—
Caries of teeth	—	6	—	6	—	—	4	—	4	—
Sore throat	—	5	—	5	—	—	5	—	5	—
Inflammation of tonsils ..	1	26	—	27	—	3	22	—	25	—
Gastritis	—	6	—	6	—	1	14	—	15	—
Ulceration of stomach	—	—	—	—	—	—	—	—	—	—
Haematemesis	—	—	—	—	—	—	1	—	1	—
Dilatation of stomach	—	—	—	—	—	—	—	—	—	—
Stricture of stomach	—	—	—	—	—	—	—	—	—	—
Dyspepsia	—	6	—	6	—	—	9	—	9	—
Enteritis	1	1	—	2	—	1	1	—	2	—
Appendicitis	1	5	—	6	—	—	9	—	9	1
Colitis	—	3	—	3	—	—	2	—	2	—
Ulceration of intestines ..	—	—	—	—	—	—	—	—	—	—
Sprue	—	—	—	—	—	—	—	—	—	—
Hernia	—	2	1	2	—	—	2	—	2	—
Diarrhoea	—	4	—	4	—	1	16	—	17	—
Constipation	—	—	—	—	—	1	15	—	16	—
Colic	—	8	—	8	—	—	14	—	14	—
Haemorrhoids	—	5	—	5	—	—	—	—	—	—
Pancreatitis	—	—	—	—	—	—	—	—	—	—
Hepatitis-Acute	—	—	—	—	—	3	3	—	6	—
Abscess	—	—	—	—	—	—	4	—	4	1
Cirrhosis	—	—	—	—	—	—	—	—	—	—
Jaundice	—	1	—	1	—	—	—	—	—	—
Peritonitis	—	—	—	—	—	—	—	—	—	—
Ascites	—	—	—	—	—	—	1	—	1	—
Other Diseases	—	5	—	5	—	1	10	—	11	—
Diseases of the Lymphatic System:-										
Splenitis	—	—	—	—	—	—	—	—	—	—
Inflammation of lymphatic gland.	—	4	—	4	—	—	2	—	2	—
Suppuration of lymphatic gland.	—	—	—	—	—	—	—	—	—	—
Lymphangitis	1	1	—	2	—	—	—	—	—	—
Elephantiasis	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	2	—	2	—	—	2	—	2	—
Diseases of the Urinary System:—										
Acute nephritis	—	—	—	—	—	1	3	—	4	—
Bright's disease	—	—	—	—	—	—	—	—	—	—
Pyelitis	—	—	—	—	—	—	—	—	—	—
Calculus	—	1	—	1	—	—	1	—	1	—
Renal Colic	—	—	—	—	—	—	—	—	—	—
Cystitis	—	—	—	—	—	—	1	—	1	—
Vesical calculus .. .	—	—	—	—	—	—	—	—	—	—
Suppression	—	—	—	—	—	—	—	—	—	—
Haematuria	—	1	—	1	—	—	1	—	1	—
Chyluria	—	1	—	1	—	—	—	—	—	—
Other Diseases	—	—	—	—	—	—	2	—	2	—
Diseases of the Generative System: Male Organs.—										
Urethritis	—	1	—	1	—	--	—	—	—	—

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	EUROPEAN OFFICIALS.					GENERAL EUROPEAN POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Gleet	—	—	—	—	—	—	—	—	—	—
Stricture	—	—	—	—	—	—	—	—	—	—
Prostatitis	—	—	—	—	—	—	1	—	1	—
Soft chancre	—	—	—	—	—	—	—	—	—	—
Condyloma	—	—	—	—	—	—	—	—	—	—
Inflammation of scrotum	—	—	—	—	—	—	—	—	—	—
Hydrocele	1	1	—	2	—	—	—	—	—	—
Orchitis	—	4	—	4	—	—	1	—	1	—
Epididymitis	—	—	—	—	—	—	—	—	—	—
Abscess of testicles	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	2	—	2	—	—	4	—	4	—
Female Organs.—										
Ovaritis	—	—	—	—	—	—	—	—	—	—
Ovarian cyst.	—	—	—	—	—	—	—	—	—	—
Endometritis	—	—	—	—	—	—	—	—	—	—
Displacement of uterus	1	—	—	1	—	—	6	—	6	—
Vaginitis	—	—	—	—	—	—	—	—	—	—
Amenorrhoea	—	—	—	—	—	—	—	—	—	—
Dysmenorrhoea	—	—	—	—	—	—	2	—	2	—
Menorrhagia	—	—	—	—	—	—	—	—	—	—
Leucorrhoea	—	—	—	—	—	—	1	—	1	—
Abortion	—	—	—	—	—	—	—	—	—	—
Delayed labour	—	—	—	—	—	—	5	—	5	—
Post-partem haemorrhage	—	—	—	—	—	—	—	—	—	—
Retained placenta	—	—	—	—	—	—	2	—	2	—
Premature birth	—	—	—	—	—	—	—	—	—	—
Puerperal septicaemia	—	—	—	—	—	—	—	—	—	—
Mastitis	—	—	—	—	—	—	—	—	—	—
Abscess of breast	—	—	—	—	—	—	1	—	1	—
Other Diseases	—	—	—	—	—	1	14	—	15	—
Diseases of the Organs of Locomotion:—										
Osteitis	—	—	—	—	—	—	—	—	—	—
Arthritis	—	—	—	—	—	—	1	—	1	—
Spondylitis	—	—	—	—	—	—	—	—	—	—
Bursitis	—	1	—	1	—	—	10	—	10	—
Other Diseases	—	25	—	25	—	1	—	—	1	—
Diseases of the Connective Tissue:—										
Cellulitis	—	4	—	4	—	—	—	—	—	—
Abscess	—	8	—	8	—	—	4	—	4	—
Elephantiasis	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	1	—	1	—	—	4	—	4	—
Diseases of the Skin:—										
Urticaria	—	—	—	—	—	—	—	—	—	—
Eczema	—	—	—	—	—	—	2	—	2	—
Boil	—	2	—	2	—	—	1	—	1	—
Carbuncle	—	—	—	—	—	—	—	—	—	—
Herpes	—	—	—	—	—	—	1	—	1	—
Psoriasis	—	—	—	—	—	—	—	—	—	—
Oriental sore	—	—	—	—	—	—	—	—	—	—
Tinea	—	—	—	—	—	—	—	—	—	—
Scabies	—	—	—	—	—	—	—	—	—	—
Acne	—	—	—	—	—	—	—	—	—	—
Prickly heat	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	2	—	2	—	1	14	—	15	3
INJURIES.—General	—	3	—	3	—	—	—	—	—	—

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	EUROPEAN OFFICIALS.					GENERAL EUROPEAN POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Local	1	54	—	55	—	—	55	1	55	3
Gun-shot wound ..	—	—	—	—	—	—	4	—	4	—
Surgical operations* ..	—	(19)	—	(19)	—	—	(58)	—	(58)	—
Tumours	—	—	—	—	—	—	2	1	2	—
Malformations	—	—	—	—	—	—	—	—	—	—
Poisons	—	—	—	—	—	—	—	—	—	—
PARASITES.—Animal:—										
Protozoa	—	—	—	—	—	—	—	—	—	—
Trematoda (Flukes).	—	—	—	—	—	—	—	—	—	—
Cestoda.—										
Taenia solium	—	—	—	—	—	—	—	—	—	—
Taenia saginata..	—	—	—	—	—	—	5	—	5	—
Nematoda:—										
Ascaris	—	—	—	—	—	—	—	—	—	—
Tricocephalus dispar	—	—	—	—	—	—	—	—	—	—
Trichina	—	—	—	—	—	—	—	—	—	—
Dracunculus	—	—	—	—	—	—	—	—	—	—
Filariasis	—	—	—	—	—	—	—	—	—	—
Strongylus	—	—	—	—	—	—	—	—	—	—
Ankylostomiasis	—	—	—	—	—	—	—	—	—	—
Insecta:—										
Myiasis	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	—	—	—	—	—	—	—	—	—
TOTAL.	17	596	4	613	3	34	629	13	663	17

* Recorded under respective diseases.

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	NON-EUROPEAN OFFICIALS.					GENERAL NATIVE POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Infective Diseases:—										
Beri-Beri.	—	—	—	—	—	—	8	—	8	—
Cerebro-Spinal Fever.	—	—	—	—	—	—	50	27	50	—
Chicken-pox	—	1	—	1	—	8	536	—	544	6
Cholera	—	—	—	—	—	—	—	—	—	—
Dengue	—	—	—	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—	—	—	—
Dysentery	—	18	—	18	—	26	375	49	401	4
Endocarditis-Infective	—	—	—	—	—	—	—	—	—	—
Enteric	—	—	—	—	—	—	14	3	14	1
Erysipelas	—	—	—	—	—	—	—	—	—	—
Gonorrhoea	—	9	—	9	—	6	351	3	357	22
Influenza	2	374	—	376	9	8	827	13	835	13
Kala Azar	—	—	—	—	—	—	—	—	—	—
Leprosy (a) Nodular	—	—	—	—	—	69	65	1	134	7
(b) Anaesthetic	—	—	—	—	—	—	130	8	130	133
Malaria. (a) Sub-tertian	—	2	—	2	—	—	372	11	372	2
(b) Benign Tertian	—	62	—	62	51	—	88	—	88	—
(c) Quartan	—	—	—	—	—	—	13	—	13	—
(d) Undifferentiated	12	1022	—	1034	12	34	2215	22	2249	46
(e) Blackwater	—	7	1	7	—	1	10	3	11	2
Measles	—	—	—	—	—	2	137	1	139	8
Malta Fever	—	—	—	—	—	1	13	—	14	1
Plague	—	—	—	—	—	—	116	73	116	14
Pneumonia	—	11	1	11	—	24	996	261	1020	42
Rabies	—	—	—	—	—	—	—	—	—	—
Relapsing Fever	—	2	—	2	—	3	65	4	68	4
Rheumatic Fever	—	5	—	5	—	—	77	—	77	2
Septicaemia	—	—	—	—	—	—	7	7	7	—
Trypanosomiasis (Sl. sickness).	—	—	—	—	—	8	103	2	111	4
Small-pox	—	—	—	—	—	—	7	1	7	—
Syphilis (a) Primary	—	2	—	2	—	—	533	1	533	31
(b) Secondary	—	—	—	—	—	80	885	10	965	53
(c) Inherited	—	—	—	—	—	—	65	4	65	—
Tetanus	—	—	—	—	—	—	9	—	9	1
Tuberculosis	—	1	—	1	—	13	141	67	154	8
Whooping cough	—	—	—	—	—	4	5	—	9	4
Yaws	—	—	—	—	—	87	16110	7	16197	144
Yellow Fever	—	—	—	—	—	—	—	—	—	—
Mumps	—	2	—	2	—	—	72	—	72	3
Anthrax	—	1	—	1	—	—	37	3	37	5
Typhus	—	—	—	—	—	—	—	—	—	—
Other Infective Diseases	—	1	—	1	—	6	95	5	101	2
Intoxications:—										
Alcoholism	—	—	—	—	—	—	5	1	5	—
Morphinism	—	—	—	—	—	—	—	—	—	—
Others	—	—	—	—	—	—	1	—	1	—
General Diseases:—										
Anaemia	—	34	—	34	—	1	29	3	30	2
Anaemia-Pernicious	—	—	—	—	—	—	1	—	1	1
Diabetes	—	2	—	2	—	—	2	—	2	—
Exophthalmic goitre	—	—	—	—	—	—	—	—	—	—
Gout	—	—	—	—	—	—	—	—	—	—
Leucocythaemia	—	—	—	—	—	—	—	—	—	—
Hodgkin's disease	—	—	—	—	—	—	—	—	—	—
Myxoedema	—	—	—	—	—	—	—	—	—	—

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	NON-EUROPEAN OFFICIALS.					GENERAL NATIVE POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Purpura	—	—	—	—	—	—	—	—	—	—
Rickets	—	—	—	—	—	—	—	—	—	—
Scurvy	—	—	—	—	—	—	18	—	18	—
Other General Diseases ..	—	10	—	10	—	2	33	5	35	2
LOCAL DISEASES:—										
Diseases of the Nervous System:—										
Sub-Section 1.—										
Neuritis	—	1	—	1	—	—	14	—	14	—
Meningitis	—	—	—	—	—	1	8	6	9	2
Myelitis	—	—	—	—	—	—	1	—	1	1
Hydrocephalus	—	—	—	—	—	—	1	—	1	—
Encephalitis	—	—	—	—	—	—	—	—	—	—
Abscess of brain	—	—	—	—	—	—	—	—	—	—
Congestion of brain	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	—	—	—	—	1	14	2	15	1
Sub-Section 2.—										
Apoplexy	—	—	—	—	—	1	5	1	6	—
Paralysis	—	—	—	—	—	7	39	10	46	8
Chorea	—	—	—	—	—	—	—	—	—	—
Epilepsy	—	—	—	—	—	—	31	2	31	3
Neuralgia	—	19	—	19	—	—	58	—	58	—
Hysteria	—	—	—	—	—	1	6	—	7	—
Other Nervous Diseases ..	—	41	—	41	1	3	218	—	221	1
Mental Diseases:—										
Sub-Section 3.—										
Idiocy	—	—	—	—	—	2	—	—	2	1
Mania	—	—	—	—	—	46	55	11	101	57
Melancholia	—	—	—	—	—	—	5	—	5	1
Dementia	—	—	—	—	—	7	5	1	12	4
Delusional insanity	—	—	—	—	—	7	16	1	23	13
Other Mental Diseases	—	1	—	1	—	14	8	1	22	14
Diseases of the Eye:—										
Conjunctivitis	—	40	—	40	—	—	192	—	192	3
Keratitis	—	—	—	—	—	—	12	—	12	3
Ulceration of cornea	—	—	—	—	—	1	35	—	36	—
Iritis	—	1	—	1	—	1	20	—	21	—
Optic Neuritis	—	—	—	—	—	—	1	—	1	—
Cataract	—	—	—	—	—	—	15	—	15	—
Other Eye Diseases	—	6	—	6	—	1	36	1	37	1
Diseases of the Ear:—										
Inflammation	—	2	—	2	—	—	53	1	53	1
Other Diseases	—	3	—	3	—	—	29	—	29	1
Diseases of the Nose:—	—	52	—	52	—	—	25	—	25	—
Diseases of the Circulatory System:										
Pericarditis	—	—	—	—	—	—	4	2	4	—
Endocarditis	—	—	—	—	—	—	1	—	1	—
Valvular, Mitral	—	—	—	—	—	—	20	5	20	1
,, Aortic	—	—	—	—	—	—	4	2	4	2
,, Tricuspid	—	—	—	—	—	—	—	—	—	—
,, Pulmonary	—	—	—	—	—	—	—	—	—	—
Arterial sclerosis	—	—	—	—	—	—	—	—	—	—
Aneurism	—	—	—	—	—	—	1	—	1	—
Other diseases	—	3	—	3	—	1	29	8	30	1

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	NON-EUROPEAN OFFICIALS.					GENERAL NATIVE POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Diseases of the Respiratory System:										
Laryngitis	—	—	—	—	—	1	9	1	9	6
Bronchitis	—	130	—	130	1	7	806	—	813	25
Broncho-pneumonia	—	—	—	—	—	1	65	25	66	—
Abscess of lung	—	—	—	—	—	—	—	—	—	—
Gangrene of lung	—	—	—	—	—	—	—	—	—	—
Emphysema	—	—	—	—	—	1	—	—	—	—
Pleurisy	—	6	—	6	—	2	32	2	34	—
Empyema	—	—	—	—	—	—	5	1	5	2
Other diseases	—	26	—	26	—	1	237	2	238	3
Diseases of the Digestive System:-										
Stomatitis	—	—	—	—	—	—	12	1	12	—
Caries of teeth	—	43	—	43	—	—	13	—	13	1
Sore throat	—	3	—	3	—	1	45	—	46	—
Inflammation of tonsils	—	25	—	25	—	—	36	—	36	1
Gastritis	—	11	—	11	—	—	8	—	8	—
Ulceration of stomach	—	—	—	—	—	—	2	1	2	—
Haematemesis	—	—	—	—	—	—	1	—	1	—
Dilatation of stomach	—	—	—	—	—	—	—	—	—	—
Stricture of stomach	—	—	—	—	—	—	1	—	1	—
Dyspepsia	—	29	—	29	—	1	29	1	30	1
Enteritis	—	1	—	1	—	—	5	1	5	—
Appendicitis	—	2	—	2	—	—	8	—	8	—
Colitis	—	14	—	14	—	—	25	1	25	—
Ulceration of intestines	—	—	—	—	—	—	1	1	1	—
Sprue	—	—	—	—	—	—	1	—	1	—
Hernia	—	—	—	—	—	2	86	6	88	2
Diarrhoea	—	18	—	18	—	3	278	5	281	5
Constipation	—	27	—	27	1	—	69	—	69	1
Colic	—	50	—	50	—	1	88	1	89	—
Haemorrhoids	—	10	—	10	—	1	8	1	9	—
Pancreatitis	—	—	—	—	—	—	—	—	—	—
Hepatitis-Acute	—	12	—	12	—	—	14	—	14	1
Abscess	—	2	—	2	—	1	5	2	6	1
Cirrhosis	—	—	—	—	—	1	6	3	7	1
Jaundice	—	—	—	—	—	—	4	1	4	1
Peritonitis	—	—	—	—	—	—	5	4	5	—
Ascites	—	—	—	—	—	1	11	2	12	—
Other Diseases	—	24	—	24	1	1	48	5	49	1
Diseases of the Lymphatic System:-										
Splenitis	—	2	—	2	—	4	55	1	59	3
Inflammation of lymphatic gland.	—	4	—	4	—	5	108	—	113	4
Suppuration of lymphatic gland.	—	3	—	3	—	1	29	—	30	5
Lymphangitis	—	—	—	—	—	1	6	—	7	—
Elephantiasis	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	—	—	—	—	—	3	1	3	—
Diseases of the Urinary System:—										
Acute nephritis	—	—	—	—	—	—	6	3	6	—
Bright's disease	—	—	—	—	—	—	2	1	2	—
Pyelitis	—	—	—	—	—	—	2	—	2	—
Calculus	—	—	—	—	—	—	2	—	2	—
Renal Colic	—	—	—	—	—	—	—	—	—	—
Cystitis	—	1	—	1	—	—	3	—	3	—
Vesical calculus	—	—	—	—	—	—	—	—	—	—
Suppression	—	1	—	1	—	—	—	—	—	—
Haematuria	—	—	—	—	—	—	1	—	1	—
Chyluria	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	2	—	2	—	1	10	2	11	—

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	NON-EUROPEAN OFFICIALS.					GENERAL NATIVE POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.
Diseases of the Generative System:										
Male Organs.—										
Urethritis	—	—	—	—	—	—	18	—	18	—
Gleet	—	—	—	—	—	—	14	—	14	—
Stricture	—	—	—	—	—	—	13	1	13	1
Prostatitis	—	—	—	—	—	—	2	—	2	—
Soft chancre	—	—	—	—	—	—	19	—	19	2
Condyloma	—	—	—	—	—	1	1	—	2	—
Inflammation of scrotum	—	—	—	—	—	—	1	—	1	—
Hydrocele	—	—	—	—	—	4	190	—	194	4
Orchitis	—	3	—	3	—	2	52	—	54	1
Epididymitis	—	—	—	—	—	—	6	—	6	—
Abscess of testicles	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	—	—	—	—	—	32	1	32	2
Female Organs.—										
Ovaritis	—	—	—	—	—	—	—	—	—	—
Ovarian cyst.	—	—	—	—	—	—	7	1	7	—
Endometritis	—	—	—	—	—	—	—	—	—	—
Displacement of uterus	—	—	—	—	—	—	1	—	1	—
Vaginitis	—	—	—	—	—	—	1	—	1	—
Amenorrhoea	—	—	—	—	—	—	—	—	—	—
Dysmenorrhoea	—	—	—	—	—	—	3	—	3	—
Menorrhagia	—	—	—	—	—	—	1	—	1	—
Leucorrhoea	—	—	—	—	—	—	—	—	—	—
Abortion	—	—	—	—	—	—	10	4	10	1
Delayed labour	—	—	—	—	—	—	22	—	22	—
Post-partem haemorrhage	—	—	—	—	—	—	—	—	—	—
Retained placenta	—	—	—	—	—	—	7	—	7	—
Premature birth	—	—	—	—	—	—	2	—	2	—
Puerperal septicaemia	—	—	—	—	—	—	4	2	4	—
Mastitis	—	—	—	—	—	—	15	1	15	3
Abscess of breast	—	—	—	—	—	1	—	—	1	1
Other Diseases	—	—	—	—	—	1	28	3	29	2
Diseases of the Organs of Locomotion:—										
Osteitis	—	1	—	1	—	1	65	—	66	2
Arthritis	—	3	—	3	—	3	118	1	121	2
Spondylitis	—	—	—	—	—	—	—	—	—	—
Bursitis	—	1	—	1	—	2	128	—	130	2
Other Diseases	—	126	—	126	3	18	343	2	361	12
Diseases of the Connective Tissue:—										
Cellulitis	—	12	—	12	—	8	281	3	289	2
Abscess	—	24	—	24	—	12	373	3	385	33
Elephantiasis	—	—	—	—	—	—	61	1	61	4
Other Diseases	—	7	—	7	—	—	156	1	156	14
Diseases of the Skin:—										
Urticaria	—	7	—	7	—	—	11	—	11	—
Eczema	—	6	—	6	—	1	37	1	38	—
Boil	—	14	—	14	—	2	77	—	79	2
Carbuncle	—	—	—	—	—	—	3	—	3	—
Herpes	—	2	—	2	—	—	6	—	6	—
Psoriasis	—	—	—	—	—	—	2	—	2	—
Oriental sore	—	—	—	—	—	—	2	—	2	—
Tinea	—	—	—	—	—	—	6	—	6	—
Scabies	—	13	—	13	—	8	177	—	185	6

TABLE VI.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1923.

DISEASES.	NON-EUROPEAN OFFICIALS.					GENERAL NATIVE POPULATION.				
	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths.	Total cases treated.	Remaining in Hospital at end of 1923.	Remaining in Hospital at end of 1922.	Yearly Total. Admissions.	Deaths	Total cases treated.	Remaining in Hospital at end of 1923.
Acne	—	1	—	1	—	—	1	—	1	—
Prickly heat	—	—	—	—	—	—	—	—	—	—
Other Diseases	—	11	—	11	—	17	835	6	852	83
INJURIES.—General	—	1	—	1	—	3	28	3	31	4
Local	3	182	—	185	1	170	1910	52	2080	147
Gun-shot wound ..	—	—	—	—	—	—	7	—	7	1
Surgical operations* ..	—	—	—	—	—	—	(573)	—	(573)	—
Tumours	—	—	—	—	—	—	99	—	99	12
Malformations	—	—	—	—	—	—	8	—	8	—
Poisons	—	—	—	—	—	2	35	4	37	1
PARASITES.—Animal:—										
Protozoa	—	—	—	—	—	—	—	—	—	—
Trematoda (Flukes).	—	—	—	—	—	—	20	—	20	—
Cestoda.—										
Taenia solium	—	—	—	—	—	—	92	1	92	2
Taenia saginata	—	—	—	—	—	—	6	—	6	1
Nematoda:—										
Ascaris	—	—	—	—	—	—	43	—	43	—
Tricocephalus dispar	—	—	—	—	—	—	—	—	—	—
Trichina	—	—	—	—	—	—	—	—	—	—
Dracunculus	—	—	—	—	—	—	1	—	1	—
Filariasis	—	—	—	—	—	—	6	1	6	—
Strongylus	—	—	—	—	—	—	1	—	1	—
Ankylostomiasis	—	—	—	—	—	2	64	9	66	3
Insecta:—										
Myiasis	—	2	—	2	—	—	10	—	10	—
Other Diseases	—	—	—	—	—	2	1	—	3	1
TOTAL.	17	2603	2	2620	31	773	33229	830	34002	1101

* Recorded under respective diseases.

TABLE VII.

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1923.

DISEASES.	EUROPEAN OFFICIALS.		GENERAL EUROPEAN POPULATION.		NON-EUROPEAN OFFICIALS.		GENERAL NATIVE POPULATION.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
INFECTIVE DISEASES:—								
Beri-Beri	—	—	—	—	—	—	1	—
Cerebro-spinal fever	—	—	—	—	—	—	—	—
Chicken-pox	—	—	—	1	—	—	70	3
Cholera	—	—	—	—	—	—	—	—
Dengue	—	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—	—
Dysentery	2	1	1	2	3	—	187	49
Endocarditis-Infective	—	—	—	—	—	—	—	—
Enteric fever	—	—	—	1	—	—	—	—
Erysipelas	—	—	—	—	—	—	2	—
Gonorrhoea	—	—	1	—	—	—	626	14
Influenza	12	1	21	4	32	—	3255	500
Kala Azar	—	—	—	—	—	—	—	—
Leprosy (a) Nodular	—	—	—	—	—	—	7	9
(b) Anaesthetic	—	—	—	—	—	—	17	8
Malaria (a) Sub-Tertian	—	—	1	—	2	—	70	12
(b) Benian Tertian	1	—	—	—	1	—	248	65
(c) Quartan	—	—	—	—	—	—	2	—
(d) Undifferentiated	23	1	10	7	102	—	11446	2227
(e) Black-water	—	—	—	—	—	—	2	—
Measles	—	—	—	—	—	—	21	5
Malta fever	—	—	—	—	—	—	—	—
Plague	—	—	—	—	—	—	—	—
Pneumonia	—	—	—	—	—	—	65	19
Rabies	—	—	—	—	—	—	—	—
Relapsing fever	—	—	—	—	—	—	1	—
Rheumatic fever	1	—	—	—	1	—	85	9
Septicaemia	—	—	—	—	—	—	1	2
Trypanosomiasis (Sl. Sickness)	—	—	—	—	—	—	—	—
Small-pox	—	—	—	—	—	—	—	—
Syphilis. (a) Primary	2	—	1	—	—	—	404	153
(b) Secondary	—	—	—	—	—	—	878	551
(c) Inherited	—	—	—	—	—	—	148	138
Tetanus	—	—	—	—	—	—	1	1
Tuberculosis	1	—	—	—	—	—	108	42
Whooping cough	—	—	—	—	—	—	27	7
Yaws	—	—	—	—	—	—	8212	7167
Yellow fever	—	—	—	—	—	—	—	—
Mumps	—	—	—	—	—	—	23	2
Anthrax	—	—	—	—	—	—	1	—
Typhus	—	—	—	—	—	—	—	—
Other infective diseases	—	—	—	—	—	—	46	1
INTOXICATIONS:—								
Alcoholism	—	—	1	—	—	—	2	—
Morphinism	—	—	—	—	—	—	—	—
Others	—	—	—	—	—	—	1	—
GENERAL DISEASES:—								
Anaemia	4	—	2	5	—	—	206	22
Anaemia-Pernicious	—	—	—	—	—	—	—	—
Diabetes	—	—	—	—	1	—	5	—
Exopthalmic goitre	—	—	—	—	—	—	—	—
Gout	—	—	—	—	—	—	5	—
Leucocythaemia	—	—	—	—	—	—	—	—
Hodgkin's Disease	—	—	—	—	—	—	—	—
Myxoedema	—	—	—	—	—	—	—	—
Purpura	—	—	—	—	—	—	—	—
Rickets	—	—	—	—	—	—	—	1
Scurvy	—	—	—	—	—	—	10	4
Other general diseases	19	—	13	15	—	—	158	56
LOCAL DISEASES:—								
Diseases of the Nervous System	6	2	8	—	40	—	2603	481
Mental diseases	—	—	1	4	—	—	12	2
Diseases of the Eye	6	—	6	3	13	—	2538	1160
„ „ Ear.	9	1	22	10	15	—	1438	414
„ „ Nose	11	—	5	1	44	—	577	66
„ „ Circulatory System	—	—	2	1	1	—	41	7
„ „ Respiratory System	16	1	7	2	82	—	14094	3454
„ „ Digestive System	55	2	49	37	228	—	14859	3056
„ „ Lymphatic System	1	—	2	—	2	—	677	115
„ „ Urinary System	4	1	—	2	—	—	60	10
„ „ Generative System	2	1	8	12	1	—	267	396
„ „ Organs of Locomotion	8	2	2	1	—	—	4556	1355
„ „ Connective Tissue	9	—	10	4	28	—	2033	524
„ „ Skin	22	—	36	8	32	—	10550	3341
INJURIES:—								
General	8	—	—	—	—	—	99	83
Local	37	1	43	11	66	—	21282	2901
Gun-shot wound	—	—	—	—	—	—	2	—
Surgical operations*	(1)	—	(17)	—	—	—	(1)	—
Tumours	—	—	1	2	—	—	12	8
Malformations	—	—	—	—	—	—	2	—
Poisons	—	—	—	—	3	—	19	1
Parasites—Animal.	2	—	2	—	9	—	2618	1024
TOTAL	261	14	255	133	706	—	105580	29465

* Recorded under respective diseases.

TABLE VIII.

EUROPEANS.

RETURN OF INFECTIVE DISEASES TREATED AT THE VARIOUS HOSPITALS AND DISPENSARIES IN THE COLONY AND PROTECTORATE OF KENYA, DURING 1923.

DISEASES.		Chuka.	Eldoret.	Fort-Hall.	Kakamega.	Kilindini.	Kitui.	Kisii.	Kismayu.	Kisumu.	Lamu.	Machakos.	Malindi.	Mandera.	Mombasa.	Moyale.	Mueressi.	Meru.	Nairobi.	Nakuru.	Nandi.	Narok.	Nyeri.	Serenli.	Total.
Chicken-Pox.	(Cases.	—	1	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dysentery.	(Cases.	3	2	—	—	—	—	—	—	2	—	—	—	—	6	—	—	—	7	—	—	—	—	—	20
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
Enteric Fever.	(Cases.	—	—	—	—	—	—	—	1	2	—	1	—	—	1	—	—	—	8	—	—	—	—	—	13
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Influenza.	(Cases.	—	1	6	—	—	1	—	1	6	—	1	—	—	112	—	—	1	65	5	1	—	11	—	211
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malaria.	(Cases.	3	9	8	2	22	—	—	5	70	4	7	10	1	144	—	9	1	64	9	—	—	10	2	380
	(Deaths.	—	—	—	—	—	—	—	—	1	—	—	—	—	2	—	1	—	—	—	—	—	—	—	4
Blackwater Fever.	(Cases.	—	—	—	—	—	—	—	—	3	1	—	—	—	2	—	1	—	—	—	—	—	—	1	8
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	2
Measles.	(Cases.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	2	—	—	—	—	—	3
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pneumonia.	(Cases.	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	2	—	—	—	—	—	4
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhus.	(Cases.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	3
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mumps.	(Cases.	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Plague.	(Cases.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
Tuberculosis.	(Cases.	—	—	—	—	—	—	—	—	2	—	—	—	—	5	—	—	—	—	—	—	—	—	—	7
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE VIII.

NATIVES (INCLUDING ASIATICS).

RETURN OF INFECTIVE DISEASES TREATED AT THE VARIOUS HOSPITALS AND DISPENSARIES IN THE COLONY AND PROTECTORATE OF KENYA, DURING 1923.

DISEASES.		Chuka.	Eldoret.	Fort-Hall.	Kakamega.	Kilindini.	Kitui.	Kisii.	Kismayu.	Kisumu.	Lamu.	Machakos.	Malindi.	Mandera.	Mombasa.	Moyale.	Mueressi.	Meru.	Nairobi.	Nakuru.	Nandi.	Narok.	Nyeri.	Serenli.	Total.
Beri-Beri. ..	(Cases.	—	2	—	—	—	—	—	—	—	1	—	—	3	—	—	—	—	—	—	—	—	—	3	9
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cerebro-Spinal Fever.	(Cases.	—	3	1	1	—	—	—	—	6	—	3	—	—	7	—	—	—	29	—	—	—	—	—	50
	(Deaths.	—	1	—	1	—	—	—	—	4	—	2	—	—	4	—	—	—	15	—	—	—	—	—	27
Chicken-Pox. ..	(Cases.	1	10	29	3	—	—	12	—	26	—	9	—	—	7	—	23	3	357	2	11	4	3	—	610
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dysentery. ..	(Cases.	13	7	22	4	16	3	12	10	107	32	1	16	1	137	—	1	40	125	59	11	1	13	1	632
	(Deaths.	—	—	2	—	—	—	2	—	8	—	1	—	—	9	—	—	1	14	10	1	—	1	—	49
Enteric Fever. ..	(Cases.	—	2	1	—	—	—	—	—	4	—	—	—	—	2	—	—	—	5	—	—	—	—	—	14
	(Deaths.	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	3
Influenza. ..	(Cases.	255	—	356	330	92	1	24	25	1	—	—	282	46	844	—	4	284	1,053	797	396	21	177	—	4,988
	(Deaths.	3	—	5	2	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	1	—	—	—	13
Leprosy. ..	(Cases.	59	1	4	61	1	31	—	4	25	—	—	28	—	13	—	—	—	5	1	1	—	2	—	236
	(Deaths.	—	—	—	1	—	—	—	1	—	—	—	6	—	1	—	—	—	—	—	—	—	—	—	9
Malaria. ..	(Cases.	32	354	789	606	992	632	479	369	2,772	1,547	502	2,914	181	2,099	—	178	612	2,045	53	99	45	382	268	17,950
	(Deaths.	1	3	4	—	1	—	3	—	4	—	1	—	1	3	—	—	—	12	—	—	—	—	—	33
Blackwater Fever. ..	(Cases.	—	—	—	—	1	—	—	—	2	—	—	2	—	8	—	2	—	4	—	—	—	—	—	19
	(Deaths.	—	—	—	—	—	—	—	—	1	—	—	—	—	3	—	—	—	—	—	—	—	—	—	4
Measles. ..	(Cases.	—	—	15	—	1	4	—	—	28	—	1	2	—	17	—	—	—	105	—	—	—	—	—	163
	(Deaths.	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Malta Fever. ..	(Cases.	—	—	2	—	—	—	—	—	—	—	3	—	—	5	—	—	—	3	—	—	—	—	—	13
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Plague. ..	(Cases.	—	—	23	—	—	—	5	—	3	—	—	—	—	20	—	—	—	62	3	—	—	—	—	116
	(Deaths.	—	—	19	—	—	—	2	—	2	—	—	—	—	12	—	—	—	37	1	—	—	—	—	73
Pneumonia. ..	(Cases.	—	22	18	9	11	10	28	8	94	6	24	11	—	102	—	7	17	580	138	—	3	—	3	1,091
	(Deaths.	—	1	7	2	—	1	3	2	15	1	5	—	—	29	—	2	2	143	49	—	—	—	—	262
Relapsing Fever. ..	(Cases.	17	—	38	—	1	—	—	4	—	—	1	—	—	—	—	—	—	4	—	—	—	—	—	65
	(Deaths.	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	4
Trypanosomiasis ..	(Cases.	—	—	—	4	—	—	98	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	103
	(Deaths.	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Tuberculosis. ..	(Cases.	13	3	21	1	—	3	16	39	8	8	5	64	2	63	—	—	3	33	4	4	1	—	—	291
	(Deaths.	2	2	2	—	—	—	4	6	2	—	—	—	—	29	—	—	—	18	2	—	—	—	—	67
Yaws. * ..	(Cases.	2,785	1	9,720	310	8	443	6,550	30	1,449	320	15	3,515	7	4,945	—	—	908	85	12	4	3	357	2	31,489
	(Deaths.	2	—	—	2	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	1	—	7
Mumps. ..	(Cases.	—	2	3	—	4	—	—	—	25	—	—	—	—	5	—	—	—	54	4	—	—	—	—	97
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Anthrax. ..	(Cases.	1	—	5	—	—	—	—	—	1	—	3	—	—	1	—	—	—	28	—	—	—	—	—	39
	(Deaths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	3

* The figures in respect to Yaws are exclusive of the number treated by Medical Officers at Out-Dispensaries.

TABLE IX.

STATISTICS REGARDING ENTERIC FEVER AMONG EUROPEAN RESIDENTS IN THE COLONY AND PROTECTORATE OF KENYA, DURING 1923.

Total Number Admitted on Account of Enteric.				Number Admitted who had been Previously Inoculated Against Enteric.		Number of Cases who Died.				Total Number Inoculated Against Enteric Fever During the Year.	
						Previously Inoculated.		Not Previously Inoculated.			
Officials.		Non-Officials.		Officials.	Non-Officials.	Officials.	Non-Officials.	Officials.	Non-Officials.	Officials.	Non-Officials.
Cases.	Deaths.	Cases.	Deaths.								
4	—	9	—	—	1	—	—	—	—	—	8

The occurrence of the cases was as follows:-

Nairobi	.. ..	8
Mombasa	.. ..	2
Kismayu	.. ..	1
Kisumu	.. ..	1
Machakos	.. ..	1

APPENDIX "A".

ANNUAL REPORT OF THE PROCEEDINGS OF THE BOARD OF HEALTH FOR THE YEAR, 1923.

(The Public Health Ordinance, 1913).

1. The membership of the Board consisted of:—
   The Hon. Principal Medical Officer (President).
   The Chief Sanitation Officer.
   The Hon. Director of Public Works.
   The Hon. Commissioner of Lands.
   The Director of Surveys.
   A. C. Tannahill, Esq.

2. Summary of work done:—

(a)	Meetings held during the year	6
(b)	Applications for sub-divisions outstanding from previous year.	2
(c)	Applications for sub-divisions submitted during the year. ..	8
(d)	Applications for sub-divisions approved during the year. ..	6
(e)	Applications for sub-divisions rejected during the year. ..	3
(f)	Applications for sub-divisions referred back for modification ..	1
(g)	Applications for sub-divisions re-submitted	—
(h)	Applications for sub-divisions outstanding at end of the year ..	—

3. The following matters of special interest present themselves as the outcome of the year's work:—

The Board has expressed approval of the principle that sanitary passages between plots in the Commercial Areas of Townships are, as a general rule, very undesirable and should not be inserted in any new plan.

4. Arising out of the question of the non-provision of sanitary lanes in residential areas it has been suggested that difficulty might arise at a future date when a sewerage system came to be installed in such areas owing to many plots being so situated that the only outlet for domestic sewage would be through adjoining properties, should no sanitary lane be provided. The vexed question of easements would then arise. Under such circumstances there appeared to be a need for a legal right of easement.

The Board has decided to give further consideration to this matter at a future date.

5. An interesting point has arisen, resulting from consideration of a proposed scheme of sub-division, due to the difficulty experienced by the applicants in obtaining satisfactory surety for a Bond required by the Board for the construction and maintenance of certain necessary roads and drains, etc. It has been suggested to the Board that an equitable mortgage gave better security than a surety, because in case of default land could be sold at public auction and the proceeds devoted to construction and maintenance works, but there was nothing to prevent a person acting as surety evading his obligations by leaving the country, and, further to this, the financial standing of a person acting as surety might so alter as to render the surety almost, if not entirely, worthless.

In accordance with the decision of the Board, following on discussion of this matter, a letter has been forwarded to the Hon'ble Colonial Secretary through the Hon'ble Attorney-General stating that the Board would be glad if they could be favoured with a decision by Government as to whether Government would be prepared to agree to the principle that equitable mortgage be accepted instead of surety in any cases where security for a Bond may be required by the Board. The Board has not as yet been informed as to whether Government has arrived at any decision in this matter.

6. The question has been raised of the need for some improved method of procedure being adopted in the case of sub-divisional schemes which involve conversion of title from Agricultural to Township use. A case was cited where a scheme of sub-division has been under consideration by the Board for over two years, whilst the primary question of conversion of title, which was involved in this scheme, was still unsettled. It was pointed out that, should conversion of title be not approved by Government, all the time spent by the Board on this scheme would be wasted, and the applicants would have wasted a considerable sum of money as well as time on the project. It was suggested that questions of conversion of title should in all cases be first settled before any schemes were submitted to the Board.

After due consideration of the various aspects of this question it was decided that the Board should take no action in the matter.

7. Two cases of contravention of the provisions of the Public Health Ordinance, 1913, have come to light during the year. In both cases land had been divided and sold, and plots occupied without the sanction of the Board being first sought in the matter. It was only when title to the land was required that these irregularities had come to light. The Board, whilst approving of both these sub-divisions, warned the offenders that they had rendered themselves liable to the penalties prescribed in the Ordinance and that offences of this character must cease.

8. During the course of their deliberations the Board have found it necessary to refuse to give further consideration to a proposal to sub-divide an agricultural property for township purposes owing to Government's refusal to agree to conversion of title from agricultural to township use. This particular proposal had been under consideration by the Board for a period of over two years.

9. The Board have found themselves unable to approve of certain proposals submitted during the year for a re-sub-division of a large estate on the outskirts of Nairobi Township, as the Board were of opinion that close development on this site was undesirable in the absence of any system of scavenging and night-soil disposal. The Board further decided that they would only approve of this proposal as and when Government might be in a position to make arrangements for the sanitation of this and the adjoining suburban areas.

In further support of their attitude in this matter the Board have addressed Government drawing attention to the fact that the need for an organised sanitary service in this and the adjoining suburban areas is pressing and that land sub-divisions which would otherwise be approved are being held up pending the institution of such a service.

APPENDIX "B".

ANNUAL REPORT OF THE PROCEEDINGS OF THE CENTRAL BOARD OF HEALTH FOR THE YEAR, 1923.

(The Public Health Ordinance, 1921).

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1. *Members of the Board, Resignations, New Appointments.*—

(a) The membership of the Board at the commencement of the year consisted of:—

The Principal Medical Officer, Dr. J. L. Gilks (Chairman).
The Chief Sanitation Officer, Dr. A. R. Paterson.
Dr. G. V. W. Anderson.
Lieut. Col. E. W. N. Guinness, O.B.E.
Dr. W. H. Kauntze.
The Hon. Mr. H. L. Sikes.
Lieut. Col. O. F. Watkins, C.B.E., D.S.O.
J. A. Watson, Esq.
The Hon. Mr. T. A. Wood, M.B.E., C.M.G., M.L.C.
F. Strawbridge, Esq., Secretary.

(b) Lieut. Col. E. W. N. Guinness, resigned his position on the Board at the commencement of the year due to being so employed out of Nairobi as to render it impossible for him to attend meetings of the Board.

(c) To fill the vacancy resulting from the resignation of Lieut. Col. Guinness the following new appointment was made on the 18th January, 1923:—

A. J. Jex-Blake, Esq., M.A., M.D. (Oxon.), F.R.C.P. (Lond.)

(d) During the absence of the Hon. Mr. H. L. Sikes from the Colony and Protectorate the following appointment was made on the 29th March, 1923, to fill the temporary vacancy:—

H. M. Birch, Esq., A.M.Inst. C.E.

(e) On the 27th December, 1923, the Hon'ble Mr. H. L. Sikes was reappointed a member of the Board on his return to the Colony and Protectorate and consequent upon the resignation of H. M. Birch, Esq.

2. *Meetings of the Board.*—Five meetings of the Board have been held during the year.

3. *Regulations submitted to board for Confirmation.*—The following Regulations were submitted to the Board for approval and confirmation in accordance with the provisions of Section 16 of the Ordinance:—

Regulations governing the Density of Buildings.—These were submitted by the Nairobi Corporation. The Board has expressed approval of the Regulations subject to certain suggested amendments, and the Regulations have been referred back for the further consideration of the Corporation in the light of the amendments suggested by the Board.

Time has been too short to permit of these Regulations being re-submitted to the Board before the close of the year.

4. *The Public Health (Rat Virus) Regulations*, 1923.—As certain technical objections had arisen with regard to the draft regulation, governing the importation, etc., of rat viruses, which had been submitted to Government by the Board in the year 1922, new Regulations had been drafted by the Attorney-General's Department and were submitted for the consideration of the Board during the year. The new draft was approved by the Board subject to certain amendments, and the draft Regulations as amended were subsequently approved by Government and published in the Official Gazette under Government Notice No. 218, dated the 26th April, 1923.

5. *Prohibition of the Cultivation of Rice in the Rice Swamp, Mombasa Island.*—The Board have considered a request submitted to Government by the District Committee, Mombasa, and the Medical Officer of Health, Mombasa, that the cultivation of rice in the Rice Swamp, Mombasa Island, should be prohibited on the grounds that such cultivation was unhealthful and insanitary inasmuch as it facilitated the breeding of anopheline mosquitoes. Five plots owned by four separate landholders were involved.

After due consideration of this matter the Board recommended to Government that the cultivation of rice on the five plots involved be prohibited.

The recommendation of the Board was subsequently approved by Government and an Order prohibiting the cultivation of rice on the five plots referred to was published in the Official Gazette under Government Notce No. 260, dated the 30th July, 1923.

6. *Milk and Dairies Regulations.*—The Draft Milk and Dairies Regulations as approved by the Board during the previous year were published by Government, for information and criticism, in the Official Gazette, dated the 11th April, 1923, under Government Notice No. 112.

These Regulations are still under consideration by Government.

7. *Registration of Nursing Homes, etc.*—Applications for Registration and Licence in respect of eight Nursing Homes have been received during the year.

All these eight applications were approved by the Board.

8. *Insanitary Housing Conditions in Nairobi Township*—The Board have considered a memorandum dealing with insanitary housing conditions in Nairobi, which had been submitted to Government by the Medical Officer of Health, Nairobi. In his memorandum the Medical Officer of Health, in commenting upon the insanitary housing conditions which exist in Nairobi Township, called particular attention to the fact that new insanitary areas were steadily being brought into existence due to existing laws being quite inadequate to prevent such developments. He stated that the cause of the insanitary conditions referred to arose from the overcrowding of land with buildings and with people, requested that legislation having for its object the restriction of the number of dwellings which may be erected per acre be enacted at the earliest possible moment to control future development, and submitted certain concrete proposals for consideration.

After due consideration of the subject-matter of the memorandum the Board approved of the principle of limitation of the number of dwellings per acre in Townships and without committing itself to any matter of detail agreed in general with the memorandum by the Medical Officer of Health, Nairobi.

As will be noted in paragraph 3, the Nairobi Corporation at a later date submitted, for the approval and confirmation of the Board, draft Regulations governing the Density of Buildings in Nairobi Township. Notwithstanding the fact that some delay has arisen with regard to the approval of these Regulations it appears probable that legislation will shortly be provided embodying the principle approved by the Board of the limitation of the number of dwellings per acre.

9. *Incidence of Infectious Disease in the Colony and Protectorate during the year*, 1922.—In the early portion of the year the Chief Sanitation Officer gave a brief verbal statement of the incidence of Infectious Disease in the Colony and Protectorate during the year 1922.

10. *Medical Survey conducted in a portion of the Nyanza Province.*—In the early portion of the year the Principal Medical Officer placed before the Board certain tables of statistics which had been compiled as the outcome of a Medical Survey carried out by Government in an area of the native reserve in the Nyanza Province, and commenting upon the value of the information supplied by these statistics he remarked that, to the best of his knowledge, only on one previous occasion had any investigation of this character been carried out. He also drew attention to the high infantile mortality rate amongst Africans disclosed by these statistics.

APPENDIX "C".

REPORT ON A TOUR OF INVESTIGATION IN THE SLEEPING SICKNESS AREA OF CENTRAL AND SOUTH KAVIRONDO.

By H. Lyndhurst Duke, M.D., Sc.D. (Cantab.) Bacteriologist, Uganda Protectorate.

(1) Objects.
(2) Previous Investigations in the Kavirondo Infected Area.
(3) Circumstances leading to the present tour, and plan of operations.
(4) Brief historical survey of the principal infected areas visited.
(5) Methods pursued and observations recorded.
(6) The present position as revealed by these observations.
(7) Remarks on the virulence of the disease, suggested by Dr. Beven's and my own observations.
(8) Proposals for future control.
(9) List of cases detected during the tour.

(1) *Object*; to study the distribution of human trypanosomiasis and the factors determining the persistence and spread of the disease in the Kavirondo Infected Area.

(2) *Previous investigations in the Kavirondo Sleeping Sickness Area.*—

In 1909 Dr. Baker opened a concentration camp in Kanyamkago, near the Kuja River, where he collected 260 cases and then died.

Dr. Pugh, went to this camp in 1910; he found that all Baker's cases had died, and during his sojourn he collected and treated 73 cases. The chiefs considered that the disease was gradually dying out—as Pugh suggested, for lack of further victims.

Early in 1917 the Provincial Commissioner, Kisumu, reported that occasional cases of Sleeping Sickness were occurring in four locations in Kavirondo viz. at the Miriu River and at the mouth of the Awatch River in South Kavirondo, and in Usaki and Kasigunga north of the Gulf.

At the end of 1920, Dr. de Boer, visited the Miriu River and reported 12 cases.

From September 1921, to January 1922, Dr. Beven toured the whole Kavirondo Sleeping Sickness area, and his careful and accurate report was of the greatest assistance to me during the present investigations.

(3) *Circumstances leading to the present tour, and plan of operations.*—During the tour just referred to Beven carried out limited clearing operations in two areas in South Kavirondo, where, at the time of his visit, the disease was most prevalent ; he also drew attention to the comparative ease with which this method of control might be applied to the whole area.

In commenting on Beven's report the Director of the Imperial Bureau of Entomology deprecated indiscriminate deforestation, and suggested that the breeding centres of the fly should first be mapped out, so that clearing measures could be directed more especially against these centres. In default of an expert entomologist to undertake this work, I was instructed by the Uganda Government to visit the area and carry out as far as possible the investigations required by the Kenya authorities.

At Kisumu, I met Drs. Wilson, the Acting Deputy P.M.O., Chell, Senior Medical Officer, Kisumu; Pope, Medical Officer of Health, Kisumu; and Wallington, Medical Officer Native Reserve, North Kavirondo, and the situation was fully discussed. It was decided at once that a complete fly-survey of the area was neither practicable nor necessary, and that the limited time at my disposal would be best employed in visiting the principal infected areas recognised by Beven in South Kavirondo. It was hoped that a comprehensive study of these foci would yield information which could be applied to the whole Kavirondo infected area.

The price demanded by the Railway for the use of a small motor-boat being in my opinion prohibitive, I decided to follow Beven's example and travel on foot along the coast. We left Kisumu on 25th June, 1923, in the motor-launch for Nyakatch Bay, and finally left the area at Karungu on 27th July, 1923, by S.S. Usoga.

The 3 areas originally selected were the Miru River, Homa Point, and the Kuja River. Owing to the untoward prolongation of the rains and the swollen state of the rivers, it was impossible to visit the middle reaches of the Kuja River where it traverses Kanyadote, Kabwoch, Kanyamkago and Sakwa—a tract of country where the ravages of the disease attained appalling proportions during the great epidemic. Instead, I went up the coast to the limits of the Gwasi District, another region that was almost completely depopulated by Sleeping Sickness.

The *G. pallidipes* and game-country along the Kuja was effectually isolated by the swollen Gori River. Three topi were shot, and no trypanosomes were seen in their blood; no other game was shot during the trip.

(4) *Brief historical survey of the principal infected areas visited.*—As far as is known, the epidemic reached its height in the Kavirondo country about 1905. The chiefs state that it lasted 4 years, but this estimate no doubt refers to the period of maximum intensity. Cherrett came to the conclusion that the duration was 10 years, during the latter 5 years of which the mortality was gradually decreasing. At the time of Cherrett's tour human trypanosomiasis still persisted in epidemic form in Uyoma in North Kavirondo; everywhere else it had died down, though on the eastern shore of Homa Bay a number of cases were seen. Cherrett found trypanosomes in 97 people in North Kavirondo and in 17 south of the Gulf.

The principal areas visited during my tour will now be dealt with in the order in which they were visited. In addition to the 3 foci described by Beven, several other localities are included, where the disease was particularly prevalent at the time of the epidemic.

The areas are:—

(1) The Miriu River.
(2) Homa point.
(3) The Oloach River.
(4) The Kuja River.
(5) The Gwasi coast, from Ukongo Point to the north side of Mungeri Bay.

The Miriu River.—The eastern bank lies in Nyakatch district, administered from Kisumu; the western bank is partly in Karachonya district and partly in Kabondo, both of which are under Kisii.

(a) *Nyakatch.*—Before the advent of Europeans into the country the population of this district was very much denser than immediately before the great Sleeping Sickness epidemic. In the old days the district was subject to periodic incursions by the Masai. These raiders came down from the highlands behind Nyabondo, and the effect of this constant menace was a concentration of the Kavirondo in the riparian zone, as far away as possible from their enemy, where they could combine with their kinsmen in Karachonya against the common foe. With the disappearance of the Masai peril, the people began gradually to migrate inland, and occupy the higher country around Nyabondo.

During the epidemic, Sleeping Sickness worked havoc among the population of this riparian zone, and of the survivors, many moved away from the river, which they had learnt in some way to associate with the disease.

On account of the Masai, the Kabondo-people whose country borders the Miriu before it leaves the hills to commence its 5 or 6 mile course through the plain to the Lake—left the river and migrated towards Kendu, before European times. From Kendu they returned and inflicted a decisive defeat on the Masai, and have remained in their old home ever since. Thus the Kabondo bank of the river in the gorge has been inhabited continuously from pre-European times. The opposite (Nyakatch) bank, at the level of the gorge, was, on the contrary, uninhabited for a considerable period; and, at the present time, most of the visitors to the gorge reaches of the Miriu River are natives of Kabondo.

The history of the Karachonya bank is different. On account of a time-honoured feud with their Nyakatch neighbours, these people were unable to avail themselves of the opening up of the Nyakatch hinterland; for this reason it is probable that the population was denser on the Karachonya side of the lower reaches of the Miriu at the time of the epidemic.

It is of interest to note that whereas on the Nyakatch side the angle between the hills and the River was practically cleared of villages by the disease, or by the consequent migration, on the Karachonya side several villages persisted quite near the gorge until they were ordered to move a few years ago. Indeed, all along the river, the Karachonya people weathered the storm as best they could in their old homes.

Some years ago the lower reaches of the Miriu were cleared. The Nyakatch people worked under the supervision of my present interpreter, Daniel Aroka, and finished their side in about a month. The other bank presented much more difficulty, and the Karachonya natives were working for some 3 months before completing their task. On the Nyakatch side the clearing programme included cultivation of the river bank, a process apparently not carried out across the river. At the time of my visit these riverside shambas had been long abandoned, and it is merely a matter of time before the banks revert to their original state.

The headmen and elders of Nyakatch say that the disease never quite disappeared after the epidemic, but that during the last few years it has been showing signs of increasing. The elders in the 2 locations near the river are anxious to move. They are tired of the constant menace of the disease; and though they recognise that the river is the source of their troubles, they say they are incapable of preventing the people from going there and point to the existing cases as evidence of their failure. On the Karachonya side only the lower reaches of the river below the ferry are visited by natives, and this desire to migrate was not apparent.

Between the Miriu and Kendu Bay we crossed 2 rivers, the Rambira and the Utumo. Sleeping Sickness was rife along the Rambira during the epidemic, but I was told that the fly has disappeared, and that there has been no disease of recent years. It is said that the fly disappeared during a phenomenally dry year some time ago, when shambas were pushed up to the river's edge. According to Daniel, this river of recent years has greatly diminished in size.

Between Kendu and Homa Point we crossed the Awatch River near the Lake. Fly occur higher up this river, but not along the lower 3 or 4 miles of its course. Sleeping Sickness took heavy toll of the natives along the reaches behind the Mission. Now, the chief says, there are no cases in the few villages (? 8) that water on these fly-reaches.

Homa Point.—Ever since the great epidemic, human trypanosomiasis has persisted in an endemic form in the villages around Homa Point.

Some 4 or 5 years ago the disease began to show signs of spreading. Before the epidemic this area was thickly populated, villages occurring at frequent intervals near the Lake along the whole fly-shore.

At the time of Beven's visit there were 3 watering-places in use, and the shore for 2—300 yards on either side of 2 of these was cleared of bush. These clearings have not been maintained, and hardly any signs of them are now discernible.

Before Beven's visit a number of people had moved from the neighbourhood of the lakeshore on account of the disease ; one village, indeed, he ordered back, their watering-place having in the meantime been cleared. Since then several more villages have moved up towards the slopes of Homa Mountain. All these villages get water from the lake during the dry season, both for themselves and for their flocks. Some of the Homa people have left the location altogether.

At the time of Beven's visit the level of the Lake was much lower than at present, and clearing operations were proportionally more difficult.

As a result of the clearing carried out by Beven the fly is said to have disappeared from the watering-places *for a time*.

The Oloach River.—This river runs into Homa Bay. The existence of the disease in this area was not brought to Beven's notice ; apparently indeed the headmen of the district—an intelligent native—knew nothing about it. The heavily-treed course of the Oloach was visible through the glasses from my camp on the borders of Karachonya, and enquiry led to the discovery of a group of villages along the fly-infested banks. As many as possible of these people were brought in, and this examination indicated a small but intense focus of the disease along the northern bank of the river.

As far as I could gather from these villagers, Sleeping Sickness has persisted since the epidemic. During the last year or two, cases have been more frequent in the little group of villages concerned, and the inhabitants have become alarmed. The men have suffered most, and very few are left in the two locations particularly involved, Kanyipir and Kawadhgone.

The opposite bank of the Oloach lies in Kochia district, under chief Obonyo. This chief visited me at Homa Bay, and stated that he knew of no cases along the Oloach. A local headman, whom we met on the march into Homa Bay, told the same story. I therefore instructed the chief to make enquiries, and he subsequently reported a similar state of affairs to that existing on the northern bank.

Many cattle have died this year in Oloach and Ungeti locations, which border the river, and many owners have lost all their stock.

In addition to these two locations, a few villages belonging to Kagang location lie near the river ; the upper reaches in Kagang are uninhabited on both banks. At the time of the epidemic there were many people in Kagang, and villages extended along the banks of the Oloach, considerably higher up than at present.

Karungu neighbourhood.—During the epidemic the disease occurred along the lakeshore north and south of Suri Point, but did not attain serious proportions. Here, again, the population to-day is very much less than before the epidemic.

The Kuja River area.—The disease first made its appearance along the lakeshore near the mouth of the Kuja, spreading thence eastwards through the thickly-populated riparian zone for many miles up the river. From all accounts the mortality along the river was appalling—worse probably than in any other part of Kavirondo. At the present time there are a few small villages scattered along the southern bank for a few miles above the main ford. Then comes a long stretch of uninhabited country extending away beyond the sphere of these investigations. These higher reaches of the river were depopulated by the ravages of Sleeping Sickness.

Northern Gwasi. (Ukongo, Kisigi, and Mungeri Bay.)

Beven reported a case of the disease at Ukongo and another at Mungeri.

During the epidemic the lakeshore populations of both these areas were practically wiped out. The Ukongo-Kisigi stretch of shore remained for years uninhabited. Some two or three years ago a few people came over from the Mfanganu Island to escape famine, and now there are 3 small villages along this section of the coast.

Before and during the epidemic, cattle did well here ; they were taken off by the few human survivors who migrated to Kadem and Tanganyika Territory. A few head, brought to Ukongo by the settlers from Mfanganu, all died within a few weeks of their arrival. On Mfanganu, at the present day, cattle do well.

The shores of Mungeri Bay were thickly populated at the onset of the epidemic. This Bay lies in 2 chiefdoms, Gwasi and Kakisingiri. Of the 100 villages that existed at the commencement of the epidemic, but one outstayed it. Many people migrated into Tanganyika and the Kuja area; others moved inland a mile or two, on to the lower slopes of the lofty hills that tower up behind the Bay.

Mino, the chief of Gwasi, informed me that there are at present only six villages along the whole shore of this great Bay; 3 of these lie in Gwasi, 3 in Kakisingiri.

The lakeshore of the Gwasi sector of Mungeri Bay remained uninhabited for many years after the epidemic.

At the present day there are no cattle in this area; importations from Mfanganu died, soon after their arrival, of an acute disease. In the old days, cattle did well here.

(5) *Methods pursued and observations recorded.* The following methods of investigations were employed : (a) Examination of natives from villages watering in fly-areas. The population was collected by the chief's representatives at convenient points, and I palpated necks and axillae and, where necessary, performed gland-puncture. After the first day or two I abandoned blood examination as a waste of time, and relied for the detection of trypanosomes on the examination of fresh gland juice under a 1/6th objective. Dried films for subsequent staining were only made on rare occasions when a differential blood-count seemed advisable.

In all save one or two cases, trypanosomes were easily demonstrated in individuals whose clinical symptoms pointed to trypanosomiasis. As to the examination of the axillary group of glands (an exceedingly unpleasant proceeding) a few words are necessary. A paper has appared recently on this subject by Dr. Griffin of Uganda. Briefly, there exist cases of human trypanosomiasis, in *G. Palpalis* areas, in whom the cervical glands are small and hard and insignificant, while the axillaries are large and soft and contain trypanosomes. I have seen such cases with Dr. Griffin at Mjanji, and they might easily be overlooked were the axillary glands not inspected. Another point in favour of this examination is the ease with which the glands in the axilla can be punctured. In almost all the cases described in this report the cervical glands were noticeably enlarged *but not in all.*

(b) *Study of the fly.* Flies were dissected to reveal the percentage infected with trypanosomes; the number caught per fly-boy-hour was noted, and also the sex-proportions of the catch.

In estimating the number per boy-hour I employed my head fly-boy Mukassa, an exceptionally skilful and steady worker and thoroughly reliable. The sex-proportions are of interest as throwing light on the prevalence of suitable food-animals for the fly in the various areas under inspection.

(c) *Interrogation of chiefs and elders.* The areas will now be taken in order.

(1) *The Miriu River.* (a) *Nykatch.* The infected areas lies in two locations.

Headman Okal. Reported 6 cases of "thodindo" (trypanosomiasis) in his location. Of these I saw 5; trypanosomes were found in 4, and the fifth case was very suspicious clinically, though on two occasions successful gland puncture was negative.

Total population examined 223
(adults .. .. 151)
(children; 15 years and under .. .. .. 72)

Of these, 17 were selected on account of large axillary glands.

14 of these selected underwent gland-puncture, and trypanosomes were found in 4, all of which had been previously diagnosed by the headman.

Headman Ojeng. Reported 6 cases; all seen. One of these had been treated at Kisumu, and seemed quite well ; 3 showed trypanosomes on gland-puncture ; and 2, in my opinion, were not suffering from trypanosomiasis.

Total population examined 199
(adults 149, children 50).

Selected for large axillaries 29

Punctured .. .. 20 (the un-punctured balance showed some obvious cause for the enlargement).

Positive 6
three of these had been diagnosed by the headman.

(b) *The Karachonya side of the Miriu.* No case reported by the chief Okoth.

Total examined 231
(including 20 cases who had received a course of treatment at Kisii, and 9 individuals whom Beven had diagnosed as infected).

Selected for large axillaries 47

Punctured 43

Trypanosomes found in 1

My fly-boys caught no fly on either bank along the lower reaches near the ford. Immediately below the exit of the river from the gorge, for several hundred yards along the bank, a fair number of fly were taken on the Karachonya side; none were taken on the opposite bank at this level. Within the gorge fly were numerous, especially on the Kabondo side.

The catch figures were:—
In the gorge on the Nyakatch side .. 5 per-boy-hour.
In the gorge on the Karachonya side .. 27 per-boy-hour.

Total flies dissected 420: of these one contained flagellates in the gut only.

Sex-proportions on Nyakatch side: females 32.7%, males 67.3%.

Sex-proportions on Karachonya side; females 17.3%, males 82.7%.

Food animals seen besides man : crocodile, Varanus, baboons and monkeys.

At the time of my visit the river was much higher than when Beven saw it. The banks are much clearer of bush at high than at low water; there are signs that the bush tends to accumulate on the Karachonya bank more than on the other side.

The shambas planted on the Nyakatch side after the clearing operations of two years ago are still discernible, but are fast lapsing into bush again; last year they were not cultivated. When the river falls there is nothing to prevent the old conditions of undergrowth recurring.

The main ford is well cleared, and, as already remarked, no fly was found on the reaches outside the gorge, save only along one short stretch near the hills.

The people still use the river during the dry season, and the flocks are watered there daily. Rodfishing still continues in the gorge, the culprits being natives from Kabondo. A certain amount of wood-cutting is also done there. On the Karachonya side of the river a rough quarantine system is in force, and fishing is not allowed on the lower reaches. Across the river everyone is a law unto himself.

Some of the Karachonya natives who were employed in clearing this bank some two years ago developed cervical adenitis shortly afterwards, and of their own accord went to Kisii for treatment. On the Nyakatch side the clearing was less extensive, and only lasted a few weeks; here the sick people dated their illness from the previous dry season.

On the whole, the Karachonya natives impressed me as possessing a more intelligent and practical outlook on the question of Sleeping Sickness than their neighbours over the river; they appreciate the value of prompt treatment, and, on the earliest appearance of glandular enlargement, they go off to Kisii and apply for injections.

No examination of fly or natives was made between the Miriu and Homa Point. It would be of interest to examine the villagers in the neighbourhood of the Rambira and Utumo Rivers, as the men of these districts took part in the clearing of the south bank of the Miriu, a task which lasted about 3 months. This would constitute a check on the notion widespread along the Miriu, that the clearing operations led to a number of people becoming infected.

Homa Point.

Total examined 109
(adults 67, children 42).

Selected for large axillaries 16

Puncture 16

Trypanosomes found in 5, 4 of which were produced by the natives as cases, and the fifth being an old case diagnosed by Beven.

Fly were numerous along the wooded shores of this point.

Catch per boy-hour 28.

Total flies dissected 417, of which 23 had flagellates in the gut only.

Sex-proportions in total catch: females 6.9% males 93.1%.

The fly has a plentiful supply of food; hippo, crocodiles, and aquatic birds abound.

There is a certain amount of traffic with Unoma across the Gulf; one of Beven's cases is reported to have gone there to settle. Apparently but little, if any, canoe traffic occurs along the shore at the present day; what fishing is done is carried on with traps placed near the recognised watering places on the lakeshore, or with nets out in the deep water.

The inhabitants of the villages still remaining use pond-water during the wet season, but depend on the lake at other times. At the present time there are 3 watering places in use in this fly-area, two of which I visited. The two easterly of these, Singi and Wadnia Keti, are dangerously overgrown; the third I did not see. The fly-zone here is confined to a narrow belt of forest backed by a low cliff which runs more or less parallel with the water's edge. This forest is honeycombed with hippo tracks, and varies in width with the level of the lake. There are a few banana-shambas scattered along this belt, and the owner of one of these situated near Singi water-place was found to be infected.

As far as I could gather there are some 10 villages remaining in the danger-zone; the inhabitants show no desire to move.

The Oloach River.

(a) Karachonya side:

Total examined .. .. (adults 15, children 9).	24
Selected for large axillaries	12
Puncture	11
Positive	7

Another case, seen on the march when it was impossible to perform gland puncture, presented all the typical symptoms of trypanosomiasis.

(b) Kochia side. The chief Obonyo reported to me by letter that he had seen 15 cases; that other cases existed, too ill to come in and report themselves; and that others again had "large glands" and "were ill". I was unable to verify this report.

Fly figures for the Oloach River:—

Catch per boy-hour	16
Total dissected	91, all negative.

Sex proportions: females 70.3%, males 29.7%.

Apparently the villages along this river are heavily infected. The women say that very few men remain, and the people who came up for examination were in an unusually squalid and miserable condition. When asked why they had not moved the women replied that their men had died and that they themselves could not negotiate a move. The banks of the river are densely forested, and the water is accessible only at certain watering-places. Three of these were named as serving the 13 villages on the Karachonya side. Hardly any signs were seen of food animals for the fly.

According to chief Obonyo of Kochia, the people of Ungeti location, whose villages are near the Oloach, water at the Kawugo River which runs into the Oloach. Fly were taken at the junction of these two rivers. A few flies were caught actually at the bridge by which the main road from Kendu to Homa Bay crosses the Oloach.

Karungu.

Total examined, from villages near the lakeshore: .. (adults 29, Children 58).	87
Selected for large axillaries	2
Punctured	2
Positive	1

The positive case, a girl of 17, was a visitor to Karungu from Kaniamwa district, near the Kuja.

No flies were taken in this area.

The Kuja River, between the main ferry and the lake, including village on the lake-shore near the mouth.

Total examined .. .. (adults 83, children 28).	111
Selected	1
Punctured	1
Positive	0

Fly figures:—

Catch per boy-hour, up-stream, near main ferry ..	5
Catch per boy-hour, down-stream, near main ferry ..	3
Total dissected	126
Flagellates in gut only	5

Sex proportions: females 39.4%, males 60.6%.

Hippo and reptiles occur along the river, but they are not abundant. The fly above the ford are frequenting certain rapidly-drying flood-pools, left by the falling river, around which are native huts and shambas.

Gwasi.

Total examined .. .. .. 85 (adults 48, children 37).
None selected for puncture.

No cases, since those referred to by Beven, have been reported from this area.

Fly figures: (a) *Nyendiwa*, the peninsular on which the chief's hut is situated, and the adjacent island.

The usual lakeshore-animals occur in plenty. No disease reported; limited shelter for fly.

Dissected	0
Catch per boy-hour	6

Sex proportions: females 8%, males 92%.

(b) *Ukongo-Kisigi promontory and Mungeri Bay.* Beven reported a case from here; no disease now. Excellent shelter for fly all along this shore line.

Total Dissected	169
Flagellates in gut only	8
Catch per boy-hour	30

Sex proportions: females 5.4%, males 95.6%.

The coast line of the Ukongo promontory and of Mungeri Bay are the only places in any way reminiscent of the ideal fly-shores of the Uganda side of the lake. Fly are more numerous in Mungeri Bay than at Homa Point, and the usual lakeshore animals are abundant. The small percentage of female flies caught is in keeping with this plentiful food-supply.

The people are gradually returning to the lakeshore in this area. We passed several canoes paddling leisurely along the shore of the Bay, and the shambas that at intervals come right down to the water's edge, often abut on heavily-sheltered stretches, admirably suited to the fly's requirements.

Examination of people from areas out of frequent contact with fly.

Total examined. .. .. 155 (adults 122, children 33).

Of these 5 adults and 11 boys had large axillaries on one or both sides, but no cervical enlargement; in 9 of the boys the enlargement was bilateral, in 2 it was confined to the right side. Three of the adults were punctured, with negative results: the boys' glands were hard, and not in any way suspicious.

Total number of examinations made during the tour ..	1,124
Selected for enlarged axillaries	140
Punctured	110
Trypanosomes found in	24

The 25th. case is the girl already mentioned as seen but not punctured, in the Oloach area.

It must be understood that the enlarged glands of those selected for puncture were not by any means all suggestive of the adenitis associated with trypanosomiasis. In a great many instances the enlargement was unilateral, or limited to a single gland; in others, scars or skin lesions on the arms suggested a septic origin of the adenitis. The common occurrence of a single large gland in the right axilla points to traumatism as the cause in many cases.

The inclusion of these atypical cases, however, ensures that no genuine case of trypanosomiasis will be overlooked; and in the present investigations, this was a very important consideration.

(6) *The present position as revealed by these observations.* At the time of Beven's visit there were signs that the disease was on the increase in certain parts of Southern Kavirondo. Probably his visit administered a temporary check to this tendency.

Beven pointed out that the greater part of the coastline offers little attraction to *G. palpalis*, and is, at the present day, almost if not quite free from trypanosomiasis. The disease has persisted in certain localities, all of which possess certain features in common—good shelter for the tsetse and, in consequence, a relatively large number of fly.

It was in these localities that the signs of spread were manifest; and from a study of these foci it is impossible to avoid the conclusion that the prevalence of the disease in any fly-area is directly dependent on the degree of contact existing between fly and man. Undoubtedly the saving element at the present day is the looseness of this contact. In most parts of the country, *G. palpalis* is only to a limited extent dependent on man for food; other animals are available, and their blood is preferred by the fly. This tsetse only becomes seriously dependent on man when its favourite food-animals are scarce or inaccessible. The fly is then hard pressed for food, and will attack man voraciously. Under these circumstances, the proportion of female flies caught by an observer will be greater than that obtaining in places where food is plentiful; instead of 5-10% of females appearing in the catch, the proportions approach equality, and where the shortage is severe the females may even greatly predominate.

Now as man is the only mammalian host available for the trypanosome in these areas, it follows that the parasite should be most prevalent where the fly is employing man as a food-animal. We have seen that the highest female-percentages were obtained in the three river areas, the Miriu, the Oloach, and the Kuja, and in none of the regions are reptiles, the favourite food of the fly, very numerous. Let us now see how far the distribution of the disease in these areas bears out the above conclusions.

On the Miriu the conditions are different on the two banks. Beven found much more disease on the Karachonya side. In Nyakatch, the stretch of river immediately below the gorge has been clear of villages for years; in Karachonya, this portion was inhabited until the people were ordered out a few years ago. There is more fly on the Karachonya bank which, at low water-levels, supports much more shelter.

On the Nyakatch side I found 10 people infected, and in addition to these, 3 of the cases diagnosed by Beven are still alive. Supposing these last to be still infected, we find that roughly 3% of the people examined have contracted trypanosomiasis within the last few years. On the other side I found 1 case, and, in addition, saw 20 people who, on their own initiative were attending Kisii for treatment for trypanosomiasis. Taking these, therefore, as infects, and adding the 16 of Beven's cases who are still alive, we arrive at a corresponding figure for Karachonya of 13% infected within the last few years. Rough though these figures are, they corroborate the evidence supplied by the fly-figures and the general observations made in the area.

The percentage of females caught along the Oloach River is astonishingly high, and in this locality the available evidence points to a very high human infection rate.

The third locality giving a high percentage is the Kuja River, near the main ford some 6 or 8 miles from the mouth. Here I found no signs of the disease. The single case which Beven reported near the ford is now well, and, at the time of my visit, was away staying with friends.

In this area there is a fairly high female-percentage, but no human trypanosomiasis. The fly is, however, considerably less numerous than on the Miriu and Oloach Rivers; the population, too, is sparse. At the time of the epidemic, when the banks were populated far up above the present ford, the conditions were ideal for the spread of the trypanosome, and the death rate was tremendous. Plainly the contact between man and fly at the present day is not close enough to allow of the continued maintenance of the trypanosome.

We see, therefore, that wherever sufficient density of population occurs in these river areas, the disease persists owing to the dependence of the fly on man.

The old centres of the disease on the lakeshore present a sharp contrast to these river areas. Both at Homa Bay and on the Gwasi coast the shelter is excellent, and there are many fly. Food, too, in the shape of hippos, reptiles, and birds is abundant, and is easily accessible to the tsetse. In these areas the fly-catch shows over 90% of males, and the fly are not troublesome in spite of their numbers.

On the Gwasi coast the disease has disappeared because, when man had been driven away by the disease, there was no mammalian reservoir for the trypanosome. At Homa Point the persistence of the disease is less easy to explain. Before the epidemic this area was densely populated, and fly have undoubtedly always been very numerous along these densely-wooded shores. In spite of the ravages of the disease, a number of villages have persisted up to the present day, so that the depopulation was never so complete here as along the Mungeri shore line. There is also free communication with the Miriu on the one side and the Oloach on the other. In spite of the abundance of food-animals, the contact between man and fly is fairly close, particularly during the dry season when the whole population of the area is dependent on the lake for water. In these lakeshore areas, therefore, the presence of plenty of food-animals makes the fly to a great extent independent of man. Thus, though the fly-density is much greater than in the river areas, a larger population can exist in comparative safety owing to the presence of a buffer food-supply in the shape of hippos, reptiles, and possibly birds.

No signs of game-animals were seen in any of the fly-areas visited, save a few pig tracks in the dense undergrowth along the Oloach. Hippo, of course, occur everywhere, but there is no evidence that this animal functions as a reservoir of *T. gambiense*. I saw no signs of cattle-trypanosomiasis during the safari.

Furthermore, no proboscis-infections were found in the 1223 flies dissected during the tour; and experience has shown that where ungulates are acting as a reservoir in *G. palpalis* regions, the common species, *T. uniforme* and *T. vivax*, both of which develop in the proboscis, are always present in the fly. The absence of a four-footed reservoir for the trypanosome in these areas is a very important feature of the problem before us. The trypanosome depends for its survival on the existence of a certain degree of contact between man and fly; and here lies the key to the problem of control.

In my opinion there is, at present, no cause for serious alarm in the persistence of an human trypanosome in these regions. But it will be a grave breach of faith if we continue to ignore the potential danger of a recurrence of the conditions, whatever they may be, which are conducive to the spread of the disease in epidemic form. A broad margin of safety is essential, and there are signs that the time has come to take the situation in hand, and to inaugurate a well-considered policy of control.

(7) *Remarks on the virulence of the disease suggested by Dr. Beven's and my own observations.*

At the beginning of the safari I hoped that an inquiry into the fate of the cases diagnosed by Beven 2 years ago would throw valuable light on the virulence of the human trypanosome in these regions. Beven reported 55 cases in the various districts of South Kavirondo, and of these I was able to trace 50: 22 are dead, two very ill, and, of the remainder, 26 are taking a more or less active interest in life. The majority of these have received treatment; some had a single injection administered by Beven, others have had a course at Kisii.

Special interest centres round a small group of these survivors, *who have never had any treatment*. As far as I could ascertain, the following cases quoted in Beven's report fall into this category.

Nyakatch ..	Moga, No. 5.
Karachonya. ..	Oya and Onyango, Nos. 21 and 22.
Homa Point ..	probably Owich, Alo and Opere, Nos. 33, 34, 35, and certainly Ojuango and Omama, Nos. 40 and 44.
Kuja area. ..	No. 52.

Some of these I saw, and they showed no signs of infection; the others were reported as well.

Case No. 48, of whom Beven remarked "worse my second visit" and who received no treatment, is still alive and still sick. It is most unfortunate that in all these cases the diagnosis of trypanosomiasis was based only on clinical symptoms. In none of them were trypanosomes demonstrated. In arriving at a diagnosis Beven relied largely on the presence of cervical adenitis. In my own cases all save 2 showed this symptom; and, conversely, practically every case showing cervical enlargement yielded trypanosomes on gland-puncture. There is, therefore, little doubt that Beven's cases were indeed trypanosomiasis. But the absence of conclusive proof seriously impairs the scientific value of this otherwise precious evidence.

Apart from the information about Beven's cases there is little fresh evidence to be brought forward on the subject of virulence. The natives maintain that once a person gets Sleeping Sickness he is doomed to more or less speedy death. Recovery, to their minds, entails a revision of the diagnosis. A certain number of the cases diagnosed by Beven were not, at the time, recognised by their relatives as suffering from "thodindo"; some of these are still alive, some have died in the interim. Mild cases will probably not be recognised by the natives. That the parasites are rare in the peripheral blood is shown by the failure to find trypanosomes in carefully searched films from Beven's 55 cases. Native accounts are unreliable, but they acknowledge cases of one or even two years duration. One of my Nyakatch cases was a woman who, for a year at least, had been quite blind and therefore tied to her village, which was 2 or 3 miles from the river; she had been ill for some time before she lost her sight.

Of the survivors of Beven's cases, 17 had received treatment. I saw one or two of these people who one-and-a-half years ago had had a single injection of soamin given intramuscularly, and they appeared to be in excellent health at the time of my visit.

No attempt was made to determine the prevalence of ankylostomiasis in these regions, and it was impossible to say whether the cases investigated were uncomplicated trypanosome infections. But the evidence set forth above indicates that the trypanosome in these areas possesses at the present time a comparatively low virulence towards man.

(8) *Proposals for control.*

With the exception of the Kuja and the Oloach rivers, it would be a comparatively easy undertaking to clear the whole fly-area in Southern Kavirondo. The shelter-zone is, as a rule, very narrow, and is backed by clear country. By this means the area could in a short time be freed from endemic trypanosomiasis. Thorough clearing of the Miriu River below the gorge, for a mile or so; evacuation of the riparian zone of the

Oloach ; clearing of the Homa Point and Ukongo-Mungeri foreshores would, for all practical purposes, stamp out the disease in South Kavirondo. The Kuja River above the main ferry must remain forbidden land until it is possible to clear and to cultivate the long and heavily-forested reaches in Kanyadoro, Kabwoch, Sakwa and Kamagambo.

So much for theoretical considerations. In practice, however, such a scheme would entail a thorough system of supervision and a pliable and numerous population to maintain and consolidate the clearings. I doubt whether it would be possible at present to effect this clean sweep. We can, however, with every hope of success, aim at so limiting the activities of the parasites that the death-rate from trypanosomiasis become negligible, and the economic development of the country can proceed unhampered by the menace of an epidemic. The different foci will require different treatment. Where adequate clearing is impossible, it will be necessary to remove the people from contact with the fly, and to close the area so vacated. A fundamental essential to success is, however, the proper supervision and maintenance of the campaign. It is no good clearing an area and allowing it to lapse into jungle the following year. There must be unity of purpose and intelligent cooperation between all parties concerned.

The following are my suggestions :

Miriu River.

Thorough clearing of both banks from a point one hundred yards above the exit of the river from the gorge to the limit of the fly shelter, a short distance below the ferry. The clearing should be done in the wet season, and the banks cultivated.

Failing this, the people of Okal's and Ojeng's locations should be moved well out of contact with the river. They are anxious to move ; but about 100 villages are involved, and the clearing of the river is a comparatively simple proposition.

Homa Point.

The foreshore for 2-300 yards on either side of the watering-places of Singi, Wadnia Keti, and Dago should be thoroughly cleared of all bush, back to the base of the low cliff which limits the fly-zone in this area. Canoe traffic along these shores should be stopped, and natives only permitted to visit the lakeshore at the cleared watering-places already specified.

Banana shambas on the intervening stretches of shore must be abandoned.

Kuja Area.

The banks for 300 yards above and below the main ferry should be cleared and cultivated. The few villages scattered along the south bank above this ferry should be provided with a cleared watering-place, and their cultivation should extend right up to the bank.

Oloach River.

It is doubtful whether the population of the locations bordering the river is sufficient to warrant the extensive clearing required to clean this area. I suggest, therefore, that the villages of the Kanyipir and Kawadhgone locations on the Karachonya side, and of the Ungeti, Oloach, Kwoyo and Kagang locations in Lochia be removed inland away from contact with the river. The alternative is the thorough clearing and policing of watering-places for these villages.

Ukongo-Mungeri Bay Area.

Settlement along these shores is dangerous, owing to the difficulty of control. Here is a long stretch of thickly fly-infested shore, remote from headquarters, at present sparsely occupied by Bantu Kavirondo—who appear to be less disciplined that their Nilotic relatives—in close proximity to Mfanganu and Rusinga Islands, on both of which fly and probably trypanosomiasis occur. It is out of the question to clear all this shore line, and it is probably impossible properly to control canoeing and fishing in Mungeri Bay. The chief states that during the epidemic the people moved back from the lake, up the slopes of the hills that shut in the Bay. He says that this removal from the water's edge, small though it is, will materialy reduce the exposure of the people to the fly. If this is considered practicable, then the selection of cleared watering-places will suffice.

The shore should be cleared of its fringe of bush for 300 yards on either side of the shambas which come right down to the water. The repopulation of this area must however, be carefully supervised. The country is fertile and can support a large population, but indiscrimnate settlement wll certainly give rise to the conditions prevailing at Homa Point, and eventually lead to serious trouble.

There remains a measure which I recommend should be applied to the whole area, namely the treatment of all cases of trypanosomiasis by a suitable drug, capable of sterilising the peripheral blood.

The natives are everywhere most anxious for medical treatment for all their ailments, and there will be no difficulty in securing the active co-operation of the chiefs in discovering and collecting cases. I promised all the cases I detected that they should receive treatment, and I trust that the authorities will see to the fulfilment of this promise.

The striking improvement that has resulted from the treatment of early cases by Beven and at Kisii is very encouraging. We have seen that some of those treated by a single intramuscular injection of soamin 18 months ago are now apparently well; at all events they are unlikely to aid in the spread of the disease.

I suggest that a hospital be established somewhere in the neighbourhood of Kendu Bay, at which intravenous treatment can be administered. Natives could easily reach this hospital from all the foci we have been considering.

I do not recommend the establishment of a segregation camp. The clearing measures outlined above, if properly executed, will eliminate all chance of spread of the disease, and segregation of the sick away from their homes always leads to trouble, and amounts to a confession of failure.

The establishment of a hospital in their midst will create confidence and encourage the natives to co-operate in the campaign against the disease. At present they are disheartened. They are tired of visiting experts, who come and make promises and then disappear over the horizon; and they long for a little effective treatment, and for practical advice and assistance.

The number of cases to be treated will not be great, the detachment from the Oloach River being much the largest. But the good done by this step will be out of all proportion to the outlay, and I feel sure that it will have far-reaching results.

As to the inauguration of a common policy to apply to all the fly-areas of Lake Victoria, I cannot here enter into a discussion of this debated question. I do, however, strongly recommend that a meeting be arranged as soon as possible between the Officer i/c Reclamation, Uganda, and the administrative authorities of North Kavirondo. It is important, both for Uganda and Kenya, that a clear understanding be reached about the control and supervision of native movements across the frontier. At present, no sort of co-operation exists, and the inhabitants of the infected area around the border between Kenya and Uganda are free to come and go when and where they please.

(9) *List of cases detected during the tour. Nyakatch.*

(1) Akelo. Female, 25. Intense conjunctivitis, blind for one year; axillaries enlarged in chains; cervical enlargement slight: Tryps.

(2) Nyawanda. Male, 12. Utieno village, slight cervical adenitis, large bilateral axillaries: well nourished: says he was sick last dry season, but now well. Tryps.

(3) Utieti. Male, 18. Okal's location: mental signs, unsteady gait: cervicals and axillaries large: Tryps.

(4) Owiyo. Adult male, Owiyo village: large cervicals and very large axillaries: well-nourished: pains over body: well at time of Beven's visit: Tryps.

(5) Magero. Adult male, Magero village: scars of cupping over glands: masses in both axillae, nothing noticeable in the neck: feels strong: stomach unwell. Tryps.

(6) Ogor. Adult male, Onyango village: still strong, no complaints: cervicals and axillaries enlarged: Tryps.

(7) Abor. Male 7, Obeng village: sick, unsteady gait: Tryps.

(8) Chyalo. Male 17, Opana village: cervicals and axillaries enlarged: Tryps.

(9) Omwaro. Male 7, Abiru village: large cervical and axillaries: says he is well; in fair condition: Tryps.

(10) Ogodo. Adult male, Ojuodi village: apathetic, pains everywhere: large cervicals and axillaries: Tryps.

Karachonya.

(11) Onyisi. Male 15, Okwaro village: both axillaries enlarged, cervicals negligible; headache: Tryps.

Homa Point.

(12) Nyadundo. Male 18, Rachwonya village: well-nourished, sick: cervical and axillary glandular enlargement: Tryps.

(13) Tojo. Male 14, Rachwonya village: complains that he is getting thin and weak: cervicals and axillaries enlarged: Tryps.

(14) Wangera. Adult male, Ogwayo village: Beven's case No. 31: fairly well-nourished, but appears to be losing flesh: cervicals and axillaries enlarged: says he had big glands at the time of Beven's visit, and that the present enlargement is recent. Possibly, has been reinfected. He owns a small banana-shamba on the lakeshore near Singi water-place. Tryps.

(15) and (16) Ochwarda and Gwoma, males 7, Denge village: axillaries and cervicals much enlarged: the father says these boys are sometimes sick, sometimes well. Tryps. in both.

Oloach River.

(17) Adero. Male 15, Hamba village: cervicals and axillaries enlarged: ill: Tryps.

(18) Odero. Adult female, Ogweno village: both gland groups enlarged: Tryps.

(19) Ochongo. Adult male, Anyango village: ill for the last few months; both gland-groups enlarged: Tryps.

(20) Rabet: Adult female, Wamatha village: both gland-groups enlarged: Tryps.

(21) Orimbo. Male 7, Obat village: great enlargement of both groups; "mumps—appearance:" Tryps.

(22) Undiek. Male 20, Langa village: active and intelligent, but thin: great enlargement of both groups, especially in cervical region where the mumps-facies is produced: Tryps.

(23) Oloach. Adult female, Agoko village: fairly well-nourished; both groups enlarged: Tryps.

(24) Adongo. Female 14, Ouma village: sick, weak, fever, headache: not punctured, as only seen on the march.

Karungu.

(25) Ogola. Female 17, poorly made: active: great enlargement of cervicals: "mumps-appearance:" axillaries very large: Visitor from Kaniamwa district, Gaha village near Mirogi.

About 30% of all the people examined were of 15 years of age or under. Of my cases, 40% are over 20 years of age, and 60% are under 20. Of Beven's cases, taking the 102 of which he was satisfied that the diagnosis was correct, 26.4% were over 20 and 73.4% were under 20 years of age.

I wish to express my gratitude to Dr. Paterson and Dr. Wilson for the trouble they have taken to make this safari as comfortable as possible, and to supply me with all possible information.

To Dr. Pope, I am indebted for the services of Daniel Aroka, whose willing assistance throughout the trip has been of the greatest value.

I take this opportunity of recording my appreciation of the manner in which the chiefs and headmen carried out my instructions on all occasions; and of thanking the administrative authorities of Kisumu and Kisii for detailing askaris to accompany me through their districts.

The majority of the fly dissections were performed by my wife.

COLONY AND PROTECTORATE OF KENYA.

ANNUAL REPORT

OF THE

BACTERIOLOGICAL LABORATORY

FOR THE YEAR 1923.

CONTENTS.

ANNUAL REPORT

GOVERNMENT BACTERIOLOGICAL LABORATORY, COLONY AND PROTECTORATE OF KENYA.

1923.

1. REPORT OF THE ADMINISTRATIVE DIVISION.

The policy pursued in past years by this Laboratory in the compilation of the Annual Report has been to make it the means of publication of the greater part of the research work carried out by the staff during the year. It has however been pointed out on several occasions that work which is only recorded in the pages of an annual report rarely if ever becomes known, as few people have the time or inclination to disentangle from the pages of statistics usually contained in these publications, the small items of new knowledge which may or may not be hidden there. The new policy is therefore to publish the results of research work in the appropriate journals, and to confine the Annual Report to a record of the year's work with short summaries of any papers published by the staff during the year. If it is considered desirable, progress reports of work in course of investigation may be included.

A considerable rearrangement of the duties in this department have been necessitated by the division of the Chemical Research Department and the amalgamation of the Medical Division of that Department with this Laboratory. Although the new arrangements will not come into force until the commencement of 1924, it is possible to give the details of the organisation in this year's report. In addition to the changes required by the increase in staff, it has been found necessary in the interests of efficiency to make changes in the organisation of the bacteriological section. In this branch it has been the policy in the past few years to divide the routine work of the department as equally as possible among the members of the staff on duty so that each worker might have some spare time to devote to any research work in which he was particularly interested. This plan, however suitable ideally, did not work satisfactorily owing to the great variations in the amount of routine work from day to day, making it well nigh impossible for anyone to undertake a piece of research requiring continuous attention for a period of days. It has been necessary therefore to make one member of the personnel responsible for the whole of the routine and to give him adequate staff of subordinates, thus leaving the other qualified officers free to carry out research work. The only exception to this general arrangement has been that the preparation of plague vaccine and calf lymph is supervised by the research workers, an arrangement which does not interfere with their own investigations as they can organise the work to suit their own convenience.

The amalgamation of part of the staff of the Chemical Research Department with this Laboratory has allowed of the appointment of an Analyst and a Biochemist and in addition to these officers a Medical Entomologist has been included in the 1924 estimates, permitting the formation of an Entomological Division.

From the commencement of 1924 therefore the Laboratory will be organised in the following Divisions :—

I. Adminstrative Division.
   - (a) Office.
   - (b) Medical Library.

II. Routine Division.
   - (a) Clinical Laboratory Section.
   - (b) Medico-legal Section.
   - (c) Pathological Section.
   - (d) Public Health Section.
   - (e) Vaccine Lymph Section.
   - (f) Vaccine Section.

III. Research Division.

IV. Chemical Division.
   - (a) Analytical Section.
   - (b) Biochemical Section.

V. Entomological Division.

It is intended that as far as possible the officers in charge of divisions or sections shall be relieved of all clerical administrative duties, so that their time may be concentrated on actual laboratory work. It is also hoped to organise an efficient library service which will be of real assistance to the members of the staff.

The question of the provision of laboratory assistants is of the greatest importance both from the point of view of economy in working and from that of the training of the African Native. There is no doubt that a trained laboratory assistant doubles the usefulness of the qualified bacteriologist, and that especially in the routine division such a person is quite capable of taking charge of a section under the control of the responsible officer of the division. It is important therefore to have an adequate staff of laboratory assistants. These are somewhat difficult to obtain and it is probably more satisfactory to train one's own men rather than take one sent out from England who would be unused to dealing with Africans. Further there are a number of European youths who have been educated in this Colony and who have no prospects of careers other than those provided by farms or shops. To some of these the possibility of earning a living as a laboratory assistant must open up the prospect of a life considerably more attractive than the others open to them. As a commencement in this direction there has been included in the estimates for 1924 an appointment as European laboratory assistant in the learner grade. It is hoped that by the time the approval of the Secretary of State of this new post has been received a suitable youth will be available from next year's candidates for the Cambridge local examination, so that his training as a laboratory assistant may be begun at once.

The problem of the training of Africans is really a question of native policy which in this Colony is to teach the African to take his place as far as possible in the general economy of the country. The positions available for the native in the Laboratory are of two kinds. There have always been posts vacant for the ordinary uneducated native which might be filled by what one might describe as the casual labour of Africa. Such natives have been used to look after the calves needed in the preparation of calf lymph and to do the general menial work of the establishment. The real problem that lies before us is to determine whether the African native is or is not capable of being used to better purpose than this. At the close of last year a certain number of natives had been enlisted for more advanced training than had been given formerly. The type of native obtained then was not of the most intelligent, and these learners could only be taught the elements of bacteriological technique owing to the very limited education that they had received. During the early part of the year under review it was realised that it would be impossible to advance the training of these Africans very far unless they possessed a fair knowledge of English and arithmetic. The position then was difficult as we had on our hands a number of boys who had been promised training but who in the light of our later ideas had not sufficient knowledge to really profit by the instruction we were prepared to give them. An attempt was made to cope with the situation by establishing a school for giving the boys an elementary education. This was carried on during office hours, the training in bacteriology being meanwhile allowed to remain in abeyance. As might have been anticipated this arrangement caused a considerable amount of discontent among the remainder of the African staff of the Laboratory as they did not see why they also should not attend school and draw their pay while doing so. As the year went on it became apparent that the progress of the boys in the school was not going to be as rapid as had been expected and that at the rate at which they were learning it would take at least a couple of years for a boy to become sufficiently educated to make him capable of laboratory instruction. Another problem also arose at this time owing to these boys in training in the school coming to ask an increase of pay, not on the ground that they knew more, but that they had now been in Government employ for a year and therefore it was time they had an increase. A schedule was then drawn up dividing laboratory technique into a series of sections and sub-sections, the passing of an examination in each subsection entitling a boy to a small increase in pay, and it was decided that no increases of pay would be given without the passing of such examinations and that no boy should be taken in for training until he had passed an entrance examination in English, Reading, Writing and Dictation, and in Arithmetic. It was also laid down that in the examination for qualification for each subsection a progressively difficult standard of arithmetic should be demanded and that boys coming for training should be informed that if their general knowledge was insufficient to pass these examinations they must attend a night school and learn in their own time. For this puspose a night school is shortly to be opened by the Medical Department. The schedule of subjects which the laboratory pupils are required to learn will be found in Appendix II.

The following changes of staff are recorded during 1923 :—

Dr. Clearkin, First Assistant Bacteriologist, returned from leave on 30th May.

Dr. Allen, Second Assistant Bacteriologist, departed on leave on 10th October.

Mr. Bailey, Laboratory Assistant, departed on leave on 6th April and returned from leave on 28th October.

Miss Colman Brown was appointed stenographer on 1st March, but relinquished the post on the grounds of ill-health on 30th November.

Miss Wishart was appointed stenographer on 1st December.

Mr. X. Rodrigues, clerk, was invalided from the service on 28th February.

No changes other than those recorded above have taken place in policy or organisation during the year. Work in the Laboratory is still hampered by the inconvenience of the building, and to a greater extent by the time occupied in the visiting of sick officials and in the administration of anaesthetics. A promise has however been obtained that

the staff of the Laboratory will be relieved of these outside duties early in 1924, but the building of a new Laboratory is still postponed, to the detriment of the work which might so much more readily be carried out in it, and to the increase of responsibility involved in the preparation of vaccines and calf lymph under conditions far from ideal. The need for a new building has been referred to in these reports year after year, but it becomes more and more urgent as the scope of the Laboratory activities enlarges and epecially as a number of Africans are now receiving their initial instruction in Laboratory work under disadvantageous conditions.

II. REPORT OF THE ROUTINE DIVISION.

By Dr. P. A. CLEARKIN, First Assistant Bacteriologist.

(a) CLINICAL LABORATORY SECTION.

(1) *Blood Examinations.*

Heading the list of routine examinations are, as in former years, blood examinations. During the year under review a differential leucocyte count was done on almost all blood films received whether parasites were observed or not. There are therefore a total of 866 leucocyte counts to be analysed.

Benign Tertian Malaria.

Plasmodium Vivax was observed in 39 cases and a differential leucocyte count was made in 21 of these.

The three highest large mononuclear counts were 35% ; 32% ; and two of 31%.

The three lowest large mononuclear counts were two of 13% ; and two of 14%.

The average large mononuclear count was 18.4%.

Quartan Malaria.

Of this infection 22 cases were observed and a differential count was made in 16.

The three highest large mononuclear counts were 44% ; 38% ; 33%.

The three lowest large mononuclear counts were 5.5% ; 8.0% ; 9.0%.

The average large mononuclear count was 20.96%.

Subtertian Malaria.

187 cases were observed in 155 of which differential leucocyte counts were made.

The three highest large mononuculear counts were 54.5% ; 54.0% ; 53.0%.

The three lowest large mononuclear counts were 5.0% ; 6.5% ; 7.5%.

The average large mononuclear count was 21.0%.

Of these 155 counts made on blood films in which Malaria parasites were demonstrated there were only 17 which showed a large mononuclear count of less than 12%.

Mixed Malarial Infections.

Differential counts were made on all four cases of mixed infection observed.

The highest large mononuclear counts were 36%.

The lowest large mononuclear count was 14.5%.

The average large mononuclear count was 23.3%.

Taking malaria as a whole there were 197 counts made and the average large mononuclear count was 20.91%. In 21 of these the large mononuclear count was below 12% so that if a count of 12% is taken as indicative of malaria in films in which parasites cannot be demonstrated there would be an error of 10.6%.

Of the 866 differential counts on blood films in which no parasites were observed the large mononuclear count was above 12% in 310. Inquiry was made from the medical practitioners who sent the latter slides as to whether the patients from whom they were taken appeared to suffer from malaria clinically and if they reacted to quinine. Out of these 310 cases information was received which showed that 165 cases were clinically malaria, and responded to the exhibition of quinine, 75 cases were not malaria clinically and no information was received about 60 cases.

(2) *The Enteric Group.*

The agglutination reaction remains unsatisfactory as a means of diagnosis and the local practitioners still cannot be persuaded to take blood culture in the early stages of the disease.

None of the group was isolated from blood culture, but B. Typhosus was obtained twice from faeces and once from urine.

One serum received from Eldoret agglutinated B. paratyphosus C. up to a titre of 1/640. The medical officer who sent the specimen was asked for particulars of the case but was unable to furnish any. This is the first case of infection by this organism noted in Kenya.

(3) *Dysentery.*

B. dysentery Shiga was isolated from two stools and Entamoba histolytica identified in 18.

(4) *Undulant Fever.*

This disease, first noted during 1922, continued to appear during 1923, and eight sera agglutinating Micrococcus melitensis and five agglutinating Micrococcus paramelitensis were received. These sera came from Nairobi, Mombasa, Fort Hall, and Machakos. The disease would therefore appear to be widespread in the Colony.

(5) *Helminthic Infections.*

Out of 280 faeces examined the results were as follows :—

Ova of Ancylostomidae were found in 24 cases	8. 5%
Ova of Taenia Saginata were found in 19 cases	6. 7%
Ova of Ascaris lumbricoides were found in 12 cases	4. 2%
Ova of Trichiuris trichiura were found in 11 cases	3. 9%
Larvae of Strongyloides steraoralis were found in 6 cases	2. 1%
Ova of Schist ostomum mansoni were found in 1 case	0.35%
Ova of Hymenolepis (? Sp.) were found in one case	0.35%

It will be seen that Ancylostomiasis accounts for the largest number of infections as in former years.

Double infections were seen in six cases	2.14%
Ova of Ancylostomidae and T. trichiura were found in 3 cases	1.07%
Ova of Ancylostomidae and A. Lumbricoides were found in 2 cases	0.70%
Ova of Ancylostomidae and T. saginata were found in 1 case	0.35%
Ova of Ancylostomidae and larvae of Stercoralis were found in 1 case	0.35%
Ova of T. saginata and larvae of Stercoralis were found in 1 case	0.35%
Ova of A. lumbricoides and T. trichiura were found in 1 case	0.35%

Of triple and quadruple infections there was one example namely one showing ova of Ancylostomidae, Trichiura trichiuris and Ascaris lumbricoides, and one those of Anclylostomidae, Trichiuris trichiura, Ascaris lumbricoides and Taenia saginata.

(6) *The Wassermann Reaction.*

The Wassermann Reaction was done on 368 samples of blood sera and on two of cerebro-spinal fluid. A positive result was obtained in 194, a doubtful positive in 35, and a negative in 139 of blood sera. Both samples of cerebro-spinal fluid gave a negative reaction.

The only matter of interest in connection with these tests was a series of examinations made on blood taken from a few cases of yaws treated with novarsenobillon. The number of cases is too few to justify the drawing of conclusions but the results are given here for what they are worth.

TABLE I.

Case No.	Immediately after treatment.	Months after treatment ceased.					
		1st.	2nd	3rd.	4th.	5th.	6th.
1.	+ +	-	+	0	+ +	+ +	+ +
2.	0	0	0	0	-	+ +	0
3.	0	-	0	0	0	0	0
4.	+	+ +	-	+ +	0	+ +	-
5.	+ +	+ +	0	0	0	+ +	-
6.	+ +	0	+	-	-	-	-
7.	0	0	-	-	-	-	-
8.	-	0	0	-	-	+ +	-

The notation is that recommended by the medical Research Committee in their Special Report Series No. 14 on the Wassermann test, except that in the above table "O" signifies that the blood was not examined that month.

As said above no deductions can be drawn from such a small number of tests but it would appear that at a variable time after the course of injections was finished the reaction became negative and about the fifth month became positive once more. Out of six sera tested in the fifth month, five were positive, whereas out of six tested in the first month only two were positive.

Complement as usual has been the great difficulty in carrying out the reaction. The usual titre is one in twenty-five, it rarely rises over one in thirty, and frequently is lower than one in twenty. Blood for complement is obtained by the puncture of the heart of guinea pig. This as a rule gives a complement of a slightly lower titre than that obtained by slaughter of a guinea pig, but the latter procedure is not feasible owing to a scanty supply of the animals. Various procedures have been tried to improve the complement such as keeping the guinea pigs in a dark cool place for twenty-four hours before drawing off the blood, varying the diet, feeding as much as possible on green vegetables, carrots, etc., but nothing seems to improve matters.

The haemolytic serum is produced in the laboratory. We have not had any great difficulty in obtaining a serum of titres varying from 1 in 1,000 to 1 in 2,000.

(b) *Medico Legal Section.*

There is little of interest to report under this heading, as no member of the laboratory staff was engaged in the chief legal case of importance during the year. The principal work carried out has been the examination of blood stains on clothes and weapons for proof of origin, and these have where possible all been submitted to the guiacum test, haemin crystal test and the pricipitin test.

(c) *Pathological Section.*

The increase in number of the tumours and portions of tissue for histological examination is gratifying. There were 65 specimens received for section and diagnosis almost double the number sent last year. Among those of interest were a round-celled sarcoma, two specimens of carcinoma of the upper eyelid, a cavernous haemangioma removed from the wrist, a melanotic sarcoma removed from the sole of the foot, and a carcinoma of the breast, all from natives. There were two specimens of epithelioma of the lip and one of carcinoma of the breast from Europeans.

One brain section taken at a post mortem examination on a native who died suddenly, was a very good example of cerebral malaria, the small blood vessels in the brain being very dilated and the red blood corpuscles contained therein full of parasites.

A considerable number of post mortem examinations was done during the year but with the present staff it is quite impossible to do adequate justice to this part of the work and there is a large amount of valuable material lost.

(d) PUBLIC HEALTH SECTION.

(1) *Water Examinations.*

The usual examinations of the Nairobi water supply were carried out during the year and in addition an opportunity was afforded during the cleaning of the reservoir to obtain samples from the concealed springs in the bottom. In previous reports the suggestion was made that the source of the contamination would in all probability be found in one of more of these concealed springs. This deduction was made from the results of the examination of the reservoir water and of the open springs feeding it, and this year's investigations have proved it to be correct. Out of four springs in the bed of the reservoir the water from one was good, B. coli not being found in 50 c.c. that from another one was bad, B. coli being present in 1.0 c.c. and that from the other two very bad, B. coli being present in 0.1 c.c.

The water delivered in Nairobi is obtained from (a) the above mentioned springs, (b) a spring known as Waddell's spring, (c) a spring known as No. 1 spring, (d) a number of surface springs flowing into the reservoir. Water taken from the tap in Nairobi when examined usually shows B. Coli present in 10 c.c. sometimes in 1.0 c.c. and on occasions it has shown B. coli in 0.1 c.c. Waddell's spring usually gives a fairly good water i.e. B. coli not present in 10 c.c. but present in 50 c.c. No. 1 spring has always given a good water B.coli not being present in 50 c.c. while the water from the superficial springs has always been fair though rather variable.

More detailed reports on all the above examinations have been made from time to time to the Medical Officer of Health, Nairobi and a consideration of the results and their bearing on the Nairobi water supply will be found in his report.

(2) MILK EXAMINATIONS.

A number of samples of milk have been examined bacteriologically. Most of these were from one large diary farm, the owners of which were carrying out experiments on the best methods of treatment and carriage of milk so that it would be delivered in Nairobi in the best possible condition, as the dairy is situated fifty miles from Nairobi.

The following series of samples were taken from this dairy. They show the B. coli content of the milk when taken from the cow, its variation afterwards and the further changes under various methods of treatment and handling.

TABLE II.

Sample Number.	Source.	B.coli count per c.c.
1.	Direct from the cow	Less than 100
2.	From a can in the dairy	More than 10,000
3.	After pasteurization	Less than 100
4.	After cooling	Less than 100
5.	Milk delivered in the Laboratory in an uninsulated five gallon can, airtight and dustproof. The milk had been pasteurized the previous day	100 to 1,000
6.	Milk delivered in the Laboratory in an uninsulated one gallon can, neither air tight nor dustproof. The milk had been pasteurized the previous day.	More than 10,000
7.	Milk delivered in the Laboratory in an insulated one gallon can, airtight and dustproof. The milk had been pasteurized the previous day	Less than 100

The low count in the sample direct from the cow will be noticed, as also the rapid rise in the short period from the milking shed to the dairy.

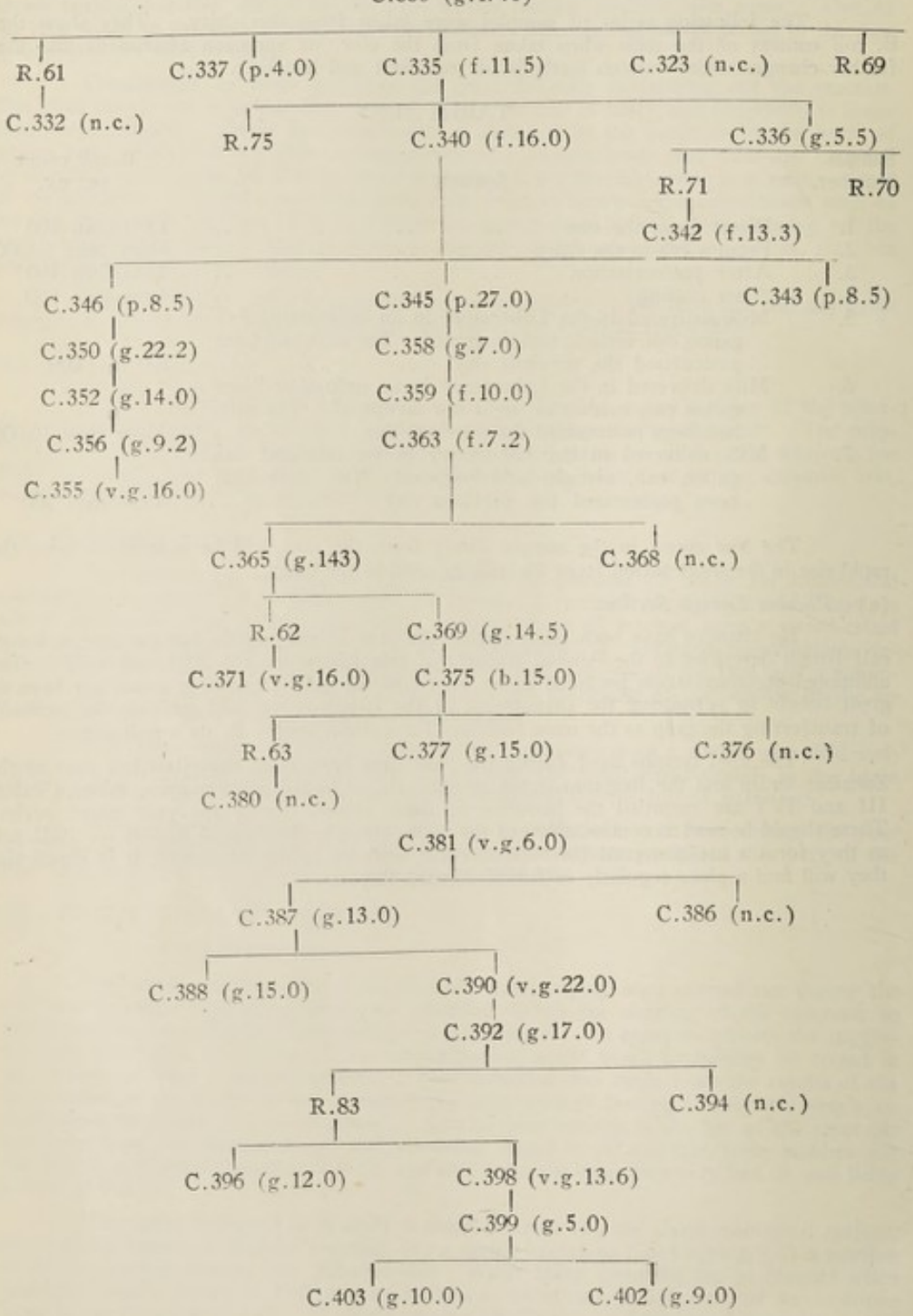
(e) *Vaccine Lymph Section.*

No changes have been made during the year in the routine for the production of calf lymph described in the Annual Reports of this laboratory for 1921 and 1922. The additional accommodation provided as an annex to the calf vaccination room has been of great benefit in permitting the preparation of the lymph to proceed without the necessity of transferring the pulp to the main building for certain stages in its manipulation.

The seed lymphs used during the year have been those described last year as the Zanzibar strain and the Belgaum strain respectively. In the accompanying tables (Tables III and IV) are recorded the histories of these strains during the year under review. These should be read as continuations of the tables given in the Annual Report for 1922, and as they form a useful record for reference for workers in the laboratory, it is hoped that they will find a place regularly in future Anunal Reports.

TABLE III.

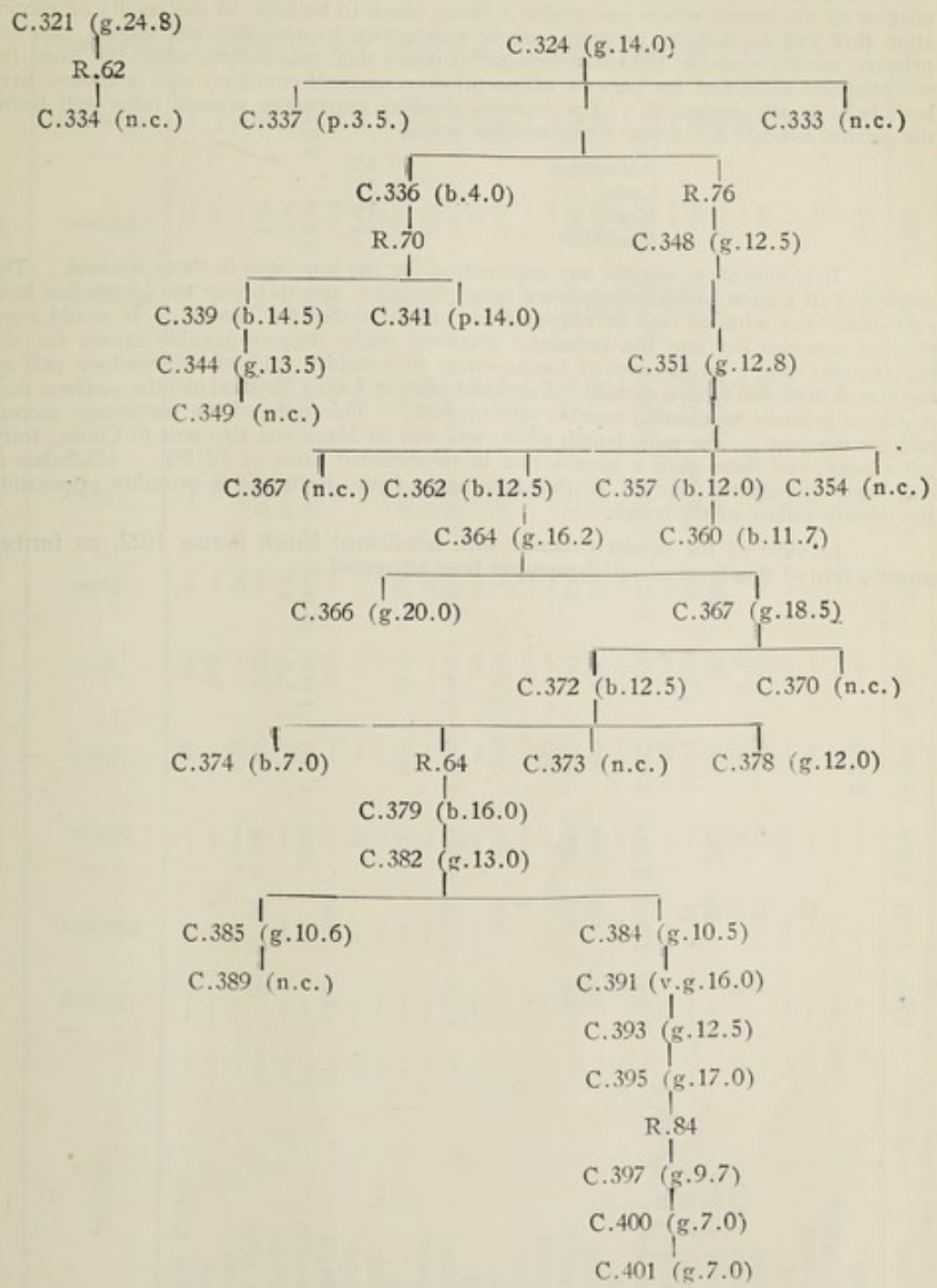
"Z" STRAIN.



N.B. A list of abbreviations used will be found in Table IV.

TABLE IV.

"B" STRAIN.



Abbreviations used.

R.	Rabbit	P.	Poor vesiculation.
C.	Calf	f.	Fair vesiculation.
Nil.	Failed to take	g.	Good vesiculation.
n.c.	Not collected	v.g.	Very good vesiculation.

Lymph batches issued.

The figures in brackets = the weight of pulp collected in grammes.

Tables are also appended showing the amount of lymph issued during the year to various stations, and the vaccination returns from some of these places. A new form for vaccination returns has been prepared but has not yet been printed. The form will be found at the end of this report as Appendix III. Its use will greatly facilitate the compilation of the annual return and enable a better check to be kept on the results of vaccination than can be done at present. It is satisfactory to note that the success rate for primary vaccinations for 1922 has been rather more than maintained, while the rates for revaccination cases and for persons whose previous vaccinal condition was unknown, have both been greatly improved. The stations showing percentage success rates well below the general average for primary vaccinations were

Kakamega	59.4%
Lamu	61.7%
Meru	71.4%
Machakos	75.7%

It is difficult to suggest any explanation for the low rates in these stations. The conditions of transit to Kakamega were noted last year, and this year the lymph has been sent direct, but with no sign of improvement, indeed rather the reverse. It would seem that an investigation into the technique practiced might suggest possible causes for the poor success rate. In the case of Lamu, owing to a sudden epidemic of smallpox part of the lymph used was twelve months old and had been in Lamu for nine months. Even then it gave a primary vaccination success rate of 36%. This reduced the percentage success rate for the year. The same lymph which was sent to Meru was also sent to Chuka, forty miles away, and there gave a success rate in revaccinated cases of 72.5%. Machakos is only forty miles from Nairobi, so that here again faulty technique is probably responsible for relative failure of the lymph.

In view of the results obtained with lanolinated lymph during 1922, no further manufacture of this form of calf lymph has been attempted.

Table V. NUMBER OF DOSES OF CALF LYMPH ISSUED IN 1923.

Station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Chania Bridge ...	—	—	—	75	—	—	—	—	—	—	—	—	75
Chuka ...	—	—	—	—	400	—	—	—	—	—	—	—	400
Eldoret ...	—	—	—	100	—	30	—	—	—	—	30	20	180
Fort Hall ...	80	80	80	80	100	80	100	80	80	100	80	80	1,020
Kacheliba ...	—	—	—	—	250	400	500	400	300	—	—	—	1,850
Kakamega ...	—	—	300	1,400	1,000	2,000	2,500	2,000	2,000	2,500	2,000	2,000	17,700
Kapsabet ...	400	300	—	—	150	—	—	62	48	60	48	48	1,116
Kericho ...	—	—	18	—	—	—	—	—	—	—	—	9	27
Kikuyu ...	—	—	3	—	—	—	—	—	—	—	—	—	3
Kisii ...	—	—	300	400	500	400	500	400	400	500	400	400	4,200
Kismayu ...	—	—	—	—	—	50	100	150	200	250	200	200	1,150
Kisumu ...	4,800	5,275	4,200	4,000	5,403	4,000	5,000	4,000	4,000	5,000	4,000	4,000	53,678
Kitui ...	—	—	—	—	—	—	—	45	45	75	60	60	285
Lamu ...	—	200	200	200	5,200	—	400	200	200	200	200	200	7,200
Limuru ...	—	1	—	—	—	2	6	—	—	—	—	—	9
Londiani ...	—	—	—	200	—	—	—	—	6	—	—	—	206
Machakos ...	200	200	200	300	450	200	250	200	200	250	200	200	2,850
Malindi ...	100	150	350	100	150	150	150	50	100	100	100	100	1,600
Meru ...	50	—	—	—	—	—	—	—	200	50	—	—	300
Mombasa ...	1,200	1,200	2,700	2,500	400	2,100	2,400	1,200	1,500	1,500	1,200	1,200	22,700
Nairobi, I.D. Hospital ...	—	—	—	12	—	—	—	—	—	—	—	—	12
Nairobi M.O.H. ...	—	31	—	6,011	1,150	498	1,206	1,083	490	943	112	920	12,444
Nairobi Prison ...	—	96	226	130	80	290	100	210	60	130	150	140	1,612
Nairobi Various ...	12	12	21	27	6	6	6	6	3	—	30	—	129
Nakuru ...	48	48	48	248	60	48	60	48	48	72	48	48	824
Nyeri ...	—	—	300	—	—	—	—	—	—	—	200	100	600
Rumuruti ...	—	12	—	—	—	—	—	—	—	—	12	—	24
Trans-Nzoia ...	—	—	—	—	—	—	9	—	—	—	—	9	18
Vanga ...	—	—	—	2,250	—	—	—	—	—	600	—	—	2,850
Total ...	6,890	7,605	8,946	18,033	18,899	10,254	13,287	10,134	9,880	12,330	9,070	9,734	135,062

Table VI. RETURN OF VACCINATIONS 1923.

District or Station	Population. Total.	Per sq. mile.	Total. vaccine done.	A. Primary Vaccinations. T.	S.	F.	U.	B. Re-vaccinations. T.	S.	F.	U.	C. Previous vaccinal condition unstated. T.	S.	F.	U	Percentage success rate of known results. A.	B.	C.
Chuka ...	?	?	58	1	—	—	1	57	29	11	17	—	—	—	—	—	72.5	—
Eldoret ...	?	?	98	97	62	14	21	2	2	—	—	—	—	—	—	81.5	100.0	—
Fort Hall ...	150,000	259	229	28	—	—	—	201	175	26	—	—	—	—	—	100.0	87.0	—
Kacheliba ...	16,392	5	201	48	40	2	6	153	69	68	16	—	—	—	—	95.2	50.3	—
Kakamega ...	289,945	114	16,643	16,177	135	92	15,950	466	37	56	373	—	—	—	—	59.4	39.7	—
Kapsabet ...	?	?	559	559	166	27	366	—	—	—	—	—	—	—	—	86.0	—	—
Kisii ...	231,202	82	3,566	2,189	—	—	2,189	1,377	—	—	1,377	—	—	—	—	—	—	—
Kismayu ...	61,647	?	298	200	144	8	48	98	26	18	54	—	—	—	—	94.7	59.0	—
Kisumu ...	266,914	144	15,239	—	—	—	—	92	80	3	9	16,147	935	35	15,177	—	96.3	96.3
Kitui ...	104,745	21	240	101	79	8	14	139	106	15	18	—	—	—	—	90.8	87.6	—
Lamu ...	20,936	?	2,897	432	165	102	165	2,465	766	409	1,290	—	—	—	—	61.7	65.1	—
Machakos ...	185,659	92	911	611	101	31	479	300	82	49	169	—	—	—	—	75.7	62.6	—
Malindi ...	28,147	?	1,395	571	4	—	567	824	24	4	796	—	—	—	—	100.0	85.7	—
Meru ...	115,794	35	362	136	85	34	17	226	106	88	32	—	—	—	—	71.4	54.6	—
Mombasa ...	—	—	3,869	350	94	1	255	702	260	12	430	2,817	50	19	2,748	98.9	95.6	72.5
Nairobi, M.O.H. ...	—	—	7,543	1,953	1,450	44	459	5,590	3,427	934	1,229	—	—	—	—	87.0	77.8	—
Nairobi, Prison ...	—	—	769	104	87	3	14	376	171	151	54	289	151	54	84	96.6	53.1	73.7
Nakuru ...	?	?	370	2	1	—	1	368	221	68	79	—	—	—	—	100.0	76.4	—
Nyeri ...	?	?	97	97	97	—	—	—	—	—	—	—	—	—	—	100.0	—	—
Total ...	—	—	56,345	23,656	2,738	366	20,552	13,436	5,581	1,912	5,941	19,253	1,136	108	18,009	88.2	74.5	91.3

Note:— T. Total. S. Successful. F. Failed. U. Result unknown.

(f) *Vaccine Section.*

In addition to the autogenous vaccines, stock vaccines from B. pestis, the enterica, B. dysenteriae, gonococcus and staphylococcus have been prepared.

(1) PLAGUE VACCINE.

The first atempt to produce this vaccine was by washing off a forty eight hours growth on agar in Roux flasks with 0.5% carbolic in normal saline, emulsifying and standardizing. This method was discontinued for several reasons, namely (1) the labour entailed in making of the agar, filling the flasks, washing and emulsifying the vaccine was greater than could be borne by an already overburdened staff and kitchen. (2) It was difficult to get washings quite clear and free from small pieces of agar. Repeated centrifuging was necessary which occupied time and added to the risk of contamination.

After trials of various methods it was decided to grow the B. pestis in broth and remove the bacteria from the broth by centrifuging as suggested by the Indian Plague Commission. The technique finally adoped after much trial is as follows.

Method at present in use for preparation of plague vaccine.

(1) Six Erlenmeyer flasks each of three litre capacity containing one litre each of fresh broth standardized to a reaction of Ph. 7.4 are placed in an incubator at 35°c for three days to test sterility.

(2) Six test tubes of similar broth each containing 5 c.c. are inoculated from our stock culture of B. pestis and grown for two days in the incubator at 35°c.

(3) A loopful of forty eight hours growth in the test tubes is placed on a slide, stained by Grams method and examined for purity.

(4) If the growth in each of the six test tubes is pure the six flasks if showing no signs of contamination are inoculated, one flask from each tube.

(5) The inoculated flasks are incubated for from five to seven days at 35°c. and shaken every morning.

(6) On the fifth or seventh day a loopful is taken from each flask stained by Grams method and examined for purity. Pure carbolic 10 c.c. is added to each flask (i.e. making the contents 1% carbolic) shaken thoroughly and allowed to stand for twenty-four hours. At the end of this time the flasks are again shaken, 0.5 c.c. of the contents taken from each and poured over an agar slope which is incubated for twenty-four hours for sterility. If a growth appears on any of the tubes the flask from which it was taken is discarded.

(7) The sterility and the purity of the flasks now being reasonably assured they are passed through an Alfa Laval separator until the issuing broth comes away quite clear.

(8) The bowl of the separator is now opened and the gelatinous mass of bacteria adhering to the sides washed off with a small quantity (about 150 c.c.) of 0.5% solution of carbolic in water. The washings are measured and poured into a stoppered sterile bottle containing beads and thoroughly shaken.

(9) Standardization is by weight. Into a weighed centrifuge tube 5 c.c. of emulsion are poured and spun at 3,000 revolutions per minute for two hours. The clear supernatant fluid is then drawn off taking care not to disturb the sediment. The tube is dried in an oven at 80°c. and weighed until it ceases to lose weight. The weight of bacteria per c.c. of emulsion is thereby obtained and the amount of carbolic saline (0.5%) necessary to add to bring it to a strength of 1 mg. per c.c. calculated. The required amount of saline is then added and thoroughly mixed.

(10) As a final test of sterility 0.5 c.c. of the emulsion is taken and poured over two agar slopes. One of these is incubated aerobically and one anaerobically. If no growth appears in either, the vaccine is placed in the coldroom at a temperature of 0°c. for storage.

The above is a concise account of the method now adopted but a few words of explanation and amplification may be added.

Details of the Technique.

Stock cultures. Three stock cultures are kept, namely (1) An old laboratory strain which originally came from Bombay. (2) A strain isolated from a case of plague in Mombasa. (3) A strain isolated from a case of plague in Nairobi.

The virulence of the Bombay strain is low and it gives a heavy growth in fresh beef broth in five days. The virulence of the other two strains is high. They give only a moderate growth in fresh beef broth in five days, but a better one in seven days.

All these strains are kept on agar, repeatedly subcultured and regularly passed through guinea pigs to keep up the virulence. Most of the vaccine made last year was made from the Bombay strain, but towards the end of the year the Mombasa strain was used. Incubation is at 35°c. as there seems to be general agreement that growth at this temper-

ature tends to preserve the virulence longer than at 37°c. Such experience as we have had seems to confirm this.

Contamination. Considerable trouble was experienced at first owing to contamination of the flasks with a spore bearing organism similar to B. subtilis. Although all operations were conducted in a special room and every precaution taken, the contamination persisted. Suspicion was eventually directed to the cotton wool plugs, though according to the laboratory routine, these were autoclaved for twenty minutes at 20lbs. pressure. A few experiments proved that the cotton wool was at fault. The autoclaves were therefore tested to discover if the centre of a drum of cotton wool reached a temperature of 120°c. and if so how long was required to attain it. The test was done by the method described in Besson's Technique Microbiologique, that is to say by placing a little benzoic acid with a minute quantity of brilliant green as an indicator in a glass capsule. The capsule is then placed in the centre of the drum of cotton wool and autoclaved. If the benzoic acid has melted and run as shown by the brilliant green, the temperature has reached 121°c.

When tested in this way it was found that the temperature in the centre of the drum did not reach 121°c. until fifteen minutes after the pressure gauge registered 20 lbs. Cotton wool was thereafter autoclaved for thirty five minutes after the pressure gauge registered 20 lbs. This seems to have disposed of the question of contamination, though there has not yet been sufficient time to say if the improvement will be permanent.

Collection of the bacteria by means of the separator.

It was known that in South Africa pneumococcus vaccine was made by separating bacteria from broth by means of the Sharples separator. It was not possible to get a separator of this type (which is quite a distinct type) in this country at the time. A few trials were made with the ordinary disc separator (Alfa Laval Viola III) and it was found that this type with all the discs removed except the top one would remove all the bacteria in two litres of broth in one hour. The container, bowl and all parts of the separator with which the broth comes in contact can be put in the autoclave and are always sterilized before use. After passing the broth through, the mass of bacteria on the sides of the bowl are washed off with a stream of 0.5% carbolic into a sterile glass dish. The separation of the bacteria is assisted when necessary with a glass rod. Carbolic saline is not used at this stage as it was found that the salt interferes with the drying and weighing for standardization probably owing to its rapid absorption of moisture from the air between the time of its removal from the drying oven and completion of weighing. The carbolic is driven off in the process of drying and does not interfere with the estimation.

Standardization. There was some difficulty in deciding what strength to make the vaccine. Th great bulk of vaccine used is Haffkines which is not standardized to any given number or weight of bacteria. In South Africa two injections are employed the first being of a strength of five hundred million bacteria and the second double that quantity. Kolle made his vaccine from the growth washed off agar and standardized to contain 2 mg. per dose, each dose being one c.c. As it is practically impossible to give two injections at intervals of a week to natives it was decided to standardize our vaccine to a strength of one thousand million per c.c. which is equivalent to 0.7 mgms. of dried bacilli per c.c. and give one injection of one c.c. The first of our vaccine issued was of this strength. Later it having been found that larger doses could be tolerated without serious reaction, the strength was increased, to one mgm. of dried bacilli per c.c. This strength gives a moderate reaction. Greater concentrations give too violent reactions and are apt to defeat their object by antagonizing the native.

Bottling and issue of the vaccine. The vaccine is issued in amber glass bottles each containing 27 to 30 c.c. These are sterilized in the autoclave and filled by gravity from a large glass container on a shelf. As each bottle is filled it is sealed with a rubber cap and dipped into a mixture of gelatine and glycerine (Gelatine 12 ounces, Glycerine 5 ounces water 12 ounces) up to the shoulder. This seals it effectively and does not interfere with the needle of the syringe penetrating the rubber to withdraw the vaccine.

Results. A sufficient number of reliable figures have not been received to judge the results critically. On the whole the protective power of the vaccine appears to be very similar to that of Haffkine's vaccine.

No bad results have been reported either in the nature of very serious reactions or of sepsis. Since the strength has been increased to 1 mg. per c.c. the reactions have been more severe but not so severe as those caused by Haffkine's vaccine.

As the B. pestis grows better in the presence of a free supply of air the first attempts to grow it in broth were made in Roux flasks each containing 100 c.c. and laid on its side. This gave a thin layer of broth with a large surface exposed to the air and a larger growth was obtained by this method than in Erlenmeyer flasks. The risks of breakage and of spilling a virulent culture by this method and the extra time involved in handling led to its disuse and the Erlenmeyer flask substituted.

(2)*Stock Vaccines.*

The Enteric Group. The stock vaccine has been made as in former years from B. typhosus, paratyphosus A., B., and C.

Gonococcus. Several strains of gonococcus were isolated during the year and a mixed stock vaccine of gonococcus and staphylococcus made. This vaccine has been popu-

lar with local practitioners who report that treatment has been considerably shortened by its use and that it has given excellent results in chronic gonorrhoea and in gonorrhoeal rheumatism.

Staphylococcus. In the past staphylococcus vaccines for furunculosis have been most unsatifactory, autogenous as well as stock. On the publication of Dreyer's paper in the British Journal of Experimental Pathology on defatted vaccines a stock defatted vaccine from several strains of S. aureus and S. albus was prepared. Only a few cases have been treated with it yet and we are unable to make any remarks about its efficacy.

III. REPORT OF THE RESEARCH DIVISION.

Vaccine from Coliform bacilli.

The research conducted on this subject is described in a paper which will be published shortly. As lengthy reports on these vaccines have appeared in the last two Annual Reports, we need only mention here that this form of vaccine therapy has become known to outside public through the medium of satisfied patients, and that the laboratory is inundated with requests for these vaccines. The results so far obtained are summarised in the accompanying Table VII. Fuller clinical descriptions of some of the cases will be found in the paper when published. Experiments on the serum reactions of coliform bacilli are in progress at the time of writing.

W. H. Kauntze,

Senior Bacteriologist.

TABLE VII.

SUMMARY OF CASES TREATED BY COLI-TYPHOID VACCINE.

Disease.	Not Improved.	Slightly Improved.	Total Cases.	Cured.	Greatly Improved.	Improved.
Chronic rheumatism.	1	-	33	23	7	2
Rheumatoid arthritis.	2	-	15	4	8	1
Colitis.	-	-	4	3	1	-
Bacilluria.	-	-	3	3	-	-
Sciatica.	-	-	3	1	2	-
Acute rheumatism.	-	1	2	1	-	-
Arthritis.	1	-	2	1	-	-
Osteo-arthritis.	1	1	2	-	-	-
Chronic dyspepsia.	-	-	1	1	-	-
Gun shot wound leg.	-	-	1	1	-	-
Pyrexia.	-	-	1	-	-	1
Total.	5	2	67	38	18	4

NOTE :—Cases still under treatment, insufficiently treated, or as yet untraced, are excluded from this table.

SUMMARY OF RESULTS OF ALL LABORATORY EXAMINATIONS AND PREPARATIONS — APPENDIX 1

1923

Grand Total of all Examinations 6005

MAN

	Blood.	Cerebro-Spinal Fluid.	Exudate from Conjunctiva.	Exudate from Knee-Joint.	Exudate from Liver.	Exudate from Lung.	Exudate from Lymphatic Gland.	Exudate from Nasal Cyst.	Exudate from Pleura.	Exudate from Spleen.	Exudate from Ulcers.	Faeces.	Hair.	Nasal Secretion.	Pharyngeal Secretion.	Pus.	Seminal Fluid.	Skin.	Sputum.	Urethral, Vaginal and Prostatic Secretion.	Urine.	Various Tissues.
Total Specimens Submitted.	1885	37	3	15	3	13	170	1	3	40	64	398	8	18	8	43	3	7	233	145	313	65
Differential Leucocyte Counts.	866																					
Enumeration of Erythrocytes and Leucocytes.	1	1																				
PARASITES detected by MORPHOLOGY or STAINING REACTIONS: Entamoeba Coli.												5										
Entamoeba Histolytica.												19										
Giardia Intestinalis.												4										
Piroplasma Canis.																						
Plasmodium Falciparum.	187																					
Plasmodium Falciparum and P. Vivax.	3																					
Plasmodium Malariae.	22																					
Plasmodium Malariae and P. Falciparum	1																					
Plasmodium Vivax.	30																					
Spironema Pertenue.											4											
Spironema Rossi.	10																					
Trichomonas intestinalis.												2										
Bacillus anthracis.						1	1			3	10											
Bacillus leprae.														4								
Bacillus Pestis.					1	3	68			22									9			
Bacillus Tetani.																						
Bacillus Tuberculosis.																			28			
Gonococcus.			2																	52	4	
Meningococcus.		8																				
Micrococcus Catarrhalis.																			6			
Microsporum Audouini.													8					6				
Pneumococcus.		3		1		1	3			3					1				10			
Spermatozoa.																	1					
Staphylococcus.							3		1							9			8			
Streptococcus.							3									2			2			
Larvae Strongyloides Stercoralis.												4										
Ova Ancylostomidae.												25										
Ova Ascaris Lumbricoides.												13										
Ova Hymenolepis (? Sp.)												1										
Ova Schistosoma Haematobium.																					2	
Ova Schistosoma Mansoni.												1										
Ova Taenia Saginata.												21										
Ova Trichiuris Trichiura.												12										
Ova double infections.												9										
Ova triple infections.												1										
Ova quadruple infections.												1										
Fasciola Hepatica.																						
Larva Cordylobia Anthropophaga																						
Taenia Saginata.																						
Xenopsylla Cheopis.																						
Negative.	2012	22	1	13	3	6	94	1	2	12	50	189		14	6	23	1	1	163	122	47	
AGGLUTINATION TESTS: Bacillus Paratyphosus. A.	2																					
Bacillus Paratyphosus. B.	2																					
Bacillus Paratyphosus. C.	1																					
Bacillus Proteus x 19.	4																					
Bacillus Typhosus.	15																					
Micrococcus Melitensis.	8																					
Micrococcus Paramelitensis.	5																					
Negative.	140																					
CULTURAL EXAMINATIONS: Bacillus Coli Agglutinating with Patient's Serum.												59				1					10	
Bacillus Dysenteriae Shiga.												2										
Bacillus Typhosus.												2									1	
Gonococcus.																				2		
Micrococcus Catarrhalis.															1	10			10			
Pneumococci.				1											1	5			3			
Staphylococcus.			1													17			6	1	3	
Streptococcus.	1														1	6			7			
Negative.	15	1								1		57				6			9	10	24	
General Chemical & Microscopical Examination																					273	
Medico-legal Examinations.																						
Complete Bacteriological Examination.																						
WASSERMANN REACTION: Positive Result.	194																					
Doubtful Positive Result.	35																					
Negative Result.	139	3																				
Sigma Re-action.	4																					
Histological Examination.																						65

CATTLE, DOG, MONKEY, RAT, OTHER EXAMINATIONS

	CATTLE: Blood.	CATTLE: Exudate from Lymphatic Gland.	DOG: Blood.	DOG: Faeces.	MONKEY: Exudate from Wound.	RAT: Exudate from Liver.	RAT: Exudate from Spleen.	OTHER: Blood Stains.	OTHER: Helminths.	OTHER: Insects.	OTHER: Maize Flour.	OTHER: Milk Supplies.	OTHER: Mineral Waters.	OTHER: Water Supplies.
Total Specimens Submitted.	1	2	21	3	1	1	2405	24	2	10	2	24	9	27
Differential Leucocyte Counts.														
Enumeration of Erythrocytes and Leucocytes.			4											
PARASITES detected by MORPHOLOGY or STAINING REACTIONS: Entamoeba Coli.														
Entamoeba Histolytica.														
Giardia Intestinalis.														
Piroplasma Canis.			7											
Plasmodium Falciparum.														
Plasmodium Falciparum and P. Vivax.														
Plasmodium Malariae.														
Plasmodium Malariae and P. Falciparum														
Plasmodium Vivax.														
Spironema Pertenue.														
Spironema Rossi.														
Trichomonas intestinalis.														
Bacillus anthracis.														
Bacillus leprae.														
Bacillus Pestis.							26							
Bacillus Tetani.					1									
Bacillus Tuberculosis.		1												
Gonococcus.														
Meningococcus.														
Micrococcus Catarrhalis.														
Microsporum Audouini.														
Pneumococcus.														
Spermatozoa.														
Staphylococcus.														
Streptococcus.														
Larvae Strongyloides Stercoralis.														
Ova Ancylostomidae.				2										
Ova Ascaris Lumbricoides.														
Ova Hymenolepis (? Sp.)														
Ova Schistosoma Haematobium.														
Ova Schistosoma Mansoni.														
Ova Taenia Saginata.														
Ova Trichiuris Trichiura.														
Ova double infections.														
Ova triple infections.														
Ova quadruple infections.														
Fasciola Hepatica.									1					
Larva Cordylobia Anthropophaga										4				
Taenia Saginata.									1					
Xenopsylla Cheopis.										6				
Negative.	1	1	14	3		1	2379							
AGGLUTINATION TESTS (all rows)														
CULTURAL EXAMINATIONS: Negative.											2			
General Chemical & Microscopical Examination														
Medico-legal Examinations.								24						
Complete Bacteriological Examination.												24	9	27
Histological Examination.														

STOCK VACCINES PREPARED.

Bacillus Coli Vaccine	274	Doses.
Bacillus Pestis Vaccine	153,000	"
Calf Lymph glycerinated	146,380	"
Gonococcus Vaccine	552	"
Micrococcus Melitensis	1,807	"
Polyvalent Dysentery Vaccine	2,218	"
Staphylococcus ("Defatted")	158	"
Staphylococcus Mixed	519	"
T. A. B. C. Vaccine	801	"

AUTOGENOUS VACCINES PREPARED.

For	Asthma	6
Of	Bacillus Coli	59
For	Catarrh	5
For	Furunculosis	9
For	Gonorrhoea	1
Of	Pneumococci	1
For	Pyorrhoea	9

APPENDIX II.

AFRICAN LABORATORY ASSISTANTS IN TRAINING.

SCHEDULE OF SUBJECTS REQUIRED.

ON ENTRANCE.

English dictation.
English reading.
Copying from manuscript.
Arithmetic, (addition, subtraction, multiplication, division).

RECEIVES Shs. 20/- + QUARTERS.

PASS FROM GRADE OF LEARNER TO GRADE II.

(1) Use of Centrifuge.
(2) Use of Incubator.
(3) Cleaning of bottles and tubes.
(4) Cleaning of Slides.
(5) Cleaning of coverglasses.
(6) Preparation of ink for writing on glass.
(7) Preparation of ringed slides for hanging drop.
(8) Sealing of capillary tubes and ampoules.

RECEIVES Shs. 30/- + QUARTERS.

(9) Making of hanging drop preparations.
(10) Preparation of blood smears.
(11) Making of preparation of faeces (a) In Saline.
(b) In Iodine.
(12) Preparation of sputum and pus smears.
(13) Staining by Gram's method.
(14) Staining by Leishmann's method.
(15) Staining by Ziehl-Neelson's method.

RECEIVES Shs. 40/- + QUARTERS.

(16) Methods of sterilizing materials used in inoculation.
(17) Inoculation of tubes of liquid media.
(18) Inoculation of agar and gelatine slopes.
(19) Inoculation of stab cultures in gelatine.
(20) Inoculation from single colonies.
(21) Subculture from single colonies.
(22) Preparation of shake cultures.
(23) Reading of fermentation results.
(23a) Testing of Indol and Carbinol.
(24) Taking of temperatures.
Also English dictation, reading, composition, copying and Arithmetic up to vulgar fractions.

RECEIVES Shs. 50/- a month + Quarters.

(25) Mechanism of the microscope.
(26) Use of microscope.
(27) Methods of examining smears.
(a) Recognition and drawing of types of bacteria.
(b) Recognition and drawing of blood cells. (red and white varieties)
(c) Recognition and drawing of eggs of intestinal worms.

RECEIVES Shs. 60/- A MONTH + QUARTERS.

(28) Simple glass blowing.
(a) Preparation of tubes.
(b) Preparation of Wright's Capsules.
(c) Preparation of ampoules.
(d) Preparation of pipettes.
(29) Weighing of materials by Metric System.
(30) Measurement by Metric System.
(31) Filling of capillary tubes with calf lymph or serum.
Also English dictation, reading, composition, copying from manuscript and arithmetic up to decimals.

Examination for Grade II *will include all the above subjects.*

PASS FROM GRADE II TO GRADE I.

(1) Methods of making total red and white cells counts.
(2) Method of making differential leucocyte counts.
(3) Recognition on morphological grounds and drawing of
  (a) Common bacteria.
  (b) Blood parasites.
  (c) Intestinal protoza in faeces.
(4) Preparation of material for making sections.
(5) Making of sections.
(6) Staining of sections, General stains.

RECEIVES 1st. INCREMENT.

(7) Preparation of ordinary culture media.
(8) Methods of sterilizing culture media and other fluids.
(9) Estimation of Hydrogenion concentration of media.
(10) Titration of media.
(11) Isolation of organisms by cultural methods.

RECEIVES 2nd. INCREMENT.

(12) Methods of making anaerobic cultures.
(13) Setting of apparatus and material for water examination.
(14) Setting up of apparatus and material for Wassermann test.
(15) Preparation of agglutination tests (a) Microscopical.
  (b) Dreyer's method.
(16) Dark ground illumination.

RECEIVES 3rd INCREMENT.

(17) Advanced glass blowing.
  Also English dictation, reading, composition, copying from manuscript, arithmentic to include ordinary calculations.

QUALIFIES FOR EXAMINATION FOR GRADE 1.

PASS FROM GRADE 1 TO GRADE SPECIAL.

(1) Special staining methods for bacteria.
(2) Special cultural methods for bacteria.
(3) Preparation of special culture media.
(4) Special staining methods for sections.
(5) Biology of bacteria.
(6) Systematic description of morphology and cultural reactions of the common bacteria.
(7) Life history and description of common protozoa.
(8) General Entomological methods.
(9) General helminthological methods.
(10) Preparation of and standardisation of vaccines.
(11) Outline of chief pathological processes caused by bacteria and recognition in tissues.

Knowledge of the following processes shall be considered a claim to increased pay.
(1) Preparation of museum specimens.
(2) Preparation of calf lymph.
(3) Photo-micrography.

PPENDIX III

COLONY AND PROTECTORATE OF KENYA.

MEDICAL FORM VIII

Vaccination Return for the month ending..... 19 ..... *Station*.....

Dates on which vaccinations were performed.	Number of persons vaccinated.	Sex		Residence.	Calf Lymph used.		Primary Vaccinations.				Re-vaccinations.				Previous Vaccinal Condition Unknown.				Remarks.
		M.	F.		Batch No.	Date Recd.	Total.	Succ.	Failed.	Unkn.	Total.	Succ.	Failed.	Unkn.	Total.	Succ.	Failed.	Unkn.	

A separate vaccination form must be used for Europeans, Asiatics and Africans.

.....Medical Officer.