271

42343

26 JUL

GOVERNOR
NORTHEY
770

1920
16th July

List previous Papers.
37006/1920

COMMUTATION OF LEAVE

Trans letter from Gen Manager Ugs Rly re cases of Mr D.R.Herne and Mr A.D.Southcombe and recommends applns should be granted

Mr Parkinson

2 these officers are entitled to some 2 years leave, as are not entitled [illegible] see ltr of 15/9/16

Approved

27/7/20

Yes. Accept

27/7/20 Northey

Enclosures Filed

1967/20

...ition... favourable consideration.

I have the honour to be,
Your Lordship's
humble, obedient servant,

Edward Northey

GOVERNOR.

INCLOSURE

In Despatch [illegible] of 16/ [illegible]

[illegible]

[illegible]

M.50[illegible]/369

8th June, 1920.

The Hon. General Manager,
Uganda Railway,
NAIROBI.

The Hon. Chief Secretary
to the Government,
East Africa Protectorate,
NAIROBI.

Through the Hon. Treasurer, Nairobi.

RE COMMUTATION OF LEAVE

Sir,

I have the honour to advise you that Messrs D.E. Herne, Permanent Way Inspector, and A.D. Southcombe, Carriage Examiner, of this Railway, have applied for permission to commute a certain portion of their leave in terms of Secretariat Circular No.[illegible] of [illegible].

2. Both the above were on leave in India, and under the rules they were required to make their application before the 1st April, 1920, which they did not do so, as they were not aware that they could [illegible] portion of their leave.

3. The rules were not communicated to the European staff on leave in India, as they were to the staff on leave in England. Under the special [illegible] circumstances, I recommend for His Excellency the Governor's sanction that Messrs Herne and Southcombe be allowed to commute whatever leave is admissible.

I have etc.,

Sd/- [illegible]

GENERAL [illegible]
UGANDA [illegible]

Kenya

No. 1260

Gov. Northey

MINUTE.

Mr. Ormsby-Gore

Mr. Parkinson

Mr.

Mr. Ormsby.

Sir H. Lambert.

Sir H. Read.

Sir G. Fiddes.

Col. Amery.

Lord Milner.

31 August 1920

Sir,

I have to acknowledge the receipt of your despatch, No. 722, of the 16th of July, regarding the applications by Mr. E. Horne, Permanent Way Inspector, [illegible] Land by Mr. A. [illegible]

[illegible]

for permission to [illegible]

My Lord,

I have the honour to transmit the usual form of particulars showing the pension to which Mr. F.J. de Gruchy, 2nd Grade Clerk in the Secretariat, is eligible, together with a copy of the proceedings of a Medical Board which was held on him in Nairobi on the 9th ultimo and which pronounced him unfit for further service in the East African Protectorate.

Pension Form.

Proceedings of Medical Board.

2. Mr. de Gruchy's services date from the 16th of June 1904 [illegible] he is therefore eligible for a pension [illegible] of 15 completed years. The [illegible] to grant him [illegible] annum with effect from [illegible] 1910, inclusive.

3. Pending the receipt of Your Lordship's decision on the question of this pension, I have authorised the payment of his military allowance, at the rate of £60 per annum with effect from the 31st July.

I have the honour to be,
Your Lordship's
humble, obedient servant,

[illegible]
SECRETARY OF STATE.

[illegible], S.W.

ENCLOSURES

ORIGINAL

In Registered No. 771 of 16

COLONIAL PENSIONS, &c.

THE SECRETARY requests [illegible] in reference to pensions, [illegible]

Name of Applicant Francisco Janim da Cama

Office of Situation Second Grade Clerk, Secretariat

Recommended for a pension of £ 88:18:8 a year

Age Forty two (42) years

Service in Years and Months 16 years, 1 month and 15 days

Salary or Wages (Actual) £176-0-0

Emoluments £ - - -

Total Amount of Salary or Wages and Emoluments, on which Superannuation, &c., is claimed £ 176-0-0

Cause of Retirement Ill-health

Dates of Appointment and Termination of the Officer's Appointments held by Applicant, with their Emoluments, distinguishing Salary from other allowances, and specifying such Allowances.

Title of Appointment	Date of Appointment	Date of Termination	Salary	Emoluments
			£	
Second Typist	1-4-04	31-3-07	96/- to 108/-	
Second Grade Clerk	1-4-09	31-3-10	108/-	
	1-4-10	31-3-11	120/-	
Second Grade Clerk	1-4-11	31-3-12	132/-	
	1-4-12	31-3-13	156/-	
	1-4-13	31-3-14	144/-	
	1-4-14	31-3-15	152/-	
	1-4-15	31-3-16	160/-	
e altered to £126/- by	1-4-16	31-3-17	196/-	
/- to £	1-4-17		176/-	

10. Whether each of the Appointments held by the Applicant has been on the Establishment of the Colony.

11. Whether [illegible] the Applicant's services [illegible] such as to require that the holder should give his whole time to the Public Service.

Yes.

12. Whether holding any other Public Appointment, or receiving or claiming to receive any Public Money by Compensation, Half-Pay or otherwise.

No.

13. If any kind of Pension or other Allowance has been commuted under the Imperial Pensions Commutation Acts, 1860 and 1871, the annual amount of Pension or Allowance so Commuted and the date of Commutation should be inserted.

None.

14. Absence, beyond ordinary Vacation leave, in each of the last 10 years:—

Year.	Period of Absence.	Number of Days.	Cause of Absence.
1907...	From 12-8-07 To 22-9-07	42	Extension of l… on half pay, o… dical grounds
1908...	„ „ „		
1909...	„ 19-6-09 „ 30-6-09	12	Local leave, w… pay, on urgen… vate affairs.
1910...	„ „ „		
1911...	„ 6-10-11 „ 11-10-11	4	Extension of l… without pay, … steamer sailin…
1912...	„ „ „		
1914/15	„ 27-12-14 „ 26-2-15	62	Extension of l… sick quarter pay… medical grou…
1915...	„ „ „		
1918...	„ 27-2-18 „ 4-3-18	6	Extension of l… without pay, … steamer sailin…
1919...	„ „ „		

15. Date of Cessation of Duty 22nd [illegible] 1920.

(Granted leave, with pay, from 23-6-20 to 30-7-20).

16. Date of Cessation of Salary 31st July 1920.

17. Date from which, inclusively, Pension will commence 31st July 1920.

18. Statement, if the circumstances warrant it, that the Applicant has discharged the "duties with diligence and fidelity, to the satisfaction of the Head of the Department."

"services of the Person recommended, stating any [illegible] "as can be authentically stated [illegible] Reprimands, &c., with full particulars of any injuries received on duty or other circumstances or matters for consideration.

I certify that Mr. [illegible] has discharged his duties with diligence and fidelity to my satisfaction.

Secretariat
Nairobi
12th July 1920

[illegible]
for Chief Secretary
to Government

19. Computation, by the Treasurer, of the Pension, &c.

I certify that the p e n s i o n which may be paid to the Applicant according to the Rules of the Colonial Service, amounts to Forty six pounds, eighteen shillings and eight pence (£46:18:8) a year; and I base my Certificate on the following calculation:—

Date of 1st Appointment - 16th June 1904
Date of Retirement - 31st July 1920

	Years.	Months.	Days.
Actual service	16	1	15
Deduct period of leave, without pay	0	0	22
TOTAL	16	0	23

Pensionable service - 16 years.
Annual salary - £170/- a year
Whereof 16/60ths - £[illegible] a year.

[illegible]
for Treasurer.
East [illegible] Protectorate.

Nairobi, 20th July 1920.

Instructions

INSTRUCTIONS REFERRED TO ON PAGE [illegible]

If this Paper of Particulars and the Certificates connected with it, be not sent in original, the copies must be duly attested.

HEAD 1 OF PAPER.—In the case of an Officer serving on the West Coast of Africa, a Statement is to be furnished whether he is a native of that Coast. (Colonial Regulations, § 439.)

HEAD 4.—State the description of Allowance for which the Applicant is recommended, viz., Superannuation, Compensation, Compassionate Allowance, or Gratuity, and its amount. In the case of Pensions claiming an addition to their Pensions in respect of Professional or other special qualifications, it should be stated, and a reference should be given to the authority under which the claim is made.

HEAD 5.—If the service has been interrupted by one or more breaks, the word "broken" should be inserted before or after the number of years and months, and the causes, dates, and circumstances of the break or breaks should be stated under Heading 9.

HEAD 6.—If the Person retiring has been in receipt of the same Salary, or in the class from which he retires, for the 36 months immediately before the date of his retirement, the actual amount of Salary or Wages at that date should be inserted, preceded by the word "actual." In all cases the average annual amount of Salary or Wages for the 36 months next preceding the date of retirement should be inserted, preceded by the word "average," but if the whole period of service is less than three years, then the average for the whole period of service should be inserted.

HEAD 7.—A separate statement should be inserted of the average Annual Value, for the 36 months immediately preceding retirement, of each Emolument, exclusive of salary or wages, which is claimed to be included in the calculation of the Pension or Gratuity.

Whenever the value of a House or Horse Allowance, so ascertained, exceeds one-fifth of the salary and other emoluments which count for Pension purposes, it is to be reduced to one-fifth of that amount, so that it shall not exceed one-seventh of the whole.

Fees which an officer is allowed to retain for his own use will be taken into account for Pension purposes, with regular salary, at the annual average of the net receipts of the 36 months next preceding the Officer's retirement. These net receipts are to be ascertained by deducting from the gross amount of Fees such Office Expenses, &c., as an officer may have had to defray from his own resources, in performing the services for which he was remunerated by Fees. The deduction, however from the Fees should be made in respect of Office Expenses incurred only out of Public Funds, for the due discharge of those duties to which a Fixed Salary is attached. A statement of "Particulars" when forwarded to the Colonial Department should be accompanied by Declarations, from the retiring Officer, showing the annual receipts by those Fees, and the annual amount defrayed as above for Office Expenses, &c., in each of the three years immediately preceding that retirement. It will be the duty of the Principal Government Officer to satisfy himself as to the accuracy of such statements before forwarding them to the Colonial Office. In the case of Officers receiving Fixed Salaries and Fees, the Fees will not in ordinary circumstances be allowed to count for Pension purposes to the extent of more than one quarter of the Salaries, and Fees will not in any case be allowed to count for Pension purposes during any period in which the Officer receiving them was not given to the Public Service.

HEAD 8.—In cases of infirmity, if the Applicant is below the ordinary age for retirement, a Medical Certificate is to be furnished showing that he is disqualified by infirmity of mind or body for discharging the duties of his situation, and that such infirmity is likely to be permanent.

In case of ten years' service or more, this Certificate should be signed by two Officers, of whom at least one should, if possible, be a Salaried Officer of the Government.

HEAD 9.—As to "broken" service see HEAD 5.

If the Applicant has had any "acting" services the details must be fully given, whether such statement or not, during the "acting" service, he was connected with the permanent Civil Service of the Colony.

HEAD 11.—If, in special circumstances, a [illegible] Civil Officer has been allowed to leave the service without forfeiting his claim to Pension, the facts are to be fully stated.

HEAD 14.—If the Applicant is liable to any deduction from his service under Clause 102 of the Colonial Regulations, the fact should be fully stated.

HEAD 16.—The length of service and other particulars of the compensation awarded to [illegible] Salary, &c., is taken, the mode of calculating it (whether by months or years) is explained.

INSTRUCTIONS REFERRED TO ON PAGE [illegible]

If this Paper of Particulars and the Certificates connected with it, be not sent in original, the copies must be duly attested.

HEAD 1 AND PARA.—In the case of an Officer serving on the West Coast of Africa, a statement is to be made whether he is a native of that Coast. (Colonial Regulations, § 430).

HEAD 3.—State the description of Allowance for which the Applicant is recommended, viz. Superannuation Compensation, Compassionate Allowance, or Gratuity, and its amount. In the case of Persons claiming an addition to their Pensions in respect of Professional or other special qualifications, this should be stated, and a reference should be given to the authority under which the claim is made.

HEAD 5.—If the service has been interrupted by one or more breaks, the word "broken" should be placed before or after the number of years and months, and the causes, dates, and circumstances of each break or breaks should be stated under heading 6.

HEAD 6.—If the Person retiring has been in receipt of the same Salary or in the class from which he retires, for the 36 months immediately before the date of his retirement, the actual amount of Salary or Wages at that date should be inserted, preceded by the word "actual." In other cases, the average annual amount of Salary or Wages for the 36 months next preceding the retirement should be inserted, preceded by the word "average," but if the whole period of service claimed is less than three years, then the average for the whole period of service claimed is to be inserted.

HEAD 7.—A separate statement should be inserted of the average Annual Value for the 36 months immediately preceding retirement, of each Emolument (exclusive of salary or wages which is taken into the calculation of the [illegible] gratuity), viz.:—

Allowances in lieu of House or House Allowance, not to exceed one-sixth of the whole Salary.

Allowances for Table Money, not to exceed one-seventh of the whole Salary.

Allowed to Officers for hire of horses while on actual service, at the annual average.

Fees of Office, or Perquisites of any kind whatsoever, not precedent mentioned.

Fees or Perquisites of any kind whatsoever, not precedent mentioned.

Allowances for Passages, when granted to the Colonial Secretary and to be accounted for by him.

Allowances for Passages, when granted to the retiring Officers, showing the amount received by them for Passages, and the amount drawn and accounted for by them for Passages.

Any other Emoluments of whatever description, not precedent mentioned.

Note.—The Fees should be made up from the Fee Book, and the Expenses paid for Passages, and the amount received by the Officer on account of Salary, in the case of Officers who are required to the Colonial Department, and to be accounted for by them. Particulars, when required to the Colonial Department, and to be accounted for by them. Particulars, from the retiring Officers, showing the amount received by them for Fees, and the amount drawn and accounted for by them for Passages, and any other Emoluments of whatever description, not precedent mentioned, during the last three years preceding the retirement. It will be the duty of the Colonial Government concerned to examine the accounts of such statements, and to certify them as the Officers' Fees and Passages. Officers receiving Fees will not be entitled to the gratuity [illegible] Fees will not be entitled to more than one quarter of the gratuity [illegible] Pension [illegible] Pensions during any period [illegible] to be allowed [illegible] to the Public Service.

HEAD 8.—In cases of infirmity of [illegible] Certificate must be furnished by the Medical Officer to be furnished [illegible] Medical Certificate is to be furnished by the Medical Officer to the Board or body for discharging the duties of his office, stating [illegible] likely to be permanent.

In case of ten years' service or more, this Certificate should be signed by two Officers, of whom at least one should, if possible, be a Salaried Officer of the Government.

HEAD 9.—As to "broken" service see HEAD 5.

If the Applicant has had any "acting" service, the details must be fully given, with a statement whether or not, during the "acting" service, he was connected with the permanent Service of the Colony.

HEAD [illegible].—If in special circumstances, a professional Civil Officer has been allowed to have "private practice" [illegible] forfeiting his claim to Pension, the facts are to be fully stated.

[illegible] Applicant for [illegible] Pension from his service under Clause 102 of the Regulations, the facts [illegible] fully stated.

HEAD 10.—The length of service and other particulars of the [illegible] are to be given. When an [illegible] Salary, &c., [illegible] of the grade [illegible] consisting [illegible] &c.) is to be [illegible]

MEDICAL

EAST AFRICA PROTECTORATE

290

Pro

A Medical Board composed as under, assembled at [illegible] on the 9th day of June 1919 for the purpose of reporting on [illegible]

President Dr. F. [illegible]

Members Dr. H. [illegible]
Dr. V. [illegible]

The Board having assembled proceed to read over the history of the case and to examine Mr. [illegible]. The members of the Board are of opinion that he is unfit for further service with the Govt. of the East Africa Protectorate, and should be invalided forthwith.

President. F. [illegible]

Members.

Remarks by P. M. O.—

[illegible]

[illegible]
Principal Medical Officer.

MEDICAL HISTORY.

of

Mr. [illegible] Gama Rose. George [illegible]

[illegible] suffered from [illegible]

[illegible] Bronchitis on his return [illegible] he was transferred to [illegible] Hospitals. He contracted [illegible] and was admitted in Lumm and was retransferred to Nairobi after being boarded Medically in 1914. Present condition of health very poor, feels a nervous breakdown, had a severe attack of Bronchial-asthma and was sent to the Coast but with no improvement. Complains of sleeplessness, headache, poor appetite and loss of weight. He is dyspeptic and suffers from constant constipation. Has attended Hospital continually drug treatment has been of no avail to improve his condition. He looks very old for his age which is 44 years and in appearance looks more like a man of 55 years.

J. Henderson

[illegible] Medical Officer,

[illegible] Native Civil Hospital,

Nairobi, 5th June 1920.

Gov/42344/20 Kenya

Gov/42887/20 Kenya

282

7 September 1920.

Sir,

DRAFT.

Kenya
No. 1362
Gov. Watting

MINUTE.

Mr. Lunbury 6.9.20
Mr. Parkinson

I have etc. to acknowledge the receipt of your despatches No. 741 of the 12th of July, No. 769 of the 14th of July, and No. 772 of the 16th of July, and to inform you that I approve the grant of pensions to the following officers on their retirement, at the rates shown:

Mr. Conveyance B. Makasha, 3rd Grade Clerk in the Treasury Dept., a pension of £30-13-0. per annum with

Mr A M Coutinho, 3rd Grade Administrative Clerk, a pension of £87. 10 s. per annum, with effect from the [illegible] inclusive.

Mr E J de Souza, a pension of £46. 15 s. per annum, with effect from the 3rd of July 1920, inclusive.

2. I should be glad if you will cause the Proceedings of a Medical Board stated to be enclosed with your despatch, No 764, of the 14th of July, to be forwarded, as they were not received with that despatch.

I have &c

(Signed) MILNER.

TELEGRAM.

From the Governor of [illegible]

To the [illegible]

(Transmitted Colonial Secretary's [illegible] p.m. 19th July, 1920)

File 1463

369. July 17th. Your telegram 3rd July Usoma Gisaka Railway Birch sent to contractors not to Uganda Railway. Have appointed General Manager Uganda Railway Survey Engineer and Chief Accountant Uganda Railway Accountant vide terms of preliminary survey agreement pending arrival of officers from England.

NORTHEY.

TELEGRAM.

From the Governor of the East African Protectorate
to the Secretary of State for the Colonies.

(Received Colonial Office 2.5 p.m. 19th July, 1920)

File 1468

369. July 17th. Your telegram 3rd July Uasin Gishu Railway Birch lent to contractors not to Uganda Railway. Have appointed General Manager Uganda Railway Survey Engineer and Chief Accountant Uganda Railway Accountant vide terms of preliminary survey agreement pending arrival of officers from England.

NORTHEY.

CO 35[illegible] 2[illegible]

[illegible] the Governor of the [illegible]

[illegible]

(Received Colonial Office [illegible] 19th July, 1920)

File 1463

369. July 17th. Your telegram 3rd July Uasin Gishu railway Birch lent to contractors not to Uganda Railway. Have appointed General Manager Uganda Railway Survey Engineer and Chief Accountant Uganda Railway Accountant vide terms of preliminary survey agreement pending arrival of officers from England.

NORTHEY.

THE EASTERN TELEGRAPH COMPANY, LIMITED

LONDON STATIONS

ISSUED FROM
142, PARLIAMENT STREET, S.W.

No

To

Kapela

Your tel 3 July

contractors

Uganda Railway

General Manager Uganda Railway

Chief accountant Uganda Railway

preliminary

survey

Northey

REPLIES SHOULD BE ORDERED Via Eastern

Mr Bottomley

Final proof from C.O. annexed

p 8 Reference to [illegible] confidential

p 10 Final proof Patent Land Mortgage

E. B.E.A.

Returned by messenger

Mr Flood Mr Bottomley

Extract from minutes of the Executive

meeting of 1 March 1921.

~~The Committee decided to defer consideration of the~~
~~Gold Coast Report for the~~

The Committee considered Dr. Kauntze's report on the Bacteriological Laboratory in Kenya.

Professor Simpson asked whether there had been cases of plague and the figures were furnished.

It was decided that the monthly return should be laid before the Committee.

Sir P. Manson enquired whether Bilharzia had ever been found, and also whether Schistosoma haematobium had been observed. He would also be glad of further information as to the vaccine treatment of Rheumatoid arthritis.

[illegible] occurring.

Professor Simpson called attention to the condition of the water supply at Heliopolis. He said it was not safe from contamination, and that the top of the slope should be cleared. The Committee commended the report.

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Put this in a draft to Sec

10.3.

Annual Report

Bacteriological Laboratory.

EAST AFRICA PROTECTORATE.

For the Year 1919.

By

Dr. W. H. KAUNTZE.
M.R.C.S., L.R.C.P. (Lond.), M.B., B.S. (Durh.), M.R.C.S. (Eng.), L.R.C.P. (Lond.),
Senior Bacteriologist, E.A.P.

Annual Report

Bacteriological Laboratory.

EAST AFRICA PROTECTORATE.

For the Year 1919.

By

Dr. W. H. KAUNTZE,

M.B.E., B.A., M.B. Ch.B. (Vict.), M.B., B.S. (Lond.), M.R.C.S. (Eng.), L.R.C.P. (Lond.),

Senior Bacteriologist, E.A.P.

Annual Report

Bacteriological Laboratory

EAST AFRICA PROTECTORATE

For the Year 1919

Dr. W. H. KAUNTZE,
Senior Bacteriologist, E.A.P.

Annual Report

Government Bacteriological Laboratory, 1919.

I.—ORGANISATION.

As intimated in the Annual Report for 1918, Dr. Ross, Director of Laboratories, was invalided from the service on health grounds, and, though he did not leave the country till April, 1919, he was not fit for duty from January 1st, 1919, to that date.

From January 1st, 1919, to January 6th, 1919, Capt. Hughes, I.M.S., remained in charge of the Bacteriological Laboratory, but on Dr. Kaunitz's release from military service on January 7th, the latter officer took over charge and assumed the duties of his appointment as Pathologist and Assistant Bacteriologist. On the separation of the Bacteriological Laboratory from the Chemical Laboratory, and its reversion to the control of the Medical Department on April 1st, 1919, Dr. Kaunitz was appointed Acting Bacteriologist. The post of Pathologist and Assistant Bacteriologist thus left vacant remained unfilled during the remainder of the year, which was unfortunate, as, owing to the shortage of staff in the Medical Department, Dr. Kaunitz had to take over the duties of Officiating Surgical Officer at the European Hospital, Alipore, from November 1st, 1919, in addition to his other duties. This change, though unavoidable, naturally curtailed all research work in the Laboratory from that date to the close of the year. Only essential routine work could be carried on and most of this had to be entrusted to the Indian assistants, Mr. Pillay and Mr. Ramen Das, to whom an acknowledgment of their invaluable services is due.

In the early months of the year an attempt was made to secure a European Laboratory Assistant, but negotiations fell through, and so far this position has not been filled.

Clerk J. X. Ribeiro returned from leave on January 11th, 1919.

The main advance in organisation that has been made during the year is the separation of the chemical and bacteriological divisions of the Laboratory, the former becoming a department of its own, the latter forming a section of the Medical Department, retaining, however, its entity in that its staff remains separate from the Protectorate medical staff.

The Laboratory Staff now consists of :—

1 Senior Bacteriologist.
1 Assistant Bacteriologist.
2 Indian Laboratory Assistants.
1 Goan Clerk.
9 African Laboratory boys.

This is but the commencement of a much larger scheme which involves a new Laboratory building (the present one being most unsuited to the needs of bacteriological work), and an extension of staff. It is obvious that a building, situated in the centre of the town, on the main thoroughfare, with motor vehicles in large numbers passing within a few yards of the windows, is most unsuited for bacteriological work in the Tropics, where it is impossible to have dust-tight windows owing to the heat. Indeed this year has seen a constant struggle to produce uncontaminated media and cultures. This is not only wasteful but heart-breaking to those working in the Laboratory. Furthermore, the accommodation is very limited, and it is almost impossible to find room for all the research one wants to do. (See Appendix IV.) Routine work during the year has increased enormously, particularly in the line of public health work, and with the present staff and accommodation it is almost impossible to carry out any research work worthy of the name; in other words, the value of the Laboratory as a source of original knowledge is being reduced. There are, however, some very important medical research problems which require investigation, not only for the light which may be thrown by them on

disease, but also for their economic value in regard to the labour question. It does not seem to be sufficiently realised that disease, in relation to its effect on birth rate and death rate, is of great economic importance in a country where the monetary welfare of the great majority of the Europeans depends on the African labour supply. A deficiency of labour means not only increased difficulty in developing farms, but also higher wages. Dr. Ross, in submitting his estimates for 1919-20, stated that to the Europeans in this Protectorate the death of a cow was apparently of greater importance than that of a native, and I quite endorse this opinion. While a large sum of money has been spent in fitting up a large and up-to-date veterinary research laboratory, the human research laboratory is allowed to stagnate with insufficient accommodation in unsuitable surroundings. Now cows can be replaced by importation from other countries, but once epidemic disease has raised the death rate so that it largely exceeds the birth rate in human beings, the native labour supply cannot be supplemented in a similar way. Dr. Clearkin, Medical Officer, Nyanza Province, in his annual report for 1919, gives the following information :

The percentage of children under 16 to women is—

In the Nandi District	81%
" South Kavirondo District	68%
" Lumbwa District	141%
" North Kavirondo District	109%
" Kisumu District (Nilotic)	87%
" Kisumu District (Bantu)	125%
" Nyangore District	99%

In the Nyanza Province, therefore, children under 16 only number 91% of the number of adult women. Inasmuch as it may be taken that every native woman marries and becomes pregnant five times in her life at least, if we allow an average of three pregnancies for each woman enumerated in these statistics, we shall have made ample allowance for women too young to have had five pregnancies, and for women so old that their children have grown up (old women are comparatively scarce in these districts). We may conclude, therefore, that 60% of all pregnancies either do not come to parturition

or result in children who die under the age of sixteen, a very serious state of affairs.

In view of these facts it would seem that the future labour supply is in grave danger of depletion, and if any grave epidemic disease breaks out, such as plague, influenza, or cerebro-spinal meningitis, diseases which have wrought havoc among the natives in the past, the country will be faced with such a shortage of labour that the continued existence of a farming community will be threatened. The diseases which are apparently producing a diminished birth rate and increased death rate are, however, not the epidemic diseases, but diseases which do not attract the attention they deserve, because their effects are not seen in a large and sudden increase in the death rate, but in a gradual and insidious diminution in numbers and efficiency of the native population. Such diseases requiring investigation are unclassified fevers (mostly of a typhoid-like character and very prevalent), protozoal infections, bacillary dysenteries, helminth infections, etc. In addition, it is of great importance that research work should be carried out on small-pox and the possibility of there being various strains of the causative organism; on the distribution and varieties of malaria and its mosquito hosts; on the isolation of the local strains of pneumococcus and meningococcus; on the endemicity of plague in the Maragoli Hills and its cause; on the endemicity of bacillary dysentery amongst the Lake tribes and its cause; on the isolation of the bacilli causing dysentery and the preparation of vaccine or serum to control the disease; on the cause of the periodic outbreaks of diarrhoea amongst the Kavirondo and Kisii people; on the classification of the bacterial flora of local water supplies and the significance of the various bacteria found; on the occurrence and distribution of stegomyia with reference to the possibility of the introduction of yellow fever into East Africa, etc., etc.

It is now generally recognised that the future of medicine is more concerned with the prevention of disease than with its cure when developed, and this is still more true of disease in the Tropics, where it tends to develop an epidemic form and to wipe out large portions of the native population. Such preventive measures as already exist have been founded on facts discovered in the labora-

tory, and in the future it must be the laboratory to which the sanitarian will turn for the solution of the problems with which he is confronted. It is therefore, from the point of view of economics, a sound investment to provide a well-equipped and well-staffed Laboratory as a preliminary to dealing with medical problems in this country. Such a Laboratory must be situated outside Nairobi, yet in touch with the hospitals there; and it must be well-equipped and well staffed if it is to be of any value.

Improvements have been effected in the present Laboratory buildings by the provision of a calf shed, and a small building containing a room for vaccinating calves and four [illegible] calves during the incubation period. In the Laboratory itself [illegible] large room has been divided into two, so as to form an office and [illegible] for the Senior Bacteriologist, and a work [illegible] for the Assistant Bacteriologist, and the old office has been divided to form [illegible] additional store room and a small library. A new fence has also been placed round the compound. Minor improvements in organisation include a card index system of filing Laboratory results, with separate divisions for [illegible] reports, Wassermann reactions, and stock cultures, and a [illegible] system of keeping [illegible] ledgers.

[illegible] REPORT ON THE YEAR'S WORK

A summary of the work done in the Laboratory during the year will be found in Appendix [illegible] time has been spent mostly in doing routine work, [illegible] attended formerly [illegible] routine measure [illegible] Laboratory. [illegible] consequently [illegible] [illegible] and this took up much time. [illegible] the earlier part of the year [illegible] production of [illegible] [illegible] months of the year were occupied [illegible] achieve [illegible] as detailed below. Following on this a small [illegible] of [illegible] [illegible] in Nairobi, with a few sporadic [illegible] parts [illegible] Protectorate. [illegible] attention to [illegible] Nairobi [illegible] standard [illegible] the method of [illegible]

all essential facts and figures and yet be capable of accomplishment with the apparatus available in the Laboratory. In addition, as no facts existed in the country on which a fair standard of purity of local waters could be founded, an investigation of such facts had to be made. Hardly had analyses of Nairobi water begun, than the Medical Officer of Health, Nairobi, requested examination of various soda waters sold in the town. It was soon obvious that the preparation of soda water in Nairobi was not carried out with the care necessary to secure a safe water, and in consequence the control of soda water by the Health Office has necessitated a very large number of [illegible] during the year. When it is realised that only three [illegible] of a size 14 ins. by 12 ins. by 12 ins. are available, it will [illegible] that only by careful arrangement could such water analysis [illegible] without interfering too much with the other work of the [illegible]. In the intervals of this work, examinations of milk for typhoid, and of blood by the Wassermann reaction technique, had to be carried out.

(A) CALF LYMPH PRODUCTION.

At the beginning of the year it was obvious from reports arriving from various medical officers that the calf lymph as issued was not giving as high a percentage of "takes" as it should. No [illegible] reports [illegible] from [illegible] with one [illegible] medical officers [illegible] that the [illegible] though more [illegible] than it had been previously, still gave a rather larger proportion of failures than might be expected. On investigation of the methods by which calf lymph was made, it was found that the potency of the lymph was adversely affected by several factors. In the first place, since August, [illegible] had [illegible] at a standstill in the Protectorate, and in consequence [illegible] [illegible] calves, and vaccination of the [illegible] and [illegible] [illegible] in the [illegible] [illegible] the pulp [illegible] [illegible] lymph [illegible] the [illegible] [illegible] to [illegible] and [illegible] [illegible] that the lymph had a proportion of failures, and that it ever took

at all. Open air vaccination also permitted of dust infecting the pulp.

Secondly, the pulp was collected on the sixth and again on the ninth day. Now even on the sixth day scab formation was marked, but on the ninth day the collection could scarcely have been more than material from the scabbing over of raw areas left after the collection on the sixth day; in other words, the pulp was largely diluted by scab, and when it is considered that the pulp is converted into lymph by grinding up with twice its weight of glycerine and twice its weight of water, the dilution of the lymph is still greater.

Thirdly, although an ice chest existed in the Laboratory, no ice had been obtainable for some considerable time. The lymph had therefore to be kept at room temperature (77° F.) for six weeks before issue.

Fourthly, no division of calves into "stock" calves and "paste" calves existed, and the lymph was used indiscriminately for issue to the public or for vaccination of fresh calves.

Fifthly, attempts to rejuvenate the lymph by passage through monkeys had failed, owing to the death of the monkeys obtained for the purpose.

The first improvement effected was in the collection of the pulp. Every calf was examined at least once in every 24 hours from the end of 72 hours onwards, and the pulp was collected when the vesicles matured. Unfortunately, as might be expected, the strain, obtained from a small-pox patient in September, 1917, had apparently degenerated, and typical vesicles were almost unobtainable. It was sought to improve the strain by picking out the best vesicles, and using the pulp so obtained for the vaccination of stock calves, but even this did not result in a satisfactory lymph. It was therefore decided to scrap the strain as soon as a fresh one could be obtained from a case of human small-pox.

No case of human small-pox became available, and while waiting for one, the 1917 strain was passed through monkeys. This apparently caused a certain amount of improvement, as better vesiculation was produced, and an increase in yield per calf was obtained. However, before a human small-pox case became available,

orders were received from the Colonial Office to cease cultivation of small-pox virus except for experimental purposes, and to obtain seed lymph from England for the vaccination of paste calves. When this arrived it was possible to obtain a pulp from typical vesicles maturing between 96 and 120 hours after vaccination.

A second improvement was made by obtaining a local supply of ice from March onwards, and although this only maintained a temperature of about 5° C. in the ice box, this was the best that could be done pending the arrival of an ice plant, an order for which was placed in England at the beginning of the year.

The third improvement effected was in the provision of proper accommodation for the calves. Two calf sheds were built, the larger one of which was divided into two, one-half holding calves prior to vaccination, the other half calves after the pulp had been collected. The second shed contained a room in which vaccination of the calves and collection of the pulp was carried out, and four stalls for calves during the incubation period.

These improvements had been effected before the arrival in April of a despatch from the Colonial Office embodying the recommendations of the Advisory Medical and Sanitary Committee for Tropical Africa. This Committee advocated a Central Lymph Institute for East Africa and Uganda, to be situated preferably in Uganda, and, as a temporary expedient, that seed lymph should be sent from England for vaccination of paste calves, only lymph from such calves being issued to the public. The strain previously in use in B.E.A. was to be maintained only for further investigation. Other recommendations were made in regard to the preparation of the lymph, but as all these had already been carried out with one exception, it is unnecessary to detail them. The exception was in regard to the storage of the lymph. Dr. Ross was unconvinced that the potency of lymph was maintained by storing the pulp unground with glycerine and water, that this method was retained, but on the receipt of the despatch, the method advocated of grinding the pulp immediately after collection was substituted. No statistics are available to judge the relative value of the two methods.

The method of vaccination of calves now employed in the Laboratory is as follows:—

(1) Heifers 6-12 months old are kept a week or more for feeding up and to determine freedom from disease.

(2) The abdomen of the calf is shaved, scarified, and seed lymph rubbed in.

(3) After 72 hours, the heifers are examined at 24 hours intervals to determine maturation of the vesicles.

(4) When the vesicles are matured, usually about 120 hours after vaccination, the scab is carefully removed from the vesicles, and the vesicles collected.

(5) The pulp so obtained is mixed with twice its weight of glycerine and twice its weight of water, and ground.

(6) The ground lymph is kept in bulk for six days at room temperature, and, following this, for five weeks at 5° C. in the ice chest.

(7) The lymph is then filled into capillary tubes as required for issue.

It is difficult to judge the lymph in the absence of reports. Only one unfavourable one has been received, however, and there is strong reason to believe that the technique of vaccination was at fault and not the lymph. From conversations on the subject with a few medical officers, the lymph is apparently taking quite satisfactorily, though there is no information available as to its immunising qualities.

The question of a combined Lymph Institute for East Africa and Uganda is a question which needs serious consideration. There is no doubt that it would economise staff, but whether it would produce a lymph equally potent in the hot climate of Uganda and in the cold parts of the Highlands of British East Africa remains to be seen. Uganda has consistently complained of the lymph produced in Nairobi both as regards its take and its immunising qualities.

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A second improvement was made by obtaining a local supply of ice from March onwards, and although this only maintained a temperature of about 4° C. in the ice box, this was the best that could be done pending the arrival of an ice plant, an order for which was placed in England at the beginning of the year.

The third improvement effected was in the provision of proper accommodation for the calves. Two calf sheds were built, the larger one of which was divided into two, one-half holding calves prior to vaccination, the other half calves after the pulp had been collected. The second shed contained a room in which vaccination of the calves and collection of the pulp was carried out, and four stalls for calves during the incubation period.

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(5) The pulp so obtained is mixed with twice its weight of glycerine and twice its weight of water, and ground.

(6) The ground lymph is kept in bulk for six days at room temperature, and, following this, for five weeks at 4° C. in the ice chest.

(7) The lymph is then filled into capillary tubes as required for issue.

It is difficult to judge the lymph in the absence of reports. Only one unfavourable one has been received, however, and there is strong reason to believe that the technique of vaccination was at fault and not the lymph. From conversations on the subject with a few medical officers, the lymph is apparently taking quite satisfactorily, though there is no information available as to its immunising qualities.

The question of a combined Lymph Institute for East Africa and Uganda is a question which needs serious consideration. There is no doubt that it would economise staff, but whether it would produce a lymph equally potent in the hot climate of Uganda and in the cold parts of the Highlands of British East Africa is open to grave doubt. Uganda has consistently complained of the lymph produced in Nairobi, both as regards its taking and its immunising qualities.

The Medical Officer of Health, Kampala, states that he had better results with the Dar-es-Salaam lymph. Uganda is now making its own lymph, so no reports on Nairobi lymph since improvements were introduced in its manufacture are available. It is suggested, however, that lymph prepared in a hot climate, such as that of Dar-es-Salaam, works better in the heat of Uganda than lymph produced in the cool climate of Nairobi. Dar-es-Salaam lymph, however, has been tried in Nairobi and proved to be ineffective. It seems possible, therefore, that lymph produced in a hot climate is unsuitable for use in a cool climate. Certainly it is a matter to be enquired into before attempting to produce a lymph for B.E.A. in a Central Lymph Institute situated in Uganda. Otherwise B.E.A. might be in the same position that Uganda was with Nairobi lymph. Another fact which has been recorded by medical officers both in Uganda and in B.E.A. is that cases who have previously had small-pox have been successfully vaccinated. The writer himself has seen five cases of confluent small-pox in natives who were well marked by an attack of small-pox only two and three years previously, one of these cases dying. In view of these observations, it is within the bounds of possibility that more than one strain of small-pox exists, and this is a matter also requiring investigation before it is [illegible] one strain of calf lymph will serve [illegible] East Africa.

One of the main problems in connection with [illegible] transport from the Laboratory to the centre where it is [illegible] It is well known that glycerinated lymph rapidly loses [illegible] fallen off the second year of its storage. [illegible] duced lymph dried in sugar over concentrated sulphuric acid by the method of Arbuthnot and Marie Phisalix, and also dried [illegible] called aseptolin. This lymph [illegible] found to retain its [illegible] properties for two years [illegible] has been issued to the hospitals in Northern Rhodesia. Only a very [illegible] considerable time, and has apparently given satisfaction. [illegible] also been supplied to the Administration, Tanganyika Territory, [illegible] June, 1915, to date. It is, however, more wasteful in use and

requires more skill in making up on the part of the vaccinator. It has therefore not attained any great popularity in places where glycerinated lymph has been in use. One of the disadvantages that has occurred has been the breaking of the exhausted ampoules in the post. It is hoped to rectify this shortly by filling the ampoules with an inert gas after exhaustion. In the West African Colonies lanolinated lymph has been much used and is apparently more resistant to heat than glycerinated lymph. An attempt was therefore made to manufacture it in Nairobi. Only a small quantity was prepared, as only commercial lanoline was available, and although it was purified [illegible] far as could be done with the apparatus available, [illegible] existed as to its freedom from chlorine and free [illegible] the doubts were justified, as it was a complete fa[illegible] ever, hoped to make a further attempt as soon [illegible] available from England.

MALARIA.

[illegible] shows the incidence of malaria in [illegible] with the rainfall. As previously noted in the Annual Report from the Laboratory, there was a large increase in the number of cases of malaria following the long rains in March and April. Usually there [illegible] following the short rains but as these rains were [illegible] there was not [illegible] in the malaria curve.

As regards the [illegible] malaria was very [illegible] the number of cases of the benign tertian type. In 1918 there were [illegible] cases of benign tertian malaria and 435 cases of subtertian malaria. In 1919 there were [illegible] cases of the former and 500 cases of the latter. This change is [illegible] probably due to the demobilization of military units amongst which the incidence of [illegible] was formerly very high.

A survey of the spleen index amongst natives [illegible] is very necessary as also [illegible]

survey showing the distribution of the various mosquitoes, particularly the varieties known to carry malaria.

	Benign Tertian Malaria.	Quartan Malaria.	Subtertian Malaria.	Crescents.	Large Mononuclear (Endothelial) and Transitional Leucocytes.	Total cases showing parasites of Malaria.	Total rainfall, Noumea, in inches.
January	7	2	17	1	2	28	9·24
February	8	1	32	4	—	41	3·22
March	6	—	39	4	—	45	7·69
April	8	—	36	2	1	43	6·88
May	4	—	38	1	—	42	3·46
June	28	1	154	2	2	173	0·22
July	18	—	100	4	4	122	2·43
August	8	2	50	5	1	58	1·12
September	6	1	31	3	1	42	4·34
October	9	3	28	2	2	30	3·64
November	6	1	14	2	—	18	3·35
December	1	1	13	1	1	22	1·85
TOTAL	98	12	540	31	23	664	36·24

C. TYPHOID AND ALLIED FEVERS.

A small outbreak of typhoid fever occurred in the spring. Practically all these cases yielded B. typhosus on cultivation of the blood. The method used was to add 5 cc. of the patient's blood drawn aseptically from a vein, to 10 cc. of sterilized ox bile in a test tube, and keeping for 24 hours at 37° C., plating out a loopful of the culture on to a MacConkey's plate and testing any resultant growth by agglutination with B. typhosus serum, and by sugar reactions. A positive result may be given in 48 hours, and therefore if the blood be taken in the early days of the disease, may be earlier than the Widal reaction.

The agglutination test (Widal reaction) for typhoid and allied

fevers has given much ground for thought during the year. It is the exception rather than the rule, in the cases tested, to find a positive result with the test before the end of 14 days, even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101° to 104° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time quite negative) in a dilution of 1/180, the spleen, which had almost disappeared, enlarged again, and rose spots appeared. It is difficult to believe that the second febrile period was dissociated in its causation from the first. In the spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred, however, in the mild cases, which have appeared since, and this explanation must therefore be considered insufficient. Furthermore, some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

All the European cases which were positive by a blood culture yielded a bacillus agglutinating in high dilutions with the standard anti-typhoid serum, and giving the sugar reactions of a typical B. typhosus. The remaining European cases which were diagnosed by the results of the agglutination reaction, gave positive reactions with B. typhosus only.

During the year there were four cases of paratyphoid fever diagnosed by the Widal reaction, two being positive to B. paratyphosus α and two to B. paratyphosus β. All four cases were in natives, and blood cultures were unsuccessful.

survey showing the distribution of the various mosquitoes, particularly the varieties known to carry malaria.

	Benign Tertian Malaria.	Quartan Malaria.	Subtertian Malaria.	Concerta.	Large Mononuclear (Endothelial) Leucocytes.	Total cases showing parasites or evidence of Malaria.	Total rainfall, Inches, in decine.
January	7	2	17	1	2	28	0·24
February	8	5	32	4	—	41	3·22
March	9	—	39	4	—	45	7·69
April	6	—	36	2	1	43	6·88
May	4	—	38	1	—	42	3·46
June	23	—	154	2	2	173	0·22
July	17	—	100	4	1	122	2·43
August	8	2	50	5	3	58	1·12
September	6	1	31	3	1	42	2·24
October	9	3	28	3	2	30	3·64
November	6	—	12	6	—	18	3·35
December	1	1	13	1	7	22	1·85
Total	99	14	540	31	23	664	36·24

6. TYPHOID AND ALLIED FEVERS.

A small outbreak of typhoid fever occurred in the spring. Practically all these cases yielded B. typhosus on cultivation of the blood. The cultural method was to add 5 cc. of the patient's blood drawn [illegible] from a vein to 10 cc. of sterilised ox bile in a test tube, incubating for 24 hours at 37° C., plating out a loopful of the culture on to a MacConkey plate and testing any resultant growth serologically with B. typhosus serum, and by sugar reactions. A positive result can be got in 48 hours, and therefore if the blood was taken at the early days of the disease, much earlier than the Widal reaction.

The agglutination test (Widal reaction) for typhoid and allied

fevers has given much ground for thought during the year. It is the exception rather than the rule, in the cases tested, to find a positive result with the test before the end of 14 days, even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101° to 104° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time quite negative) in a dilution of 1/180, the spleen, which had almost disappeared, enlarged again, and rose spots appeared. It is difficult to believe that the second febrile period was dissociated in its causation from the first. In the spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred, however, in the mild cases, which have appeared since, and this explanation must therefore be considered insufficient. Furthermore, some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

All the European cases which were positive by a blood culture yielded a bacillus agglutinating in high dilutions with the standard anti-typhoid serum, and giving the sugar reactions of a typical B. typhosus. The remaining European cases which were diagnosed by the results of the agglutination reaction, gave positive reactions with B. typhosus only.

During the year there were four cases of paratyphoid fever diagnosed by the Widal reaction, two being positive to B. paratyphosus *a* and two to B. paratyphosus *B*. All four cases were in natives, and blood cultures were unsuccessful.

survey showing the distribution of the various mosquitoes, particularly the varieties known to carry malaria.

	Innes Turned Malaria.	Costata Malaria.	Subpictus Malaria.	Culicifacies.	Large Myzomyias (Fauces and Listonella)	Total cases showing presence of Malaria.	Total rainfall, Nainital, inches.
January	7	2	17	1	2	28	0·24
February	8	1	32	4	1	41	3·22
March	6		30	4		45	7·69
April	6		30	6	1	43	6·88
May	4		38	1		42	3·46
June	23	1	154	2	2	173	0·22
July	17		100	4	4	122	7·43
August	9	2	50	5	1	58	1·12
September	2	1	31	3	3	42	2·34
October	9	3	23	2	2	30	3·63
November	6		12	1		18	3·35
December	1	1	13	1	1	22	1·85
Total	93	12	540	34	22	664	39·43

c. TYPHOID AND ALLIED FEVERS.

A small outbreak of typhoid fever occurred in the spring. Practically all these cases yielded B. typhosus on cultivation of the blood. The method used was to add 5 cc. of the patient's blood [illegible] or from a vein, to 10 cc. of sterilised ox bile in a test tube, incubating for 24 hours at 37° C., plating out a loopful of the culture on to a MacConkey plate and testing any resultant growth by the Widal with B. typhosus serum, and by sugar reactions. A positive result can be given in 48 hours, and therefore if the blood was taken during the early days of the disease much earlier than the Widal reaction.

The agglutination test (Widal reaction) for typhoid and allied fevers has given much ground for thought during the year. It is the exception rather than the rule, in the cases tested, to find a positive result with the test before the end of 14 days even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101° to 102° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time quite negative) in a dilution of 1/180, the spleen, which had almost disappeared, enlarged again, and rose spots appeared. It is difficult to believe that the second febrile period was dissociated in its causation from the first. In the spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred, however, in the mild cases, which have appeared since, and this explanation must therefore be considered insufficient. Furthermore, some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

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During the year there were four cases of paratyphoid fever diagnosed by the Widal reaction, two being positive to B. paratyphosus A and two to B. paratyphosus B. All four cases were in adults, and blood cultures were unsuccessful.

survey showing the distribution of the various mosquitoes, particularly the varieties known to carry malaria.

	Benign Tertian Malaria.	Quartan Malaria.	Subtertian Malaria.	Crescents.	Large Mononuclear & Transitional Forms.	Total cases showing parasites or evidence of Malaria.	Total rainfall, Nairobi, inches.
January	7	2	17	1	2	28	0·24
February	8	1	32	4	—	41	3·22
March	6	—	39	4	—	45	7·69
April	6	—	36	2	1	43	6·88
May	4	—	38	1	—	42	3·46
June	83	3	154	2	2	173	0·22
July	18	—	106	4	4	122	2·43
August	9	2	90	5	1	58	1·12
September	8	1	31	1	1	42	2·14
October	9	3	20	2	2	30	3·64
November	6	—	14	3	—	18	3·35
December	1	1	13	1	—	22	1·85
TOTAL	95	12	540	31	23	664	36·24

C. TYPHOID AND ALLIED FEVERS.

A small outbreak of typhoid fever occurred in the spring. Practically all these cases yielded B. typhosus on cultivation of the blood. The method used was to add 5 cc. of the patient's blood drawn aseptically from a vein to 50 cc. of sterilised ox bile in a test tube, incubating for 24 hours at 37° C., plating out a loopful of the culture on to a MacConkey plate and testing any resultant growth by agglutination with B. typhosus serum, and by sugar reactions. A provisional result could thus be given in 48 hours, and therefore if the blood was taken in the early days of the disease, much earlier than the Widal reaction.

The agglutination test (Widal reaction) for typhoid and allied

fevers has given much ground for thought during the year. It is the exception rather than the rule, in the cases tested, to find a positive result with the test before the end of 14 days even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101° to 104° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time quite negative) in a dilution of 1/180, the spleen, which had almost disappeared, enlarged again, and rose spots appeared. It is difficult to believe that the second febrile period was dissociated in its causation from the first. In the spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred, however, in the mild cases, which have appeared since, and this explanation must therefore be considered insufficient. Furthermore, some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

All the European cases which were positive by a blood culture yielded a bacillus agglutinating in high dilutions with the standard anti-typhoid serum, and giving the sugar reactions of a typical B. typhosus. The remaining European cases which were diagnosed by the results of the agglutination reaction, gave positive reactions with B. typhosus only.

During the year, there were four cases of paratyphoid fever, diagnosed by the Widal reaction, two being positive to B. paratyphosus *A* and two to B. paratyphosus *B*. All four cases were in natives, and blood culture was unsuccessful.

survey showing the distribution of the various mosquitoes, particularly the varieties known to carry malaria.

	Benign Tertian Malaria.	Quartan Malaria.	Subtertian Malaria.	Crescents.	Large Mononuclear (Hyaline) and Transitional Leucocytes.	Total cases showing parasites or evidence of Malaria.	Total rainfall, Nairobi, in inches.
January	7	2	17	1	2	28	0·24
February	8	1	32	4	—	41	3·22
March	6	—	39	4	—	45	7·69
April	6	—	36	2	1	43	6·88
May	4	—	38	1	—	42	3·46
June	8	—	154	2	2	173	0·22
July	17	—	100	4	1	122	2·43
August	8	2	90	5	1	58	1·12
September	2	1	37	1	3	42	2·14
October	9	3	18	2	2	30	3·64
November	6	—	12	2	—	18	3·35
December	1	1	13	1	—	22	1·85
TOTAL	82	14	540	31	23	664	36·24

C. TYPHOID AND ALLIED FEVERS.

A small outbreak of typhoid fever occurred in the spring. Practically all these cases yielded B. typhosus on cultivation of the blood. The method used was to add 5 c.c. of the patient's blood (taken aseptically from a vein) to 50 c.c. of sterilised ox bile in a test tube, incubate for 48 hours at 37° C., plating out a loopful of the culture on to a MacConkey plate and testing any resultant growth by direct agglutination with known B. typhosus serum, and by sugar reactions. A positive result could thus be given in 48 hours, and therefore if the blood was taken in the early days of the disease much earlier than the Widal reaction.

The agglutination test (Widal reaction) for typhoid and allied

fevers has given much ground for thought during the year. It is the exception rather than the rule, in the cases tested, to find a positive result with the test before the end of 14 days even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101° to 104° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time quite negative) in a dilution of 1/180, the spleen, which had almost disappeared, enlarged again, and rose spots appeared. It is difficult to believe that the second febrile period was dissociated in its causation from the first. In the spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred, however, in the mild cases, which have appeared since, and this explanation must therefore be considered insufficient. Furthermore, some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

All the European cases which were positive by a blood culture yielded a bacillus agglutinating in high dilutions with the standard anti-typhoid serum, and giving the sugar reactions of a typical B. typhosus. The remaining European cases which were diagnosed by the results of the agglutination reaction, gave positive reactions with B. typhosus only.

During the year there were four cases of paratyphoid fever diagnosed by the Widal reaction, two being positive to B. paratyphosus *a* and two to B. paratyphosus *B*. All four cases were in natives, and blood cultures were unsuccessful.

survey showing the distribution of the various mosquitoes, particularly the varieties known to carry malaria.

	Benign Tertian Malaria	Quartan Malaria	Subtertian Malaria	Crescents	Large Mononuclears (Hyaline) and Pigmented Leucocytes	Total cases showing parasites or evidence of Malaria	Total cases N. Nairobi, Injections
January	7	1	17	1	2	28	0·24
February	30	1	32	4		41	3·22
March	6	1	39	4		45	7·69
April ..	16	2	36	2	1	43	6·88
May ..	8	1	31	1		42	3·40
June ..	13	4	154	16	4	175	0·22
July ..	10	1	106	14	3	124	2·43
August	5	2	50	5	1	63	1·14
September	1	1	31	3	1	37	2·14
October	9	1	18	2	1	30	3·12
November	6		12	2		18	2·41
December	13	1	13	4	2	32	1·85
TOTAL	124	15	540	58	22	704	36·24

C. TYPHOID AND ALLIED FEVERS

A small outbreak of typhoid fever occurred in the spring. Practically all the cases yielded B. typhosus on cultivation of the blood. The method used was to add 5 cc. of the patient's blood drawn aseptically from a vein to 100 cc. of sterilized ox bile in a test tube, incubating for 24 hours at 37° C., plating out a loopful of the mixture on to a MacConkey plate and testing any resultant growth against a known B. typhosus serum, and by sugar reactions. A diagnosis could thus be given in 48 hours and therefore, if the blood was taken in the early days of the disease, much earlier than the Widal reaction.

The agglutination test (Widal reaction) for typhoid and allied fevers has given much ground for thought during the year. It is the exception rather than the rule, in the case of, to find a positive result with the test before the end of 14 days, even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101° to 102° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time quite negative) in a dilution of 1/180, the spleen, which had almost disappeared, enlarged again, and rose spots appeared. It is difficult to believe that the second febrile period was dissociated in its causation from the first. In the spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred, however, in the mild cases which have appeared since, and this explanation must therefore be considered insufficient. Furthermore, some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

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During the year there were four cases of paratyphoid fever diagnosed by the Widal reaction, two being positive to B. paratyphosus α and two to B. paratyphosus β. All four cases were in natives, and blood cultures were unsuccessful.

(D) DYSENTERY.

The number of dysenteric stools sent to the Laboratory for examination has markedly diminished during this year, and this is apparently coincident with a diminution in the incidence of the disease in Nairobi itself. It is difficult to account for this, as sanitary conditions have not changed during the year as far as can be seen. Possibly it may be associated with the closing of the military camps and hospitals. This, however, would account only for a diminution in the number of imported cases [illegible]

[illegible] when [illegible]

[illegible] in this country still [illegible]

[illegible] [illegible]lly exists in Nairobi for the spread [illegible] Every [illegible] cases and in other years there are [illegible] carriers, both [illegible] and [illegible] [illegible] Asiatics, to [illegible] always present [illegible] of these carriers [illegible] another factor [illegible] the propagation of the disease.

The type [illegible] of dysentery has altered. During the period of the [illegible] [illegible] form of dysentery was bacillary [illegible] [illegible] gradually diminished, so that during the whole [illegible] dysentery bacillus was [illegible] Flexner. On the other hand [illegible] The protozoa [illegible]

[illegible] of dysentery [illegible] to the Laboratory [illegible] true criterion [illegible] the [illegible]

obtain for such a disease. The question of dysentery and dysenteric carriers in the native reserves is one requiring investigation, particularly as to the amount of disability it causes, and as to the type of the disease, amoebic or otherwise. Until that is done we can form no true opinion on the epidemiology of the disease and its prevention.

(E) HELMINTHIASIS.

This is a question of the utmost importance to the health of the [illegible] yet been realised to what an extent natives [illegible] what an amount of disability arises [illegible] performed at Kisumu in 1918 by Dr. [illegible] worms. In [illegible] post-mortems per[illegible] Hospital, Nairobi [illegible] showed [illegible] were infected [illegible] Carrier [illegible] examined by Dr. [illegible] natives [illegible] 745 dysentery cases examined by the [illegible] 538 showed infection, while in 200 post-mortems on non-dysenteric cases, helminths were found in [illegible] In 473 carrier corps recruits, i.e., men who had just come from the reserves and been passed as fit for active service, who contracted dysentery, [illegible] were infected with worms, and of 819 stools examined for helminths in the Laboratory during 1919, [illegible] gave positive results. This percentage is low, however, since the positive results were increased by stools [illegible] for examination after anthelminthic treatment, the majority of [illegible] being negative. Although it is extraordinary how little some natives seem to be affected even by very heavy worm-infections, yet there is little doubt that such infections reduce markedly the man's resistance to disease, particularly to intestinal disease, and also reduce a man's capacity for hard work. The subject is one which requires a considerable amount of investigation, not only as to the actual incidence of [illegible] the natives in the reserves, but also as to the [illegible] Undoubtedly many [illegible] to the reserves [illegible] with the same [illegible] of the

As regards the actual findings in the Laboratory during [illegible] the number of stools in which the various worms or their ova were found, was as follows:—

1,788 stools examined.

Ova of A. duodenale were found in 161 cases = 19·9%
" " T. saginata were found in 123 cases. = 15·0%
" " T. trichiura were found in 75 cases = 9·2%
" " A. lumbricoides were found in 31 cases = 3·8%
" " S. mansoni were found in 15 cases = 1·8%
Larvæ of S. stercoralis were found in 9 cases. = 1·1%

Double infections occurred in 54 cases = 6·6%. They were as follows:—

Ova of A. duodenale and T. saginata, 32 cases.
" " A. duodenale and T. trichiura, 9 cases.
" " T. saginata and T. trichiura, 2 cases.
" " A. duodenale and A. lumbricoides, 5 cases.
" " A. lumbricoides and T. trichiura, 1 case.

Triple infections occurred in 18 cases = 2·2%. They were as follows:

Ova of A. duodenale, T. saginata and T. trichiura, 13 cases.
" " A. duodenale, A. lumbricoides and T. trichiura, 5 cases.

At the beginning of the year the occurrence of bilharzia in natives living close to Nairobi on shambas, suggested the possibility of the source of their infection being the local streams, and the systematic examination of the streams around Nairobi was commenced. This perforce ceased in November when the duties of the R.S.O. European Hospital fell on the Senior Bacteriologist. Up to that time, however, the search for infected snails was abortive, all examined proving negative.

(F) PYREXIAS.

During the year there have occurred several cases of fever in which the pyrexia has lasted for three or more weeks. In some the initial pyrexia was high, about 104° F., but this was especially

[illegible] the pyrexia was comparatively [illegible] ranging from 99° to 101° F. In all these cases, except for a slightly enlarged and tender spleen, there were very few other symptoms. Slight headache, slightly furred tongue, and in a few cases a slight feeling of malaise, were all the symptoms that were noticed. The Widal reaction was consistently negative to B. typhosus, to B. paratyphosus A and B, and to M. melitensis. Blood culture failed in every case, except for one child from whose blood a staphylococcus was isolated. This was agglutinated by the patient's serum in a dilution of 1 in 150. As the staphylococcus corresponded to S. albus, it may have been a contamination, and the high agglutinin content of the patient's serum a coincidence. It is intended to conduct further investigations into these anomalous fevers as soon as staff and accommodation are available.

(G) RHEUMATOID ARTHRITIS.

This subject is still under investigation. Five cases have come up for vaccine treatment during the year. The first of these was in a young man who had suffered for some years, and was getting progressively worse. The left shoulder was immovable, his right wrist had practically no movement, and his elbows were only movable to a limited extent. His feet had become so painful at times as to prevent him walking. His pain and disability were worse in wet weather. There was no sign of pyorrhœa or gonorrhœa, and no history of any previous venereal disease. From his stool eight or nine lactose-fermenting bacilli were isolated. These were tested against the patient's serum, and one of them was agglutinated in a dilution of 1 in 300 of the serum. From this bacillus a vaccine was made up and inoculations were commenced with a dose of 10 million bacilli. In a week's time the dose was doubled, and the doubling of the dose was continued at intervals of 10 to 14 days. After four injections the patient said he felt better, after six injections there was a little increase in movement in the affected joints, and after ten injections the amount of recovery in the wrists was remarkable. At the same time swelling conditions ceased to affect the pain. After 20 injections the patient was leaving very well, he had recovered a considerable amount of movement in his wrists,

C

and all pain had disappeared. Some time after this patient began to recover, a lady case in the early stages of rheumatoid arthritis. A bacillus was isolated from her stool, which was agglutinated 1 in 250 by her blood serum. Three injections cured this case completely. No pain and no disability remained. Shortly after this three more cases arrived in rapid succession. These were all much more advanced cases, almost as much so as the first case. They are still under treatment, but already exhibit a good deal of improvement. In all three the vaccine made was from the bacillus in the stool, which was agglutinated by the individual's serum. It would seem that here the arthritis was due to infection from the intestine by a definite bacillus and that such infection could be dealt with by a vaccine. Naturally, once bony changes have taken place in a joint, the most that can be hoped for is the arrest of the disease and partial recovery from the disability. Five cases are of course too few to judge from, and much more work must be done before one can draw any certain conclusions.

(8) WATER ANALYSES.

As stated above, these have occupied much time and thought during the year. The number of such analyses which had been previously carried out were very few, and had been limited practically to plating out on MacConkey's [illegible] bile salt neutral red agar and then isolating lactose fermenters therefrom. When the question of a bacteriological examination of the Nairobi water supply came up, it was found necessary to elaborate the technique, especially as the Principal Sanitation Officer requested that the water might be examined at regular intervals. Consequently it was decided to make the tests as exhaustive as possible without taxing the laboratory staff and equipment too much. Naturally the whole labour of the analyses fell on the Bacteriologist, as it was obviously work which could not be left to Indian assistants unaccustomed to it.

The first examination of the Nairobi water supply was made soon after the reservoir was cleaned out. The supply is obtained from a number of springs at Kikuyu roughly 13 to 14 miles from Nairobi, and the water is collected in a small valley which has a dam built across it. The actual water-basin, which is formed by the floor of the valley, is surrounded by a cement catch-water drain to collect surface water. This catchment drain, at the time of the first examination of the water, was in bad repair, and allowed surface water to leak into the reservoir. The sides of the valley are covered by long grass and bush. A corrugated iron fence runs round the valley, not at the top of the slope, but at a little distance down. Outside this corrugated iron fence there is a horse boma full of dung. The surface water from this is bound to travel down into the valley whenever there is heavy rain. On the top of the hill is situated Kikuyu Station, with a number of native huts. The water from the reservoir passes unfiltered into the main to the reservoir at Nairobi. The reservoir being open requires cleaning every year, owing to the growth of algæ and [illegible] plants. The cleaning is accomplished by draining it out of the main, and sending squads of natives into the reservoir, who [illegible] about in the mud, pull up the plants, and usually remain in the reservoir the whole day. The witnesses state that agitation and defæcation by the natives actually take place in the reservoir. The reservoir is then allowed to fill again, and left for another year. Nairobi, when an outbreak of typhoid occurred in Nairobi soon after the cleaning of the reservoir, the water was suspected [illegible] was never found, but the examination [illegible] the water that various steps were [illegible] It was decided, as an experiment, that [illegible] bleaching powder should be added in certain proportions [illegible] and the fæcal coliforms removed by the addition of [illegible] to the water in the main just beyond the reservoir. This plan has not yet been carried out as no supply of bleaching powder has been available.

The next article to which attention was drawn was the soda [illegible] from the various factories in Nairobi. Some of these factories [illegible] from the sanitary point of view, others were not to [illegible]. Examination of the soda water showed in most cases, however, a high bacterial content, and, unsatisfactory [illegible] coupled [illegible] of the cylinders, [illegible] from the water from the [illegible] what [illegible]

The source of [illegible] two points at which it unquestionably occurred were in the storage of the water after filtration in an open tank exposed to dust, etc., and in the use of bottles cleaned out with Nairobi water by means of a wire brush of doubtful cleanliness. Since the discovery that the soda water was liable to contamination, control of the factories has been maintained by bacteriological examinations at regular intervals.

The main difficulty has been the fixing of some standard by which the purity of the water could be judged. It is obvious that [illegible] may be large owing to their entrance into the [illegible] but in a water [illegible] pollution [illegible] coli [illegible] factory [illegible] a high standard and found that [illegible] afforded to it either by the provision of a [illegible] followed by filtration, or by chemical [illegible] which lays down in his book, "The Examination of [illegible] and Water Supplies" that

"Upland and moorland surface waters, collected in reser[illegible] may be regarded as [illegible] if they afford no [illegible] of the presence of the bacillus coli communis in 10 c.c. [illegible] especially if the B. [illegible] progenes cannot be detected [illegible] 1/10 c.c. p[illegible]

Again, he states as follows:

"The results [illegible] upon standing waters for the [illegible] B. coli [illegible] and for the spores of B. enteritidis [illegible] progenes may be grouped as under:

"1. Waters 100 c.c. of which contain no [illegible] capable [illegible] of fermenting bile-salt glucose broth, and which contain no [illegible] of the B. [illegible] or its allies in 250 c.c. [illegible] afford no [illegible] of which contain no [illegible] bile-salt glucose broth [illegible] bile [illegible] ...ough the [illegible] spores of B. enteritidis sporogenes and its allies. Waters of this character are very common. They are not of so high a degree of bacterial purity as those of Group 1, but they afford no evidence of contamination with sewage, manure, or surface water.

"4. Waters 100 c.c. of which contain bacteria capable of fermenting bile-salt glucose broth, but not lactose broth, and giving the milk reaction for B. enteritidis sporogenes and its allies. Such waters will almost invariably prove to be more or less affected by admixture with surface water or imperfectly filtered subsoil water.

"Waters giving with 100 c.c. or less the presumptive [illegible] inflammatory reactions for the presence of colon bacilli but not containing the true B. coli (flagellar, saccharic, and stercoric) acid not giving the B. enteritidis sporogenes reaction with the milk test. These waters give indications of surface relationship or of being derived from subsoil which has been affected by manurial matter. Whilst not attributing signs of dangerous pollution, some knowledge of the source would be required before giving a definite opinion. Repeated analyses should also be made, and especially of samples collected after heavy rainfalls.

"6. Waters as Group 5, but containing also the B. enteritidis sporogenes in 250 c.c. or under. These waters give a decisive indication of the presence of impurities derived from [illegible] sources and inquiries and inspections should be made before giving any definite opinion.

"7. Waters containing bacteria of the true colon type, but [illegible] spores of B. enteritidis sporogenes in 250 c.c.

"Here the question of relative abundance and the source of the water have to be taken into consideration. The majority

give rise to endless [illegible] ... yet
manifest. The water may contain colon bacilli in 1 c.c. and yet
manifest. The water may contain colon bacilli in 1 c.c. and yet
be derived from a source beyond the risk of pollution, or it
may only contain a single colon bacillus in 100 c.c. and yet
have come from a dangerous source. If the B. coli is not found
in 20 c.c., and streptococci cannot be found in 50 c.c., or B.
enteritidis sporogenes in 500 c.c., the pollution at the time the
sample was taken could scarcely have been of a dangerous
character; but further examinations alone can tell whether more
serious contamination ever occurs. Moorland and upland waters
may not reach even this standard, and yet be perfectly whole-
some, if the source upon examination is found free from the
risk of contamination by human beings.

"8. Waters containing both B. coli and the spores of B.
enteritidis sporogenes. Such waters must be regarded as con-
taminated with sewage or manurial matter, but whether danger-
ous or not can only be ascertained (if at all) by an examination
of the source. I have known the presence of a large number
of gulls on a reservoir cause pollution of this character. I could
not say that the water was unwholesome, but it enabled me to
press the necessity for careful filtration.

"It is perfectly obvious that a chemical or bacteriological
examination of a sample of water can only justify an opinion
upon that particular sample, and not upon the source from which
it was obtained. Yet a large number of people who send odd
samples of water for examination conclude that if the report is
satisfactory the source is also satisfactory. It is quite true
that if the water is found to be polluted, the source is unsatis-
factory (assuming that the sample was properly taken), but it
does not follow that if the sample is of good quality the source
is a safe one from which to derive water. The source
which yielded the impure sample may be inherently unsatis-
factory and incapable of being made satisfactory, or, on the
other hand, it may admit of being adequately protected, possibly
with very little trouble or expense." (Loc. cit. p. 234).

[illegible] to 22 and [illegible]
[illegible] and B. enteritidis [illegible] allied organism in soda-
[illegible] from the [illegible] of the collecting vessels is obviously
open to pollution with sewage or manurial matter, it has seemed best
to condemn its use in an unboiled-tested and filtered condition.

As regards soda waters, inasmuch as [illegible] are supposed to be
subject to adequate filtration, it [illegible] customary to demand
that no colonies should grow on [illegible] bile-salt neutral red agar
from 1 c.c. and that B. coli, streptococci and B. enteritidis sporogenes
should be absent from 50 c.c. With the present Laboratory equip-
ment and staff the testing of larger quantities of water, except in
special cases, is impossible as a routine measure. The soda water
from two of the factories has given consistently good results after
bacteriological control of soda water was instituted, except for one
sample from the Uganda Railway Soda Water Factory. This was
traced to dirty bottles, and since adequate methods of cleaning
returned empties were instituted, the soda water from this factory
has been practically sterile.

In appendix II. will be found a summary of the results of the
various water analyses.

W. H. KAUNTZE,
Senior Bacteriologist, E.A.P.

APPENDIX II

1	Nairobi main	2	4,833	4,800	336	28-180	<20	20-100
2	Nairobi parks		413		400	28-48	<20	<20
3	Nairobi dairy			33	9	<20	<20	<20
4	Soda water				324	1,000-10,000	<20	<20
5	Geothermal				401	1,000-10,000	<20	<20
6	Well, Kabete				501	700-1,000	<20	<20
7	Spring, Kabete				975	100-1,000	<20	<20
8	Kabete				825	990-1,000	<20	>100
9	[illegible]							
10	[illegible]							
11	[illegible]				300	100-1,000	<20	20-100
12	[illegible]				338	100-1,000	<20	<20
13	[illegible]				1,413	20-100	<20	<20
14	[illegible]				17	10-100	<20	<20
15	[illegible]				30	10-100	<20	<20
16	[illegible]							
17	[illegible]		210	1,000	31	20-40,000	1,000-10,000	>100
18	[illegible]		90	90	5	100-1,000	<20	<20
19	[illegible]		1,340	1,188	8	1,000-10,000	<20	<20
20	[illegible]		130	550	8	100-1,000	<20	<20
21	[illegible]		30	130	5	100-1,000	<20	>100
22	Nairobi main		70	160	77	1,000-10,000	<20	20-100
23	Soda water			168	15	1,000-10,000	<20	<20
24	Soda water			90	5	<20	<20	<20
25	Soda water			90	5	<20	<20	<20
26	Soda water			150	5	<20	<20	<20
27	Nairobi main		30	1,020	36	100-1,000	<20	20-100
28	Nairobi main		20	768	40	1,000-11,100	<20	>100
29	Soda water			2,280	41	1,000-10,000	<20	<20
30	Nairobi main		60	114	41	100-1,000	<20	20-100
31	Soda water			114	41	20-100	<20	<20
32	Soda water			228	41	<20	<20	<20
33	Nairobi main		170	187	44	100-1,000	<20	>100
34	Filtered water		600	700	44	<20	<20	<20
35	Soda water		300		53	1,000-10,000	<20	<20
36	Well, Kabete		150		58	2,000-10,000	<20	>100
37	Spring, Kabete		330		274	1,000-10,000	<20	>100
38	Kabete		150			1,000-10,000	<20	>100
39	Soda water					<20	<20	<20
40	Soda water				20	<20	<20	<20
41	Soda water				20	<20	<20	<20
42	Soda water				20	<20	<20	<20
43	Soda water				20	<20	<20	<20
44	[illegible]				40	100-1,000	<20	>100
45	[illegible]				113	<20	<20	<20
46	[illegible]					<20	<20	<20
47	[illegible]				198	20-100	<20	<20

[illegible] the number of [illegible] from the supply [illegible] quantities supplied in litres

[illegible] the [illegible] range of the returned supply

APPENDIX [illegible]

Serial No.	Source	Colonies on Gelatine per cc. 3 days	Colonies on Agar per c.c. 48 hours	Colonies on [illegible] per 100 c.c. 48 hours	B. coli per 100	[illegible] per 100	[illegible] per 100
1	Nairobi main	1,255	3,000	336	20–100	<20	20–100
[illegible]	[illegible] water	155	[illegible]	400	20–100	<20	<20
[illegible]	Soda water	[illegible]	15	9	<20	<20	<20
[illegible]	Soda water	[illegible]	[illegible]	324	1,000–10,000	<20	<20
[illegible]	Ginger ale	[illegible]	[illegible]	401	1,000–10,000	<20	<20
[illegible]	[illegible]	[illegible]	[illegible]	801	100–1,000	<20	<20
[illegible]	[illegible]	[illegible]	[illegible]	925	100–1,000	<20	<20
[illegible]	[illegible]	[illegible]	[illegible]	425	100–1,000	<20	>100
10	[illegible] reservoir [illegible] tank	[illegible]	[illegible]	[illegible]	100–1,000	<20	20–100
[illegible]	[illegible]	[illegible]	118	[illegible]	100–1,000	<20	<20
[illegible]	[illegible] water	[illegible]	[illegible]	[illegible]	20–100	<20	<20
[illegible]	Soda water	[illegible]	[illegible]	[illegible]	[illegible]–100	<20	<20
[illegible]	Soda water	[illegible]	[illegible]	[illegible]	?	[illegible]	?
[illegible]	[illegible] water	[illegible]	[illegible]	[illegible]	[illegible]–10,000	1,000–10,000	>100
[illegible]	[illegible] water	[illegible]	40	[illegible]	[illegible]–1,000	<20	<20
[illegible]	[illegible] water	1,[illegible]	1,188	[illegible]	[illegible]–10,000	<20	<20
[illegible]	[illegible] water	[illegible]	750	[illegible]	100–1,000	<20	<20
[illegible]	[illegible] reservoir	[illegible]	130	55	100–1,000	<20	>100
[illegible]	Nairobi main	[illegible]	160	70	1,000–10,000	<20	20–100
[illegible]	Soda water	[illegible]	[illegible]	45	1,000–10,000	<20	<20
[illegible]	Soda water	[illegible]	140	[illegible]	<20	<20	[illegible]
[illegible]	Soda water	[illegible]	[illegible]	[illegible]	<20	<20	[illegible]
[illegible]	Soda water	[illegible]	254	[illegible]	<20	<20	[illegible]
[illegible]	Nairobi main	40	1,030	[illegible]	100–1,000	<20	[illegible]
25	Nairobi main	120	[illegible]	40	1,000–10,000	<20	>100
26	Soda water	47	[illegible]	[illegible]	1,000–[illegible]	<20	<20
27	Nairobi main	[illegible]	135	45	100–1,000	<20	20–100
28	Soda water	[illegible]	[illegible]	[illegible]	20–100	<20	[illegible]
29	Soda water	[illegible]	[illegible]	[illegible]	<20	<20	[illegible]
30	Nairobi main	[illegible]	[illegible]	[illegible]	100–1,000	[illegible]	>100
[illegible]	Filtered water	[illegible]	[illegible]	[illegible]	<20	[illegible]	[illegible]
[illegible]	Soda water	[illegible]	[illegible]	13	[illegible]	[illegible]	[illegible]
[illegible]	Well, Kabuga	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Spring, Kabuga	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Nairobi main	[illegible]	[illegible]	[illegible]	[illegible]–10,000	<20	[illegible]
[illegible]	Soda water	[illegible]	[illegible]	[illegible]	<20	<20	<20
[illegible]	Soda water	[illegible]	[illegible]	[illegible]	<20	<20	<20
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<20	<20	<20
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<20	<20	<20
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<20	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100–1,000	<20	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]–10,000	[illegible]	[illegible]

[illegible] after the [illegible]

[illegible] 16, 26, 27 [illegible]

[illegible] the [illegible] of the filtered supply

APPENDIX II

Sample No.	Source	Colonies Gelatine per c.c. 7 days	Colonies Agar per c.c. 48 hours	Colonies B.Coli per c.c.	B. coli per litre	Temperature on filter	Remarks (Bacteriological report)
1	Waterfall main	4,333	5,000	356	20-100	<20	20-100
	Well, garden	475		400	20-100	<20	<20
	Rain water		15	0	0	<20	<20
	Soda water			324	1,000-10,000	<20	<20
	Ginger ale			401	1,000-10,000	<20	<20
	Spring			501	100-1,000	<20	<20
	Spring			923	100-1,000	<20	<20
	Well			820	100-1,000	<20	>100
	Well, Bank						
		300	870		1000-10,000	<20	20-100
			330	340	100-1,000	<20	<20
					10-100	<20	<20
					1-10	<20	<20
		670	1050		1000-10,000	<20	>100
		105	50		1-10	<20	<20
		350	1150		10,000-12,000	<20	<20
		130	125		100-1,000	<20	<20
		90	130		100-1,000	<20	>100
		90	100		1,000-10,000	<20	20-100
	Soda water		150		1,000-10,000	<20	<20
	Soda water		8		<20	<20	<20
	Soda water		8		<20	<20	<20
	Soda water		8		<20	<20	<20
	Soda water				100-1,000	<20	<20
	Well water		25	25	100-1,000	<20	>100
	Artesian well	20	60	6	100-1,000	<20	>100
	Soda water				1,000-10,000	<20	<20
	Mineral water				100-1,000	<20	>100
	Soda water				10-100	<20	<20
	Soda water		125		<20	<20	<20
	Nursing mother		8		10-100	<20	>100
	Filtered water	100	8	25	<20	<20	<20
	Soda water	100				<20	<20
	Well, Kalinga	170	8	8	1-10	<20	20
	Spring, Kalinga	130		124	1-10	<20	<20
	Garden	225			100-1,000	<20	20
	Soda water	150			<20	<20	<20
	Soda water				<20	<20	<20
	Soda water			30	<20	<20	<20
	Soda water			0	<20	<20	<20
	Soda water	0		60	<20	<20	<20
	Well	0	8	25	100-1,000	<20	<20
				13	<20		
					<20		
					100-1,000		

APPENDIX II.

Serial No.	Source	Colonies on Gelatine per c.c. 3 days.	Colonies on Agar per c.c. 48 hours.	Colonies on L.B.A. per c.c. 48 hours.	B. coli per litre.	Streptococci per litre.	Clostridium sporogenes per litre.
1	Nairobi main	2,335	3,080	336	20–100	<20	20–100
	[illegible] water	175		400	20–100	<20	<20
	Soda water	6	15	9	<20	<20	<20
	Soda water			324	1,000–10,000	<20	<20
	[illegible]			401	1,000–10,000	<20	<20
	Soda water	2		801	100–1,000	<20	<20
	[illegible]			925	100–1,000	<20	<20
	[illegible]		10	820	100–1,000	<20	>100
	[illegible] reservoir						
	[illegible] tank	300	970		100–1,000	<20	20–100
	[illegible]		338	260	100–1,000	<20	<20
	[illegible] water		[illegible]		20–100	<20	<20
	Soda water		[illegible]	[illegible]	20–100	<20	<20
	Soda water		[illegible]	[illegible]		?	?
	Soda water	210	1,050		[illegible] 10,000	1,000–10,000	>100
	Soda water	100	40		[illegible] 1,000	<20	<20
	[illegible]	1,350	1,188		1,000–10,000	<20	<20
	[illegible]	150	75		100–1,000	<30	<20
	[illegible] reservoir	10	130		100–1,000	<20	>100
	Nairobi main		160		1,000–10,000	<20	20–100
	Soda water		158		1,000–10,000	<20	<20
	Soda water		[illegible]		<20	<20	<20
	Soda water		[illegible]		<20	<20	<20
	Soda water				<20	<20	<20
	Nairobi main		[illegible]		100–1,000	<20	[illegible]
	Nairobi main		[illegible]		1,000–10,000	<20	>100
	Soda water		[illegible]		1,000–10,000	<20	<20
	Nairobi main	[illegible]	[illegible]		100–1,000	<20	20–100
	Soda water				20–100	<20	<20
	Soda water		[illegible]		<20	<20	<20
	Nairobi main	[illegible]	[illegible]		100–1,000	<20	>100
	Filtered water	[illegible]			<20	[illegible]	[illegible]
	Soda water	[illegible]			[illegible]	[illegible]	[illegible]
	[illegible] Kabuga	[illegible]			[illegible]	[illegible]	[illegible]
	[illegible] Kabuga	140		[illegible]	[illegible]	[illegible]	[illegible]
	Nairobi main	[illegible]			[illegible]	<20	[illegible]
	Soda water	[illegible]			[illegible]	<20	<20
	Soda water				<20	<20	<20
	Soda water				<20	<20	<20
	Soda water				<20	<20	<20
	Soda water				<20	<20	<20
	[illegible]				<20	<20	[illegible]
	[illegible]				[illegible] 1,000	<20	[illegible]
	[illegible]			[illegible]	<20	<20	[illegible]
	[illegible]				1,000–10,000	[illegible]	[illegible]

[illegible] after the cleaning [illegible] of the reservoir.
[illegible] 16, 17 were contaminated owing to inefficient [illegible]
[illegible] during the [illegible] of the external supply.

APPENDIX IV.—NOTES ON THE PRESENT ACCOMMODATION AT THE BACTERIOLOGICAL LABORATORY.

The present Laboratory is situated in Government Road, the main artery for traffic of all kinds, from fast moving motor cars to slow moving and ponderous bullock carts. The building is only 10 feet from the road, and the main laboratory room has a window and door opening on to it, as also has the sterilising room, and the calf lymph preparation room. During the dry weather clouds of dust are raised by the passing traffic, and the Laboratory building [illegible]

[illegible] one contaminated with various [illegible] ed into the Laboratory with the dust [illegible] ame, and therefore a waste of money, [illegible] anxiety, particularly when it is realised [illegible] lymph [illegible] lymph [illegible]

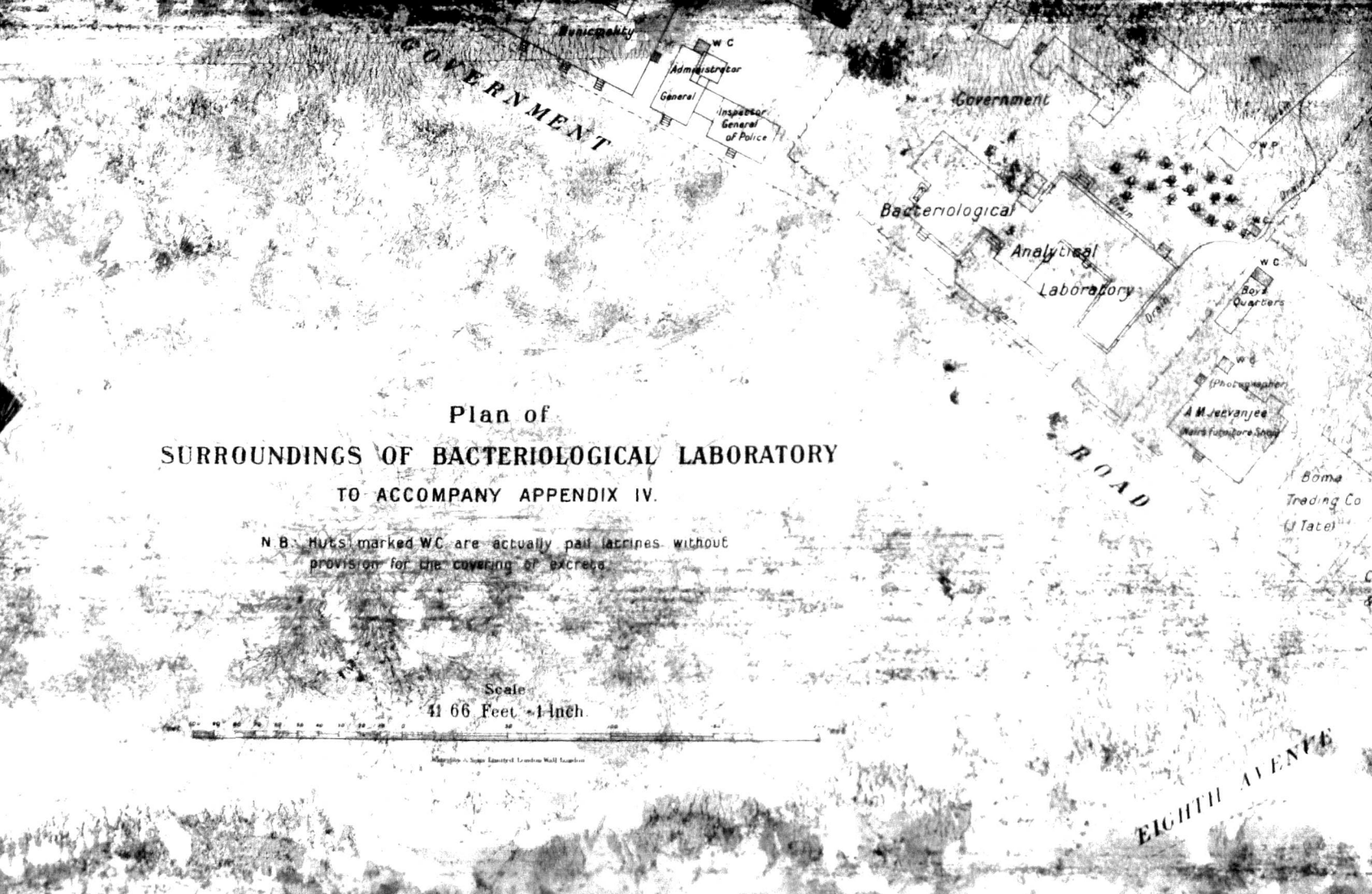
any particular organism [illegible] to ensure that it really has been obtained from a particular case and is not merely a contamination [illegible]

Again, there is no [illegible] plant on order from England. When it arrives there is no accommodation for it. The Analytical Laboratory, which occupies a portion of the Laboratory building, is pressing for more room. The Bacteriological Laboratory is still more cramped, especially as the staff is being increased. The present site of the Laboratory forbids extension enough to supply three rooms for each Laboratory. Consequently it would seem better policy to use the money that would otherwise be spent on building these six rooms in the erecting of a part of a new Bacteriological Laboratory building on a fresh site, the Analytical Laboratory taking over the rooms in the present building that will then be vacated by the Bacteriological Department. (Dust does not interfere to any extent with the Analytical Laboratory work.)

The question is apparently one of finance. It is estimated that to meet the present requirements of the Protectorate a sum of £22,000 would be expended over Laboratory buildings, stables and staff quarters, with a further £3,000 to complete the Laboratory as extensions of this work are soon found necessary. Now if the work done in the Laboratory during 1919 is estimated on the same scale as the charges to the outside public, the actual revenue or saving of expenditure to the Government amounted to £9,249, distributed as follows:—

Examinations	£5,145
Calf lymph	£2,692
Vaccine	£1,412
Total	£9,249

This sum is £7,000 in excess of the actual estimate of expenditure of the Laboratory for the financial year April, 1919, to March, 1920, and this does not represent the value to the country of any research work done, as it cannot be calculated. Even from the financial point of view therefore, the Laboratory is a paying investment.



Plan of
SURROUNDINGS OF BACTERIOLOGICAL LABORATORY
TO ACCOMPANY APPENDIX IV.

N.B. Huts marked W.C. are actually pail latrines without provision for the covering of excreta.

Scale
41 66 Feet = 1 Inch.

APPENDIX V—VACCINATION RETURN.

A table is appended showing the returns of all vaccinations performed in East Africa during the year 1919. It will be noted that an extremely large number of results unknown is recorded. This is inevitable in certain places, but is unexpected in such places as Nairobi Prison and the Police Depôt. As an indication of the value of the system, the figure is valueless, firstly on the ground that a large result [illegible] the ground that of the [illegible]

[illegible] by [illegible] to keep [illegible] it is possible [illegible] technique is perfect. The table has been made up to the latest possible date. It may be taken that the children are all first vaccinations. Some of the adults have been vaccinated probably at least once previously. It will be noted that the calf lymph does not seem to have been so satisfactory from December, 1919, to April, 1920, these being the months when the day air temperature is highest in East Africa. [illegible] defects in transport being the real cause of inefficient [illegible] it would seem that, given good technique [illegible] transportation, the present lymph [illegible] prevents [illegible] unprotected individuals.

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STATEMENT SHOWING THE PERCENTAGE NUMBER OF VACCINATIONS PERFORMED AT EACH STATION DURING THE YEAR 1919

Stations	Vaccination			Unknown
	Number	Failed	Protect	
Mombasa	12,424	—	—	12,424
Lamu	4,000	700	883	2,417
Malindi	3,119	9	17	3,093
Kilindini	26	6	12	8
Machakos	17,378	—	—	17,378
Nairobi Prison	1,050	105	60	885
Nairobi	62,496	—	—	62,496
Kyambu	1,048	49	65	934
Makindu	2,243	15	154	2,056
Kitui	268	34	168	66
Nakuru	1,840	—	—	1,840
Naivasha	329	77	14	238
Eldama Ravine	1,751	—	—	1,751
Kabarnet	969	—	66	903
Kacheliba	126	40	57	29
Fort Hall	51,206	598	334	50,364
Nyeri	48,257	500	1,501	46,230
Embu	11,548	—	—	11,548
Meru	560	92	449	19
Kisumu	30,300	—	—	30,300
Kisumu Native Civil Hospital	131	—	—	131
Mumias	1,217	—	—	4,217
Kericho	3,550	18	277	3,255
Nandi	222	4	23	195
Mombasa Prison	173	64	250	159
Eldoret	4,[illegible]	485	679	3,[illegible]
Kisumu	1,[illegible]	1,026	884	130
Kisii	182	46	18	118
Police Depot	780	[illegible]	[illegible]	129
Arches Post	130	—	—	[illegible]
Serenli	500	—	—	[illegible]
TOTAL	264,829	3,802	6,135	[illegible]

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RESULTS OF VACCINATION IN NYANZA PROVINCE.

	Adults				Children			
	Observed	Successful	Of those observed per cent successful	Unknown	Observed	Successful	Of those observed per cent successful	Unknown
August, 1919	122	80	65·5	42	9	9	100·0	—
September, 1919	98	9	9·1	89	15	15	100·0	—
October, 1919	68	6	8·8	62	44	44	100·0	—
November, 1919	83	44	53·0	39	11	11	100·0	—
December, 1919	88	39	44·3	49	55	55	100·0	—
January, 1920	96	9	9·3	87	10	10	100·0	—
February, 1920	11	11	100·0	—	3	3	100·0	—
March, 1920	44	—	—	44	—	—	—	—
April, 1920	14	14	100·0	—	6	6	100·0	—
May, 1920	32	23	71·8	9	46	46	100·0	—
TOTAL	454	252	55·5	202	176	176	100·0	—

APPENDIX VII - METEOROLOGICAL RETURN FOR THE YEAR 1919.

GOVERNMENT LABORATORY, NAIROBI.

Month	Temperature						Rainfall		Wind		Remarks
	Solar Maximum in Sun.	Maximum Grass.	Mean Shade Maximum	Mean Shade Minimum	Range Mean Monthly	Maximum and Minimum Mean Combined.	Amount in Inches.	Degree of Humidity.	General Direction.	Average Force.	
January	—	—	80·4	55·3	25·1	67·89	0·24	58·30	—	—	—
February	—	—	82·1	58·1	24·0	70·07	3·22	56·66	—	—	—
March	—	—	84·2	57·3	26·9	70·78	7·69	60·23	—	—	—
April	—	—	77·5	58·2	19·3	67·81	6·88	67·03	—	—	—
May	—	—	76·6	56·2	20·4	66·43	3·40	63·63	—	—	—
June	—	—	75·8	52·4	23·4	64·10	0·22	61·15	—	—	—
July	—	—	68·6	52·0	16·6	60·68	2·43	7·38	—	—	—
August	—	—	75·9	51·8	24·1	63·91	1·12	64·70	—	—	—
September	—	—	77·1	54·4	22·7	65·72	2·14	63·93	—	—	—
October	—	—	74·7	50·2	18·5	65·44	3·64	66·20	—	—	—
November	—	—	74·9	56·0	18·9	65·48	3·35	67·75	—	—	—
December	—	—	76·6	54·0	22·6	65·32	1·85	62·25	—	—	—
Year average	—	—	77·0	55·2	21·8	66·11	36·24	64·03	—	—	—

APPENDIX VII — METEOROLOGICAL RETURN FOR THE YEAR 1929

GOVERNMENT LABORATORY, NAIROBI

Month	Temperature						Rainfall		Wind		Remarks
	Solar Maximum	Maximum Grass	Mean Shade Maximum	Mean Shade Minimum	Range Mean Monthly	Maximum and Minimum Mean Combined	Amount in Inches	Degree of Humidity	General Direction	Average Force	
January	—	—	80·4	55·3	25·1	67·89	0·24	58·51	—	—	—
February	—	—	82·1	58·1	24·0	70·07	3·22	56·66	—	—	—
March	—	—	84·2	57·3	26·9	70·78	7·69	60·23	—	—	—
April	—	—	77·5	58·2	19·3	67·81	6·88	69·03	—	—	—
May	—	—	76·6	56·2	20·4	66·43	3·46	68·63	—	—	—
June	—	—	75·8	52·4	23·4	64·10	0·22	64·15	—	—	—
July	—	—	68·6	52·0	16·6	60·68	2·43	71·30	—	—	—
August	—	—	75·9	51·8	24·1	63·91	1·12	64·70	—	—	—
September	—	—	77·1	54·4	22·7	65·72	2·14	63·93	—	—	—
October	—	—	74·7	50·2	18·5	65·44	3·64	66·20	—	—	—
November	—	—	74·9	56·0	18·9	65·42	3·35	67·75	—	—	—
December	—	—	76·6	54·0	22·6	65·32	1·85	62·25	—	—	—
Year average	—	—	77·—	55·2	21·8	66·1	36·24	64·03	—	—	—

APPENDIX VII — METEOROLOGICAL RETURN FOR THE YEAR 1919.

GOVERNMENT LABORATORY, NAIROBI.

Month	Temperature						Rainfall		Winds		Remarks
	Solar Maximum.	Maximum Grass.	Mean Shade Maximum.	Mean Shade Minimum.	Range Mean Monthly.	Maximum and Minimum Mean Combined.	Amount in inches.	Degree of Humidity.	General Direction.	Average Force.	
January	—	—	80·4	55·3	25·1	67·89	0·24	58·50	—	—	—
February	—	—	82·1	58·1	24·0	70·07	3·22	56·66	—	—	—
March	—	—	84·2	57·3	26·9	70·78	7·69	60·23	—	—	—
April	—	—	77·5	58·2	19·3	67·81	6·88	67·03	—	—	—
May	—	—	76·6	56·2	20·4	66·43	3·46	63·63	—	—	—
June	—	—	75·8	52·4	23·4	64·10	0·22	64·15	—	—	—
July	—	—	68·6	52·6	16·0	60·68	2·43	71·30	—	—	—
August	—	—	75·9	51·8	24·1	63·91	1·12	64·70	—	—	—
September	—	—	77·4	54·4	22·7	65·72	2·14	63·93	—	—	—
October	—	—	74·7	56·2	18·5	65·44	3·64	66·20	—	—	—
November	—	—	74·9	56·0	18·9	65·42	3·35	67·75	—	—	—
December	—	—	76·6	54·0	22·6	65·32	1·85	62·25	—	—	—
Year average	—	—	77·0	55·2	21·8	66·11	36·24	64·03	—	—	—

APPENDIX VII — METEOROLOGICAL RETURN FOR THE YEAR 1919.

GOVERNMENT LABORATORY, NAIROBI.

Month	Temperature						Rainfall		Winds		Remarks
	Solar Maximum in Grass.	Minimum on Grass.	Mean Shade Maximum.	Mean Shade Minimum.	Range. Mean Monthly.	Maximum and Minimum Mean Combined.	Amount in Inches.	Degree of Humidity.	General Direction.	Average Force.	
January	—	—	80·4	55·3	25·1	67·89	0·24	58·50	—	—	—
February	—	—	82·1	58·1	24·0	70·07	3·22	56·66	—	—	—
March	—	—	84·2	57·3	26·9	70·78	7·69	60·23	—	—	—
April	—	—	77·5	58·2	19·3	67·81	6·88	67·03	—	—	—
May	—	—	76·6	56·2	20·4	66·43	3·40	63·63	—	—	—
June	—	—	75·8	52·4	23·4	64·10	0·22	61·15	—	—	—
July	—	—	68·6	52·6	16·0	60·68	2·43	71·38	—	—	—
August	—	—	75·9	51·8	24·1	63·91	1·12	64·70	—	—	—
September	—	—	77·1	54·4	22·7	65·72	2·14	63·93	—	—	—
October	—	—	74·7	56·2	18·5	65·44	3·64	66·20	—	—	—
November	—	—	74·9	56·0	18·9	65·42	3·35	67·75	—	—	—
December	—	—	76·6	54·0	22·6	65·32	1·85	62·25	—	—	—
Year average	—	—	77·1	55·2	21·8	66·1	36·24	64·03	—	—	—

APPENDIX VII — METEOROLOGICAL RETURN FOR THE YEAR 1919.

GOVERNMENT LABORATORY, NAIROBI.

Month.	Temperature						Rainfall		Winds		Remarks.
	Solar Maximum.	Maximum Grass.	Mean Shade Maximum.	Mean Shade Minimum.	Kenge Mean Monthly.	Maximum and Minimum Mean combined.	Amount in inches.	Days of Humidity.	General Direction.	Average Force.	
January	—	—	80·4	55·3	25·1	67·89	0·24	58·30	—	—	—
February	—	—	82·1	58·1	24·0	70·07	3·22	56·66	—	—	—
March	—	—	84·2	57·3	26·9	70·78	7·69	60·23	—	—	—
April	—	—	79·5	58·2	19·3	67·81	6·88	67·93	—	—	—
May	—	—	76·6	56·2	20·4	66·43	3·36	63·63	—	—	—
June	—	—	75·8	52·4	23·4	64·10	0·22	64·15	—	—	—
July	—	—	68·6	52·0	16·6	60·68	2·43	7·39	—	—	—
August	—	—	75·9	51·8	24·1	63·91	1·12	64·70	—	—	—
September	—	—	77·1	54·4	22·7	65·72	2·14	63·93	—	—	—
October	—	—	74·7	50·2	18·5	65·44	3·64	66·20	—	—	—
November	—	—	74·9	56·0	18·9	65·42	3·35	67·75	—	—	—
December	—	—	76·6	54·0	22·6	65·32	1·85	62·25	—	—	—
Year average	—	—	77·0	55·2	21·8	66·1	36·24	64·03	—	—	—

Date	Maximum Temperature in the Screen Fahr.	Minimum Temperature in the Screen Fahr.	Rainfall inches.	9 a.m. Wet bulb	9 a.m. Dry bulb	9 a.m. Dew point	9 a.m. Humidity	9 p.m. Wet bulb	9 p.m. Dry bulb	9 p.m. Dew point	9 p.m. Humidity
1	74.0	57.5	0.03	60.0	62.0	58.3	88.0%	63.0	66.0	58.3	68.0%
2	75.0	57.0	0.00	60.0	62.0	58.3	88.0%	66.0	74.0	60.2	62.0%
3	75.5	56.5	0.00	62.0	63.0	59.3	88.0%	65.0	73.0	59.1	62.0%
4	75.5	55.0	0.00	61.0	64.0	58.3	82.0%	65.0	73.0	59.1	62.0%
5	80.0	60.0	0.00	63.0	68.0	59.1	73.0%	65.0	74.0	58.4	58.0%
6	76.0	58.0	0.00	62.0	67.0	58.0	73.0%	62.0	71.0	53.9	51.0%
7	77.0	55.0	0.00	60.0	63.0	57.5	82.0%	65.0	74.0	58.4	58.0%
8	79.5	53.0	0.00	63.0	68.0	59.1	73.0%	64.0	74.0	55.5	44.0%
9	82.0	57.0	0.00	64.0	71.0	58.7	65.0%	65.0	78.0	50.8	42.0%
10	79.5	57.0	0.00	62.0	67.0	58.0	73.0%	64.0	76.0	55.5	49.0%
11	80.5	57.0	0.00	62.0	67.0	58.0	73.0%	65.0	78.0	51.0	42.0%
12	80.5	58.0	0.00	59.0	64.0	54.1	68.0%	64.0	77.0	54.0	47.0%
13	79.0	58.0	0.00	62.0	66.0	58.8	78.0%	63.0	76.0	52.2	40.0%
14	79.0	55.0	0.00	62.0	68.0	57.3	68.0%	63.0	77.0	51.2	39.0%
15	77.0	54.0	0.00	60.0	64.0	56.7	77.0%	62.0	75.0	54.0	47.0%
16	79.0	56.0	0.00	58.0	64.0	56.2	88.0%	62.0	74.0	54.0	47.0%
17	82.0	55.0	0.00	63.0	67.0	59.3	82.0%	64.0	76.0	54.0	42.0%
18	81.5	53.0	0.00	62.0	71.0	56.6	61.0%	65.0	80.0	52.2	36.0%
19	79.0	53.0	0.19	63.0	70.0	57.0	65.0%	63.0	78.0	50.8	36.0%
20	81.5	56.0	0.00	63.0	70.0	57.0	65.0%	64.0	78.0	52.2	39.0%
21	81.0	56.0	0.00	61.0	68.0	55.5	64.0%	63.0	78.0	50.8	36.0%
22	81.0	55.0	0.00	62.0	72.0	54.5	54.0%	64.0	79.0	51.2	36.0%
23	81.5	52.0	0.03	61.0	70.0	54.0	57.0%	65.0	80.0	52.2	36.0%
24	81.0	52.0	0.00	61.0	68.0	55.5	64.0%	65.0	80.0	52.2	36.0%
25	85.0	51.0	0.00	61.0	69.0	54.8	60.0%	65.0	81.0	52.2	36.0%
26	83.5	53.0	0.00	61.0	67.0	56.2	68.0%	65.0	80.0	52.2	36.0%
27	82.0	54.0	0.08	60.0	65.0	55.0	73.0%	64.0	78.0	52.2	39.0%
28	84.0	55.0	0.00	62.0	66.0	57.0	73.0%	64.0	78.0	52.2	39.0%
29	84.0	54.0	0.00	62.0	70.0	55.8	61.0%	64.0	82.0	51.0	32.0%
30	84.0	55.0	0.00	63.0	71.0	56.0	61.0%	64.0	82.0	51.0	32.0%
31	85.5	55.0	0.00	62.0	70.0	55.2	57.0%	65.0	83.0	50.8	30.0%

Mean maximum temperature	80.40 F.		
Mean minimum	53.89 F.	RAINFALL.	
Maximum recorded temperature	85.00 F.	Total rainfall	0.34 in.
Minimum recorded temperature	50.00 F.	Number of wet days	3
Extreme daily range	37.00 F.	Mean humidity 9 a.m.	71.0%
,, monthly range	35.00 F.		
Mean monthly range	25.11 F.		
,, temperature	67.89 F.		

Date	Mean outside Temp. Degrees Fahr	Minimum Temp Degrees Fahr	Rain Inches	9 a.m. Wet bulb.	Dry bulb.	Dew point.	Humidity.	4 p.m. Wet bulb.	Dry bulb.	Dew point.	Humidity.
1	74·0	68·0	0·75	64·0	70·0	59·4	69·0%	64·0	70·0	59·4	69·0%
2	62·0	54·5	0·00	63·0	65·0	61·4	88·0%	64·0	72·0	58·0	61·0%
3	72·0	58·0	0·00	62·0	65·0	56·5	83·0%	65·0	75·0	57·8	55·0%
4	52·0	57·5	0·00	62·0	65·0	59·5	83·0%	65·0	77·0	56·6	50·0%
5	70·5	58·0	0·00	63·0	68·0	59·1	73·0%	65·0	79·0	55·4	44·0%
6	80·0	47·0	0·00	63·0	67·0	59·8	78·0%	64·0	77·0	54·9	47·0%
7	81·5	58·0	0·00	63·0	67·0	59·8	78·0%	64·0	80·0	53·1	39·0%
8	80·0	58·0	0·00	63·0	67·0	61·4	88·0%	65·0	79·0	55·4	44·0%
9	80·0	57·0	0·00	63·0	67·0	61·4	88·0%	64·0	78·0	54·3	44·0%
10	79·0	57·0	0·54	63·0	70·0	57·6	65·0%	65·0	80·0	54·8	41·0%
11	73·0	59·0	0·19	63·0	70·0	57·6	65·0%	64·0	79·0	53·7	42·0%
12	77·0	56·0	0·00	61·0	65·0	55·8	61·0%	62·0	70·0	55·8	61·0%
13	78·0	53·0	0·00	62·0	68·0	54·8	61·0%	63·0	80·0	53·1	39·0%
14	78·0	54·0	0·00	61·0	68·0	55·5	64·0%	64·0	85·0	52·9	35·0%
15	81·0	56·0	0·00	62·0	68·0	57·3	68·0%	63·0	79·0	54·8	37·0%
16	80·0	60·0	0·00	64·0	70·0	58·4	69·0%	64·0	78·0	54·3	39·0%
17	78·0	60·0	0·11	63·0	67·0	59·8	78·0%	64·0	75·0	57·3	44·0%
18	78·0	57·0	0·30	63·0	68·0	59·1	73·0%	65·0	75·0	57·8	58·0
19	79·0	58·0	0·13	63·0	70·0	57·6	65·0%	61·0	66·0	57·9	55·0%
20	80·0	58·0	0·22	64·0	70·0	59·4	69·0%	62·0	65·0	59·5	83·0%
21	77·0	60·0	0·29	63·0	68·0	59·1	73·0%	63·0	78·0	57·8	55·0%
22	75·0	58·0	0·00	63·0	66·0	60·6	83·0%	63·0	64·0	62·2	94·0%
23	74·0	58·5	0·05	62·0	67·0	58·0	73·0%	63·0	72·0	56·2	57·0%
24	76·5	59·0	0·00	63·0	67·0	59·8	78·0%	65·0	75·0	57·8	55·0%
25	76·5	59·0	0·00	64·0	70·0	59·4	69·0%	65·0	75·0	57·8	55·0%
26	77·0	58·0	0·04	62·0	66·0	58·8	78·0%	63·0	74·0	58·0	52·0%
27	78·0	58·0	0·00	62·0	63·0	57·3	68·0%	65·0	75·0	57·8	55·0%
28	80·0	57·0	0·00	64·0	69·0	60·1	73·0%	65·0	76·0	57·2	52·0%
29	81·5	61·0	0·00	65·0	72·0	59·7	65·0%	65·0	80·0	54·8	41·0%
30	78·5	60·5	0·00	63·0	68·0	59·1	73·0%	63·0	75·0	54·4	49·0%

Mean maximum temperature	74·27 F
Mean minimum	57·34 F
Maximum recorded temperature	81·50 F
Minimum recorded temperature	53·00 F
Extreme daily range	31·50 F
,, monthly range	30·50 F
Mean monthly range	16·93 F
Mean temperature	65·81 F

RAINFALL

Total rainfall	6·88 ins.
Number of wet days	17
Mean humidity 9 a.m.	74·73%
4 p.m.	50·31%

1910

Date.	Maximum Temperature in the Shade.	Minimum Temperature in the Shade.	Rainfall.	Sunshine.	9 a.m.				4 p.m.			
					Wet bulb.	Dry bulb.	Dew point.	Humidity.	Wet bulb.	Dry bulb.	Dew point.	Humidity.
1	79·0	58·0	0·75	8·4	70·0	59·4	69·0%	64·0	70·0	59·4	69·0%
2	76·0	58·5	0·00	6·30	65·0	61·4	58·0%	64·0	72·0	58·0	61·0%
3	77·0	58·0	0·00	6·20	65·0	59·5	83·0%	64·0	75·0	57·8	55·0%
4	82·0	57·3	0·00	6·20	65·0	59·5	83·0%	65·0	77·0	56·6	50·0%
5	80·5	58·0	0·00	6·30	68·0	59·1	73·0%	65·0	79·0	55·4	44·0%
6	80·0	57·9	0·00	6·20	67·0	58·8	78·0%	64·0	80·0	55·1	39·0%
7	81·0	58·0	0·00	6·30	67·0	59·8	78·0%	64·0	80·0	55·1	39·0%
8	80·0	58·0	0·00	6·20	67·0	63·4	88·0%	66·0	79·0	55·4	44·0%
9	80·0	57·0	0·00	6·20	67·0	63·4	88·0%	64·0	78·0	54·3	41·0%
10	81·5	57·0	0·00	6·40	70·0	59·4	69·0%	66·0	80·0	54·8	41·0%
11	79·5	56·5	0·00	6·20	68·0	58·3	76·0%	64·0	79·0	53·7	42·0%
12	80·0	55·0	0·00	6·20	70·0	58·8	61·0%	62·0	70·0	58·8	61·0%
13	82·5	57·0	0·00	6·40	70·0	58·8	61·0%	62·0	70·0	58·8	61·0%
14	83·5	61·0	0·00	6·30	70·0	57·0	65·0%	64·0	82·0	51·8	35·0%
15	82·0	60·0	0·00	6·30	68·0	59·1	73·0%	63·0	80·0	51·4	37·0%
16	82·0	58·0	0·00	6·30	70·0	57·0	65·0%	63·0	79·0	52·0	39·0%
17	82·0	59·5	0·00	6·20	68·0	57·8	68·0%	63·0	80·0	51·4	37·0%
18	81·5	58·0	0·00	6·30	69·0	58·3	68·0%	63·0	80·0	51·4	37·0%
19	80·0	54·0	0·00	6·20	68·0	57·8	68·0%	63·0	80·0	51·4	37·0%
20	83·5	58·0	0·00	6·30	70·0	57·6	65·0%	64·0	82·0	50·2	33·0%
21	85·0	61·0	0·00	6·50	72·0	56·7	65·0%	63·0	83·0	49·7	32·0%
22	86·5	55·0	0·00	6·40	70·0	57·6	65·0%	64·0	88·0	50·2	30·0%
23	87·0	57·0	0·00	6·30	70·0	57·6	65·0%	64·0	85·0	50·2	30·0%
24	86·0	60·0	0·00	6·40	71·0	58·7	68·0%	62·0	80·0	49·7	35·0%
25	84·0	59·0	0·73	6·30	67·0	59·8	78·0%	62·0	70·0	50·3	37·0%
26	86·5	59·0	0·13	6·20	70·0	55·8	61·0%	62·0	76·0	52·2	43·0%
27	76·5	59·5	1·09	6·20	70·0	58·8	78·0%	62·0	67·0	58·0	73·0%
28	71·0	51·0	0·00	6·30	67·0	59·8	78·0%	62·0	74·0	53·2	48·0%
29	74·0	59·0	0·85	6·10	68·0	59·3	88·0%	62·0	66·0	58·8	78·0%
30	75·0	59·0	0·79	6·20	64·0	60·3	88·0%	61·0	63·0	59·3	88·0%
31	70·0	58·0	0·73	6·10	61·0	59·3	88·0%	63·0	67·0	59·8	78·0%

Mean maximum temperature	84·23 F	Rainfall.	
Mean minimum	57·34 F		
Maximum recorded temperature	87·00 F	Total rainfall	7·69 ins.
		Number of wet days	8
Minimum recorded temperature	51·00 F	Mean humidity 9 a.m.	73·26%
Extreme daily range	31·40 F	4 p.m.	47·19%
,, monthly range	36·00 F		
Mean monthly range	26·89 F		
,, temperature	42·78 F		

April

Date.	Maximum Temperature in the Shade.	Minimum Temperature in the Shade.	Rainfall.	Sunshine.	9 a.m.				4 p.m.			
					Wet bulb.	Dry bulb.	Dew point.	Humidity.	Wet bulb.	Dry bulb.	Dew point.	Humidity.
1	74·0	58·0	0·32	6·30	62·0	55·3	88·0%	63·0	70·0	57·6	65·0%	
2	74·0	60·0	0·08	6·20	64·0	60·3	88·0%	64·0	72·0	58·0	61·0%	
3	76·0	58·0	1·45	6·30	63·0	61·4	88·0%	64·0	71·0	58·7	65·0%	
4	78·0	59·0	0·05	6·30	65·0	61·4	88·0%	62·0	68·0	55·5	64·0%	
5	73·0	59·0	0·02	6·50	73·0	59·1	82·0%	61·0	63·0	59·3	88·0%	
6	73·0	59·0	1·31	6·10	63·0	59·3	88·0%	62·0	66·0	58·8	78·0%	
7	77·0	56·0	0·83	6·10	62·0	60·1	64·0%	64·0	75·0	56·1	52·0%	
8	77·0	56·5	0·35	6·20	66·0	58·8	78·0%	63·0	74·0	55·0	52·0%	
9	79·0	57·0	0·54	6·30	70·0	57·6	65·0%	62·0	67·0	58·0	73·0%	
10	77·0	59·0	0·19	6·50	70·0	57·6	65·0%	64·0	74·0	56·7	55·0%	
11	73·0	59·0	0·00	6·20	65·0	57·7	78·0%	63·0	72·0	56·2	57·0%	
12	77·0	59·0	0·00	6·30	68·0	59·1	73·0%	64·0	75·0	56·1	53·0%	
13	78·0	53·0	0·00	6·20	68·0	57·3	68·0%	64·0	75·0	56·1	52·0%	
14	78·0	54·0	0·00	6·10	68·0	55·5	61·0%	63·0	75·0	54·4	49·0%	
15	81·0	56·0	0·00	6·20	68·0	57·3	68·0%	62·0	78·0	56·9	39·0%	
16	80·0	60·0	0·00	6·40	70·0	59·4	69·0%	64·0	78·0	54·3	44·0%	
17	78·0	60·6	0·11	6·30	67·0	59·8	78·0%	64·0	73·0	57·3	58·0%	
18	78·0	57·0	0·30	6·30	68·0	59·1	73·0%	65·0	75·0	57·8	55·0%	
19	79·0	58·0	0·13	6·30	70·0	57·6	65·0%	62·0	66·0	57·0	73·0%	
20	80·0	58·0	0·22	6·40	70·0	59·4	69·0%	62·0	65·0	59·5	83·0%	
21	77·0	60·0	0·29	6·30	68·0	58·1	73·0%	65·0	75·0	57·8	55·0%	
22	75·0	58·0	0·00	6·30	66·0	60·6	83·0%	63·0	64·0	62·2	94·0%	
23	74·0	58·5	0·05	6·20	67·0	58·0	73·0%	63·0	74·0	56·2	57·0%	
24	76·5	59·0	0·00	6·30	67·0	59·8	78·0%	65·0	75·0	57·8	55·0%	
25	76·5	59·0	0·00	6·40	70·0	59·4	69·0%	65·0	75·0	57·8	55·0%	
26	77·0	58·0	0·04	6·20	66·0	58·8	78·0%	63·0	74·0	55·0	52·0%	
27	78·0	58·0	0·00	6·20	63·0	57·3	68·0%	65·0	75·0	57·8	53·0%	
28	80·0	57·0	0·00	6·40	69·0	60·1	73·0%	65·0	76·0	57·2	52·0%	
29	81·5	61·0	0·00	6·50	72·0	59·7	65·0%	63·0	80·0	54·8	41·0%	
30	78·5	60·5	0·00	6·30	68·0	59·1	73·0%	63·0	75·0	54·4	49·0%	

Mean maximum temperature	77·47 F	Rainfall.	
Mean minimum	58·15 F		
Maximum recorded temperature	81·50 F	Total rainfall	6·68 ins.
		Number of wet days	17
Minimum recorded temperature	53·00 F	Mean humidity 9 a.m.	74·73%
Extreme daily range	25·00 F	4 p.m.	50·33%
,, monthly range	28·50 F		
Mean monthly range	19·32 F		
,, temperature	67·81 F		

Day	Maximum temp. Degrees Fahr.	Minimum temp. Degrees Fahr.	Rain Inches	9 a.m. Wet bulb.	Dry bulb.	Dew point.	Humidity	3 p.m. Wet bulb.	Dry bulb.	Dew point.	Humidity
1	77.0	56.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
2	77.0	55.0	0.00	60.0	66.0	55.1	68.2	66.0	74.0	59.2	60.0%
3	77.0	56.0	0.00	60.0	64.0	56.7	77.0	64.0	74.0	55.7	55.0%
4	75.0	54.5	0.00	59.0	63.0	55.6	77.0	63.0	74.0	54.6	52.0%
5	77.0	53.0	0.00	58.0	62.0	54.6	77.0	62.0	75.0	52.6	46.0%
6	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
7	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
8	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
9	76.5	54.5	0.00	59.0	63.0	55.6	77.0%	63.0	74.0	54.6	52.0%
10	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
11	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
12	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
13	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
14	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
15	75.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
16	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
17	74.0	52.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
18	73.5	52.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
19	76.0	52.0	0.00	59.0	63.0	55.6	77.0%	63.0	74.0	54.6	52.0%
20	76.0	53.0	0.00	59.0	63.0	55.6	77.0%	63.0	74.0	54.6	52.0%
21	76.5	53.5	0.00	59.0	63.0	55.6	77.0%	63.0	74.0	54.6	52.0%
22	76.0	50.0	0.00	60.0	64.0	56.7	77.0%	64.0	74.0	55.7	55.0%
23	77.0	49.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
24	79.5	49.0	0.00	59.0	63.0	55.6	77.0%	63.0	74.0	54.6	52.0%
25	78.5	52.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
26	76.5	50.0	0.00	58.0	62.0	54.6	77.0%	62.0	75.0	52.6	46.0%
27		49.0									
28		53.0									
29		52.0									
30		52.0									
31		53.0									

Mean maximum temperature ... 75.72 F.
Mean minimum ... 52.21 F.
Maximum recorded temperature ... 79.00 F. on the 11th.
Minimum recorded temperature ... 49.00 F. on the 24th.
Extreme daily range ... 30.0 F.
Mean monthly range ... 23.51 F.
Mean monthly temperature ... 64.16 F.

Day	Max.	Min.	Rain.	9 a.m. Dry bulb	9 a.m. Wet bulb	9 a.m. Dew point	9 a.m. Humidity	3 p.m. Dry bulb	3 p.m. Wet bulb	3 p.m. Dew point	3 p.m. Humidity
1	76.5	54.0	0.00	59.0	55.2	48.0%	62.0	73.0	53.0	51.0%	
2	74.0	54.0	0.00	58.0	54.6	47.0%	60.0	71.0	51.6	50.0%	
3	72.0	55.0	0.00	58.0	52.5	46.0%	60.0	70.0	52.3	53.0%	
4	72.0	55.0	0.00	57.0	54.4	48.0%	60.0	70.0	52.3	53.0%	
5	69.0	54.0	0.04	57.0	53.5	47.0%	60.0	68.0	53.7	60.0%	
6	66.0	46.0	0.04	56.0	54.2	47.0%	60.0	67.0	54.4	64.0%	
7	74.0	52.0	0.00	56.0	52.5	46.0%	61.0	71.0	53.4	51.0%	
8	75.0	57.0	0.00	58.0	54.0	47.0%	62.0	73.0	53.0	51.0%	
9	76.5	51.0	0.03	58.0	54.6	47.0%	60.0	70.0	52.3	51.0%	
10	76.5	53.0	0.80	56.0	54.2	48.0%	60.0	67.0	54.4	64.0%	
11	68.0	55.0	0.54	56.0	54.2	47.0%	58.0	63.0	53.8	72.0%	
12	68.0	55.0	0.01	56.0	54.2	47.0%	60.0	64.0	55.7	77.0%	
13	68.0	55.0	0.08	56.0	55.1	93.0%	58.0	63.0	53.8	72.0%	
14	64.0	55.0	0.42	57.0	56.1	93.0%	58.0	63.0	53.8	72.0%	
15	62.0	53.0	0.08	56.0	54.2	87.0%	59.0	62.0	56.4	82.0%	
16	64.0	53.0	0.00	54.0	50.6	82.0%	57.0	60.0	54.4	82.0%	
17	67.0	43.0	0.10	55.0	50.0	84.0%	60.0	64.0	56.7	77.0%	
18	70.0	47.0	0.00	56.0	50.0	83.0%	62.0	75.0	52.0	40.0%	
19	77.0	50.0	0.00	59.0	63.0	35.0%	77.0%	61.0	73.0	52.1	48.0%
20	68.0	58.0	0.45	58.0	60.0	56.2	88.0%	58.0	60.0	56.2	88.0%
21	72.0	52.0	0.00	58.0	62.0	54.0	77.0%	60.0	66.0	55.1	68.0%
22	71.0	52.0	0.00	55.0	58.0	52.3	81.0%	60.0	67.0	54.4	64.0%
23	68.0	55.0	0.00	55.0	59.0	51.4	76.0%	60.0	66.0	55.1	68.0%
24	65.0	50.0	0.00	56.0	59.0	53.3	82.0%	58.0	65.0	52.3	63.0%
25	66.0	50.0	0.00	54.0	55.0	53.0	93.0%	59.0	61.0	53.0	67.0%
26	66.0	50.0	0.00	54.0	56.0	52.1	87.0%	61.0	65.0	52.7	78.0%
27	63.0	53.0	0.00	54.0	55.0	53.0	93.0%	60.0	62.0	58.3	88.0%
28	68.5	54.0	0.00	55.0	57.0	53.2	87.0%	60.0	67.0	54.4	64.0%
29	74.0	45.0	0.00	56.0	57.0	53.3	82.0%	61.0	72.0	52.7	51.0%
30	75.0	47.0	0.00	53.0	57.0	49.5	75.0%	61.0	72.0	52.7	51.0%
31	75.0	49.0	0.00	58.0	50.0	51.4	76.0%	61.0	71.0	52.1	48.0%

Mean maximum temperature	68.65 F	Rainfall	
Mean minimum	52.03 F		
Maximum recorded temperature	77.00 F	Total rainfall	2.43 ins.
		Number of wet days	12
Minimum recorded temperature	43.00 F	Mean humidity 9 a.m.	82.8%
Extreme daily range	28.06 F	3 p.m.	64.8%
Mean daily range	16.62 F		
Extreme monthly range	33.00 F		
Mean monthly range	16.62 F		
Mean monthly temperature	60.68 F		

Day	Max.	Min.	Rain.	9 a.m. Dry bulb	9 a.m. Wet bulb	9 a.m. Dew point	9 a.m. Humidity	3 p.m. Dry bulb	3 p.m. Wet bulb	3 p.m. Dew point	3 p.m. Humidity
1											
2											
3											
4	75.0	48.0	0.00	55.0	59.0	51.4	76.0%	60.0	73.0	50.4	45.0%
5	77.0	45.0	0.00	58.0	63.0	53.8	72.0%	61.0	73.0	52.1	48.0%
6	79.0	46.0	0.00	56.0	61.0	51.7	72.0%	61.0	74.0	51.5	45.0%
7	82.0	48.0	0.00	56.0	61.0	51.7	72.0%	63.0	75.0	54.4	48.0%
8	82.5	46.0	0.00	60.0	65.0	55.0	73.0%	63.0	75.0	54.4	48.0%
9	78.0	45.0	0.00	55.0	61.0	49.8	67.0%	60.0	76.0	48.0	38.0%
10	78.0	50.0	0.00	54.0	61.0	47.9	62.0%	60.0	75.0	49.2	40.0%
11	68.0	54.0	0.00	55.0	57.0	53.2	82.0%	58.0	67.0	50.8	56.0%
12	77.0	55.0	0.00	57.0	60.0	54.4	82.0%	60.0	75.0	49.2	40.0%
13	76.0	55.0	0.00	57.0	60.0	54.4	82.0%	60.0	73.0	50.4	45.0%
14	76.0	54.0	0.11	57.0	59.0	55.2	88.0%	60.0	72.0	51.0	48.0%
15	75.0	53.0	0.00	56.0	59.0	53.3	82.0%	61.0	73.0	52.1	48.0%
16	77.0	55.0	0.00	60.0	65.0	55.9	73.0%	61.0	75.0	50.0	43.0%
17	71.0	56.0	0.00	58.0	62.0	54.6	77.0%	58.0	60.0	49.4	58.0%
18	77.0	54.0	0.00	58.0	60.0	56.2	88.0%	60.0	74.0	51.0	48.0%
19	76.0	53.0	0.00	58.0	62.0	54.6	77.0%	60.0	73.0	50.4	45.0%
20	78.0	46.0	0.00	59.0	64.0	55.6	77.0%	61.0	74.0	51.5	45.0%
21	76.0	50.0	0.00	56.0	62.0	51.7	72.0%	58.0	75.0		
22	77.0	50.0	0.00	56.0	60.0	52.5	76.0%	62.0	75.0	52.0	40.0%
23	73.0	51.0	0.00	55.0	58.0	52.3	81.0%	58.0	65.0	53.8	72.0%
24	74.0	56.0	0.00	55.0	58.0	52.3	81.0%	60.0	70.0	52.3	53.0%
25	73.0	53.0	0.00	58.0	60.0	56.2	88.0%	60.0	71.0	51.6	50.0%
26	70.0	54.0	0.00	55.0	57.0	53.2	87.0%	60.0	68.0	53.7	60.0%
27	78.0	45.0	0.00	56.0	60.0	52.5	76.0%	62.0	74.0	53.2	48.0%
28	75.0	56.0	0.00	58.0	63.0	53.8	74.0%	61.0	72.0	52.7	51.0%
29	77.0	57.0	0.00	59.0	62.0	50.4	82.0%	61.0	74.0	51.5	45.0%
30	80.0	57.0	0.00	60.0	64.0	56.7	77.0%	60.0	63.0	57.5	82.0%
31	82.0	52.0	0.07	60.0	63.0	57.5	82.0%	60.0	62.0	58.3	88.0%
32	74.0	52.0	0.20	59.0	61.0	57.3	88.0%	60.0	71.0	51.6	50.0%
33	76.0	56.0	0.12	60.0	63.0	57.5	82.0%	60.0	64.0	56.7	77.0%
34	72.0	58.0	0.02	60.0	62.0	55.1	68.0%	60.0	62.0	58.3	88.0%

Mean maximum temperature	75.68 F	Rainfall	
Mean minimum	51.31 F		
Maximum recorded temperature	82.00 F	Total rainfall	1.44 ins.
		Number of wet days	13
Minimum recorded temperature	42.00 F	Mean humidity 9 a.m.	75.80%
Extreme daily range	36.00 F	3 p.m.	54.40%
Mean daily range	24.37 F		
Extreme monthly range	40.80 F		
Mean monthly range	24.14 F		
Mean monthly temperature	63.50 F		

Day	9 a.m.			9 a.m.			9 p.m.		
	Sunshine during previous 24 hours. Hours.	Minimum Temperature (in screen) Degrees Fahr.	Rain. Inches.	Wet bulb.	Dry bulb.	Dew point.	Humidity.	Wet bulb.	Dry bulb.	Dew point.	Humidity.
1	7.5	54.0	0.30	57.0	59.0	55.2	88.0%	62.0	73.0	53.9	51.0%
2	7.4	54.0	0.00	58.0	62.0	54.6	77.0%	60.0	71.0	51.6	50.0%
3	7.2	55.0	0.00	58.0	60.0	52.5	76.0%	60.0	70.0	52.3	53.0%
4	7.2	55.0	0.00	57.0	60.0	54.4	82.0%	60.0	70.0	52.3	53.0%
5	6.0	54.0	0.02	57.0	61.0	53.5	77.0%	60.0	68.0	53.7	60.0%
6	6.0	46.0	0.04	56.0	58.0	54.2	87.0%	60.0	67.0	54.4	64.0%
7	7.4	52.0	0.02	56.0	60.0	54.5	76.0%	61.0	71.0	53.4	53.0%
8	7.5	47.0	0.00	55.0	62.0	54.0	77.0%	62.0	73.0	53.0	51.0%
9	7.5	51.0	0.03	58.0	62.0	54.0	77.0%	60.0	70.0	52.3	53.0%
10	7.5	53.0	0.80	56.0	58.0	54.2	87.0%	60.0	67.0	54.4	64.0%
11	6.8	55.0	0.54	56.0	58.0	54.2	87.0%	58.0	63.0	53.8	72.0%
12	6.8	55.0	0.01	56.0	58.0	54.2	87.0%	60.0	68.0	55.2	77.0%
13	6.8	55.0	0.08	56.0	57.0	55.1	93.0%	58.0	63.0	53.8	77.0%
14	6.4	55.0	0.42	57.0	58.0	56.1	93.0%	58.0	63.0	53.8	72.0%
15	6.2	53.0	0.08	56.0	58.0	54.2	87.0%	59.0	62.0	56.4	82.0%
16	6.2	52.0	0.00	54.0	56.0	52.1	87.0%	57.0	60.0	54.4	82.0%
17	6.2	43.0	0.10	55.0	56.0	54.1	93.0%	60.0	64.0	56.7	77.0%
18	7.6	47.0	0.00	56.0	59.0	53.3	82.0%	62.0	75.0	52.6	40.0%
19	7.7	36.0	0.00	56.0	63.0	55.0	77.0%	61.0	73.0	52.1	48.0%
20	6.8	55.0	0.45	58.0	60.0	56.2	88.0%	58.0	60.0	56.2	88.0%
21	7.2	52.0	0.00	58.0	62.0	54.0	77.0%	60.0	66.0	55.1	68.0%
22	7.1	52.0	0.00	55.0	58.0	54.2	81.0%	60.0	67.0	54.4	64.0%
23	6.8	55.0	0.00	55.0	59.0	54.4	76.0%	60.0	66.0	55.1	68.0%
24	6.5	50.0	0.00	56.0	59.0	53.3	82.0%	58.0	65.0	52.3	63.0%
25	6.0	50.0	0.00	54.0	55.0	53.0	93.0%	59.0	63.0	53.0	67.0%
26	6.0	50.0	0.00	54.0	56.0	52.1	87.0%	61.0	65.0	57.7	78.0%
27	6.1	53.0	0.00	54.0	55.0	53.0	93.0%	60.0	62.0	58.3	88.0%
28	6.5	54.0	0.00	55.0	57.0	53.2	87.0%	60.0	67.0	54.4	64.0%
29	7.4	45.0	0.00	56.0	57.0	53.3	82.0%	61.0	71.0	52.7	51.0%
30	7.5	47.0	0.00	53.0	57.0	49.3	75.0%	61.0	72.0	52.7	51.0%
31	7.8	49.0	0.00	55.0	59.0	51.4	76.0%	61.0	71.0	52.1	48.0%

Mean maximum temperature	68.65 F		
Mean minimum	52.03 F	RAINFALL	
Maximum recorded temperature	77.00 F	Total rainfall	2.43 ins.
Minimum recorded temperature	43.00 F	Number of wet days	12
Extreme daily range	29.00 F	Mean humidity, 9 a.m.	82.8%
Mean monthly range	16.62 F	9 p.m.	66.8%
Mean monthly temperature	60.34 F		

Day	9 a.m.			9 a.m.			9 p.m.		
	Sunshine during previous 24 hours. Hours.	Minimum Temperature (in screen) Degrees Fahr.	Rain. Inches.	Wet bulb.	Dry bulb.	Dew point.	Humidity.	Wet bulb.	Dry bulb.	Dew point.	Humidity.
1	7.5	48.0	0.00	55.0	59.0	51.4	76.0%	60.0	73.0	50.4	45.0%
2	7.7	45.0	0.00	58.0	63.0	53.8	72.0%	61.0	73.0	52.1	48.0%
3	7.5	46.0	0.00	56.0	61.0	51.7	72.0%	61.0	74.0	51.5	43.0%
4	8.0	48.0	0.00	56.0	61.0	51.7	72.0%	61.0	75.0	51.1	40.0%
5	8.5	46.0	0.00	60.0	65.0	55.9	73.0%	63.0	75.0	54.3	49.0%
6	7.8	42.0	0.00	55.0	61.0	48.8	67.0%	60.0	76.0	49.0	38.0%
7	7.8	50.0	0.00	54.0	61.0	47.9	64.0%	60.0	75.0	49.2	40.0%
8	6.8	54.0	0.00	55.0	57.0	53.2	87.0%	58.0	62.0	56.8	86.0%
9	7.7	55.0	0.00	57.0	60.0	54.4	82.0%	60.0	75.0	49.2	40.0%
10	7.6	55.0	0.00	57.0	60.0	54.4	82.0%	60.0	73.0	50.4	45.0%
11	7.6	54.0	0.11	57.0	59.0	55.2	88.0%	60.0	72.0	51.6	48.0%
12	7.5	53.0	0.00	56.0	59.0	53.3	82.0%	61.0	73.0	52.1	48.0%
13	7.7	55.0	0.00	60.0	65.0	55.9	73.0%	61.0	75.0	50.0	43.0%
14	7.1	56.0	0.00	58.0	62.0	54.6	77.0%	58.0	60.0	49.4	58.0
15	7.3	54.0	0.00	58.0	60.0	56.2	88.0%	60.0	72.0	51.6	48.0
16	7.6	53.0	0.00	58.0	62.0	54.6	77.0%	60.0	73.0	50.4	45.0
17	7.8	46.0	0.00	59.0	63.0	55.6	77.0%	61.0	74.0	51.5	45.0
18	7.6	50.0	0.00	56.0	62.0	54.7	72.0%	58.0	75.0		
19	7.7	50.0	0.00	56.0	60.0	54.5	76.0%	62.0	75.0	52.6	40.0%
20	7.3	51.0	0.00	55.0	58.0	54.3	81.0%	58.0	65.0	53.8	72.0%
21	7.4	50.0	0.00	55.0	58.0	52.3	81.0%	60.0	70.0	52.1	53.0%
22	7.3	53.0	0.00	58.0	60.0	56.2	88.0%	60.0	71.0	51.0	50.0%
23	7.0	54.0	0.00	55.0	57.0	53.2	87.0%	60.0	68.0	53.7	60.0%
24	7.8	45.0	0.00	56.0	60.0	52.5	76.0%	62.0	74.0	53.5	48.0%
25	7.5	50.0	0.00	58.0	63.0	53.8	72.0%	63.0	72.0	54.7	51.0%
26	7.7	57.0	0.00	59.0	62.0	56.4	82.0%	61.0	74.0	51.5	45.0%
27	8.0	57.0	0.00	60.0	64.0	56.7	77.0%	60.0	63.0	57.5	82.0%
28	8.2	52.0	0.07	60.0	63.0	57.5	82.0%	60.0	62.0	58.3	88.0%
29	7.4	52.0	0.20	59.0	62.0	57.3	88.0%	60.0	72.0	51.6	50.0%
30	7.6	50.0	0.12	60.0	63.0	57.5	82.0%	60.0	64.0	56.7	77.0%
31	7.2	48.0	0.02	60.0	66.0	55.1	68.0%	60.0	66.0	58.1	88.0%

Mean maximum temperature	75.03 F		
Mean minimum	51.84 F	RAINFALL	
Maximum recorded temperature	82.00 F	Total rainfall	1.42 ins.
Minimum recorded temperature	42.00 F	Number of wet days	3
Extreme daily range	36.00 F	Mean humidity, 9 a.m.	79.0%
Mean monthly range	40.80 F	9 p.m.	59.0%
Mean monthly temperature	24.14 F		
	63.01 F		

SEPTEMBER, 1910.

Day of month	Temperature of air (Fahr.) Mean for 24 hours	Departure from average	Rainfall	Sunshine	Temperature of air (Fahr.) 9 a.m. Dry bulb	Wet bulb	Dew point	Humidity	3 p.m. Dry bulb	Wet bulb	Dew point	Humidity	Max.	Min.	Evap.	Rain
1	75.8	8.0	0.55	3.0	61.0	57.3	88.0	60.0	69.0	55.3	37.0					
2	75.8	8.0	0.41	3.0	61.0	55.9	77.0	62.0	70.0	55.8	41.0					
3	70.0	3.0	0.44	5.0	65.0	54.1	68.0	62.0	72.0	54.5	34.0					
4	72.4	5.0	0.00	8.0	62.0	54.6	77.0	65.0	75.0	57.8	35.0					
5	74.0	7.0	0.00	8.0	61.0	55.4	82.0	66.0	72.0	58.0	61.0					
6	73.0	5.4	0.00	5.0	64.0	54.8	72.0	64.9	74.0	56.7	35.0					
7	73.0	3.3	0.00	5.0	64.0	54.6	77.0	64.0	74.0	56.7	35.0					
8	73.6	4.0	0.00	5.2	58.0	54.2	87.0	63.0	74.0	55.0	32.0					
9	75.0	5.0	0.0	3.0	63.0	54.1	68.0	62.0	74.0	53.2	48.0					
10	75.0	5.0	0.0	5.7	50.0	54.2	88.0	60.0	73.0	50.4	43.0					
11	76.0	4.0	0.00	5.0	62.0	54.6	77.0	60.0	74.0	49.8	43.0					
12	76.0	4.5	0.00	5.0	64.0	52.0	93.0	60.0	74.0	49.8	43.0					
13	76.0	5.0	0.00	5.0	57.0	54.2	81.0	60.0	74.0	49.8	43.0					
14	76.0	5.0	0.00	5.0	61.0	55.5	77.0	60.0	74.0	49.8	43.0					
15	74.0	4.0	0.00	6.0	63.0	55.6	73.0	61.0	69.0	54.8	60.0					
16	95.0	5.0	0.40	3.0	70.0	52.5	70.0	61.0	72.0	52.7	51.0					
17	78.0	5.0	0.00	3.0	65.0	54.1	68.0	62.0	70.0	52.1	43.0					
18	77.0	5.0	0.00	5.0	64.0	53.0	72.0	62.0	73.0	52.1	48.0					
19	78.0	5.0	0.00	6.0	67.0	56.4	68.0	61.0	70.0	54.0	57.0					
20	76.0	5.0	0.02	6.0	64.0	56.7	77.0	61.0	72.0	52.7	51.0					
21	76.0	5.0	0.00	6.0	64.0	56.7	77.0	62.0	78.0	56.9	39.0					
22	76.0	5.0	0.00	6.0	64.0	55.4	82.0	62.0	77.0	51.5	41.0					
23	81.0	5.0	0.00	6.0	61.0	60.0	57.0	62.0	75.0	52.0	40.0					
24	82.0	5.0	0.00	6.0	63.0	58.0	59.1	73.0	65.0	57.0	50.0					
25	81.0	5.0	0.20	6.0	62.0	60.0	58.8	78.0	66.0	68.0	53.7	60.0				
26	79.0	5.0	0.10	6.0	62	58.3	68.0	66.0	68.0	58.7	60.0					
	76.0	5.0	0.01	6.0		55.1	68.0	62.0	75.0	52.9	40.0					
	78.0	5.0	0.0	6.0		56.7	77.0	62.0	74.0	53.2	48.0					
	77.0	5.0	0.0	6.0	0.10	55.9	73.0	61.0	70.0	54.0	57.0					
		5.0		6.0	0.4	58	77.0	62.0	78.0	52.3	53.0					

Mean maximum temperature 77.08 F

Mean minimum 54 F

Maximum recorded temperature 86.0 F

Minimum recorded temperature 46.5 F

Extreme daily range 30.0 F

Extreme monthly range 36.5 F

Mean monthly range 26.72 F

Mean temperature 65.72 F

RAINFALL

Total rainfall 2.14 ins.

Number of wet days 10

Mean humidity 9 a.m. 77.06%

3 p.m. 50.80%

Mean maximum temperature 74.06 F

Mean minimum 50.10 F

Maximum recorded temperature 86.0 F

Minimum recorded temperature 46.5 F

Extreme daily range 27.5 F

Extreme monthly range 36.5 F

Mean monthly range 24.0 F

Mean temperature 62.08 F

RAINFALL

Total rainfall 2.14 ins.

Number of wet days 10

Mean humidity 9 a.m.

3 p.m.

Report.

RIGHT HONOURABLE
VISCOUNT MILNER, G.C., G.C.B., G.C.M.G., &c., &c.,
SECRETARY OF STATE FOR THE COLONIES,
DOWNING STREET.

As intimated by Your Excellency's telegram No. [illegible] of the 13th September, 1919, the proposal has been in abeyance owing to lack of funds, and I trust that the observations on pages 14-15 of the Report will be taken into account before any definite decision is reached on this question.

(c.) The Nairobi Water Supply.

Chemical treatment in the reservoir continues to engage attention and is being undertaken as opportunity offers. Negotiations are proceeding for the transferring the Water Supply to the Nairobi Municipality, and in such an event it is hoped to allocate funds for improving the system from the loan which the Municipality contemplate raising on their own behalf.

4. The congestion of work at the Government Press precludes the possibility of the Report being printed locally, and in view of the importance of its early issue I would ask that 250 copies may be printed in England. A similar procedure for the 1914-1918 Reports was suggested in my despatch No. 605 of the 23rd June, 1919.

52777

Doctor Kaunt[illegible] ...ing
...ice, and
...Township's
can arrange to take [illegible]
the Crown Agents for [illegible]
I shall be glad also if he may be
consulted on any question arising
out of this Report.

I have the honour to be
Your Lordship's
humble, obedient, servant

Edward Northey

GOVERNOR.

INCLOSURE

BACTERIOLOGICAL LABORATORY.

EAST AFRICA PROTECTORATE.

FOR THE YEAR

1910.

By.

Dr. W. H. Kauntze

M.B.E., B.A., M.B., Ch. B. (Oxon.),

M. B., B. S. (Lond.), M.R.C.S.,

L. R. C. P. (Lond.).

CHIEF BACTERIOLOGIST. E.A.P.

I. ORGANISATION.

As intimated in the Annual Report for 1918, Dr. Ross, Director of Laboratories, was invalided from the service on health grounds, and, though he did not leave the country till April, 1919, he was unfit for duty from January 1st, 1919 to that date.

From January 1st, 1919 to January 6th, 1919, Capt. Hughes, I.M.S. remained in charge of the Bacteriological Laboratory, but on Dr. Kaunhe's release from military service on January 7th, the latter officer took over charge and assumed the duties of his appointment as Pathologist and Asst. Bacteriologist. On the separation of the Bacteriological Laboratory from the Chemical Laboratory, and its reversion to the control of the Medical Department on April 1st, 1919, Dr. Kaunhe was appointed Senior Bacteriologist. The post of Pathologist and Assistant Bacteriologist thus left vacant remained unfilled during the remainder of the year. It was unfortunate that owing to the shortage of staff in the Medical Department, Dr. Kaunhe had to take over the duties of Resident Surgical Officer at the European Hospital, Nairobi, from November 1st, 1919, in addition to the duties of his permanent office, and this naturally curtailed all research work in the Laboratory from

routine work could be carried on and most of this had to be entrusted to the Indian assistants, Mr. Pillay and Mr. Mowjee, to whom an acknowledgement of their invaluable services is due.

In the early months of the year, an attempt was made to secure an European Laboratory Assistant, but negotiations fell through, and so far this position has not been filled.

Clerk J.X. Rodrigues returned from leave on January 11th, 1919.

The main advance in organisation that has been made during the year is the separation of the chemical and bacteriological divisions of the Laboratory, the former becoming a department of its own, the latter forming a section of the Medical Department retaining however its entity in that its staff remains separate from the Protectorate medical staff.

The Laboratory Staff now consists of:-

1. Senior Bacteriologist.
1. Assistant Bacteriologist.
2. Indian Laboratory Assistants.
1. Open Clerk.
9. African Laboratory Boys.

This is but the commencement of a much larger scheme which involves a new Laboratory building (the present one being most unsuited to the needs of bacteriological work) and an extension of staff. It is obvious that a building situated in the centre of the

town

924.

[redacted] in [redacted] a few yards of the windows, is [redacted] for bacteriological work in the Tropics where it is impossible to have dust-tight windows owing to the heat. Indeed this year has been a constant struggle to attempt to get uncontaminated media and cultures. This is not only wasteful of time but heart-breaking to those working in the laboratory. Furthermore the accommodation is [redacted] and it is almost impossible to find [redacted] all the work one wants to do. (See Appendix [redacted] Report.) The work during the year has increased enormously particularly [redacted] of public health work, and with the present staff and accommodation it is almost impossible to carry out any research work worthy of the name. In other words the scientific value of the laboratory is being reduced as a source of original knowledge. There are however some very important medical research problems which [redacted] investigation not only for the light which may [redacted] on disease, but also for their economical [redacted] regard to the labour question. It does not seem to be sufficiently realised that disease in relation to its effect on birth rate and death rate, is of great economic importance in a country where the monetary welfare of the great majority of the Europeans depends on the African labour supply. A deficient labour supply not only means increased difficulty in developing farms, but also higher wages. Dr. Ross in submitting his estimates for 1919-20 stated that in

[redacted]

[redacted] cow was apparently [redacted] of a native, and I quite endorse [redacted] large sum of money has been spent in fitting up a large and up-to-date veterinary research laboratory. Now cows can be replaced by importation from other countries, but once epidemic disease has raised the death rate so that it largely exceeds the birth rate in human beings, the native labour supply cannot be supplemented in a similar way. Dr. Clearkin, Medical Officer, Nyanza Province, in his annual report for 1919 gives the following information.

The percentage of children under 16 to women is

In the Nandi District	81%
" " South Kavirondo District	65%
" " Lumbwa District	141%
" " North Kavirondo District	109%
" " Kisumu District (Nilotic)	87%
" " Kisumu District (Bantu)	125%
" " Kisumu Township	99%

In the Nyanza Province therefore children under 16 only number 91 % of the number of adult women, and inasmuch as it may be taken that every native woman marries and becomes pregnant five times in her life at least, if we allow an average of 3 pregnancies for each woman enumerated in these statistics, we shall have made ample allowance for women ~~under 16~~ too young to have had five pregnancies, and for women so old that their children have grown up (old women are comparatively scarce in these districts). We may conclude

of [illegible] importance that [illegible] native, and I quite endorse this opinion. A large sum of money has been spent in fitting up a large and up-to-date veterinary research laboratory. Now cows can be replaced by importation from other countries, but once epidemic disease has raised the death rate so that it largely exceeds the birth rate in human beings, the native labour supply cannot be supplemented in a similar way. Dr. Clearkin, Medical Officer, Nyanza Province, in his annual report for 1919 gives the following information.

The percentage of children under 16 to women is

In the Nandi District	81%
" " South Kavirondo District	[illegible]
" " Lumbwa District	1[illegible]
" " North Kavirondo District	109%
" " Kisumu District (Nilotic)	87%
" " Kisumu District (Bantu)	1[illegible]%
" " Kyengoro District	9[illegible]%

In the Nyanza Province therefore children under 16 only number 91 % of the number of adult women, and inasmuch as it may be taken that every native woman marries and becomes pregnant five times in her life at least, if we allow an average of 3 pregnancies for each woman enumerated in these statistics, we shall have made ample allowance for women under 16 too young to have had five pregnancies, and for women so old that their children have grown up (old women are comparatively scarce in these districts). We may

all pregnancies
do not
result in children who
die under the age of
affairs.

In view of these facts it would seem that the future labour supply is in grave danger of depletion, and if any grave epidemic disease breaks out, such as plague, influenza, cerebro-spinal meningitis, diseases which have wrought havoc among the natives in the past, the country will be faced with such a shortage of labour that the continued existence of a farming community will be threatened. The diseases which are apparently responsible for a diminished birth rate and increased death rate are, however, not the epidemic diseases, but diseases which do not attract the attention they deserve because their effects are not seen in a large and sudden increase in the death rate but in a gradual and insidious diminution in numbers and efficiency of the native population. Such diseases requiring investigation are unclassified fevers (mostly of a typhoid like character and very common), intestinal infections, bacillary dysentries, helminth infections etc.. In addition it is of great importance that research work should be carried out on small pox and the possibility of there being various strains of the organism; on the distribution and varieties of malaria and its mosquito hosts; on the isolation of the local strains of pneumococcus and meningococcus; on the endemicity of plague in the Maragoli Hills and its cause; on the endemicity of bacillary dysentery amongst the Lake tribes and its cause; on the isolation of the bacilli causing dysentery and the preparation

[illegible] of the periodic outbreaks of disease amongst the Kavirondo and Kisii people; the classification of the bacterial flora of local water supplies and the significance of the various bacteria found; on the occurrence and distribution of stegomya with reference to the possibility of the introduction of yellow fever into East Africa; etc. etc.

It is now generally recognised that the future of medicine is more concerned with the prevention of disease than with its cure when developed, and this is still more true of disease in the Tropics where it tends to develop an epidemic form and to wipe out large portions of the native population. Such preventive measures as already exist have been founded on facts discovered in the laboratory, and in the future it must be the Laboratory to which the sanitarian will turn for the solution of the problems with which he is faced. It is therefore from the point of view of economics a sound investment to provide a well equipped and well staffed Laboratory as a preliminary to dealing with medical problems in the country. Such a Laboratory must be situated outside Nairobi yet in touch with the hospital there, and it must be well equipped and well staffed if it is to be of any value.

Improvements have been effected in the present laboratory buildings by the provision of a calf shed, and a small building containing a room for vaccinating calves and four stalls to hold calves during the incubation period. In the Laboratory itself the

the

form an office and Laboratory for the Senior Bacteriologist, and a work room for the Assistant Bacteriologist, and the old office has been divided to form an additional store room and a small library A new fence has also been placed round the compound. Minor improvements in organisation include a card index system of filing Laboratory results, with separate divisions for water analysis, Wassermann reactions, and stock cultures; and a simplified system of keeping stores and store ledgers.

WORK DONE.

A summary of the work done in the Laboratory during the year will be found in appendix A. The year has mostly been spent in doing routine work, much of which has formerly not been attempted as a routine measure in the Laboratory. New methods had consequently to be introduced and taught to the Indian assistants and this has taken much time. During the earlier part of the year the production of an efficient calf lymph was the most urgent necessity, and the first three months of the year were occupied in achieving this, as detailed below. Following on this a small epidemic of typhoid fever occurred amongst Europeans in Nairobi, with a few

sporadic

[illegible] cases in outlying parts of the Protectorate. This drew attention to the natural water supply, and the next few months were spent in standardising a routine method of water analysis which would give all essential facts and yet be capable of accomplishment with the apparatus available in the Laboratory. In addition as no facts existed in the country on which a fair standard of purity of water could be founded, an investigation of such facts had to be made. Hardly had investigations of Nairobi water begun, than the Medical Officer of Health, Nairobi, requested examination of various soda waters sold in the town. It was soon obvious that the preparation of soda water in Nairobi was not carried out with the care necessary to secure a safe water, and in consequence the control of soda water by the Health Officer has necessitated a very large number of examinations during the year. When it is realised that only three incubators of a size 14" x 12" x 12" are available, it will be seen that only by careful arrangement could such water analysis be carried on without interfering too much with the other work of the Laboratory. In the intervals of this work, examinations of milk for typhoid, and elaboration of Wassermann reaction methods had to be carried out.

A. CALF LYMPH PRODUCTION.

At the beginning of the year, it was obvious from reports arriving from various Medical Officers

that the calf lymph as issued was not giving satisfactory with a percentage of " takes " as might be expected. No unfavourable reports were received, but from conversation with one or two Medical Officers it was gathered that the lymph though more satisfactory than it had been previously, still gave a rather larger proportion of failures than might be expected. On investigation of the methods by which calf lymph was made it would seem that the potency of the lymph was adversely affected by several factors. In the first place since August 1914 practically all building has been at a stand still in the Protectorate, and in consequence no proper accomodation existed for the calves, and vaccination of the calves and collection of the pulp had to be carried out in the open air. There is no doubt that the sun could reach not only the pulp during its collection but also the lymph used for vaccination of the calf. Under such conditions of exposure to sun and dust, the wonder is not that the lymph had a proportion of failures, but that it ever took at all. Open air vaccination also permitted of dust infecting the pulp.

Secondly the pulp was collected on the sixth and again on the ninth day. Now even on the sixth day scab formation was marked, but on the ninth day the collection could scarcely have been more than material from the scabbing over of raw areas left after the collection on the sixth day, in other words the pulp was largely diluted by scab, and

that the calf lymph as issued was not giving as high a percentage of takes as might be expected. No unfavourable reports were received, but from conversation with one or two Medical Officers it was gathered that the lymph though more satisfactory than it had been previously, still gave a rather larger proportion of failures than might be expected. On investigation of the methods by which calf lymph was made it would seem that the potency of the lymph was adversely affected by several factors. In the first place since August 1914 practically all building has been at a stand still in the Protectorate, and in consequence no proper accomodation existed for the calves, and vaccination of the calves and collection of the pulp had to be carried out in the open air. There is no doubt that the sun could reach the pulp during its collection and also the lymph used for vaccination of the calf. Under such conditions of exposure to sun and dust, the wonder is not that the lymph had a proportion of failures, but that it ever took at all. Open air vaccination also permitted of dust infecting the pulp.

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and when it is considered that the pulp is converted into lymph by grinding up with an equal weight of glycerine and twice its weight of water, the dilution of the lymph is still more marked.

Thirdly although an ice chest existed in the Laboratory no ice had been obtainable for some considerable time. The lymph had therefore to be kept at room temperature (77°F) for six weeks before issue.

Fourthly no division of calves into " stock " calves and " test " calves existed and the lymph was used indiscriminately for issue to the public or for vaccination of stock calves.

Fifthly attempts to rejuvenate the lymph by passage through monkeys had failed owing to the death of the monkeys obtained for the purpose.

The first improvement effected was in the collection of the pulp. Every calf was examined at least once in every 24 hours from the end of 72 hours onwards, and the pulp was collected when the vesicles matured. Unfortunately as might be expected, the strain obtained from a smallpox patient in September, 1917 had apparently degenerated, and typical vesicles were almost unobtainable. It was sought to improve the strain by picking out the best vesicles, and using the pulp so obtained for the vaccination of stock calves, but even this did not result in a satisfactory result. It was therefore decided to scrap the strain as soon as a fresh one could be obtained from a case of human smallpox.

No case of human smallpox became available, and

while waiting for one, the 1917 strain was passed through buffaloes. This apparently caused a change in amount of improvement as better vesiculation was produced, and an increase in yield per calf was obtained. However before a human small pox case became available, orders were received from the Colonial Office to cease cultivation of small-pox virus except for experimental purposes and to obtain seed lymph from England for the vaccination of paste calves. When this arrived, it was possible to obtain a pulp from typical vesicles maturing between 96 and 120 hours after vaccination.

A second improvement was made by obtaining a supply of ice locally from March onwards and although this only maintained a temperature of about 5° C in the ice box, this was the best that could be done pending the arrival of an ice plant, an order for which was placed in England at the beginning of the year.

The third improvement effected was in the provision of proper accomodation for the calves. Two calf sheds were built, the larger one of which was divided into two, one half holding calves prior to vaccination, the other half calves after the pulp had been collected. The second shed contained a room in which vaccination of the calves and collection of the pulp was carried out, and four stalls for calves during the incubation period.

These improvements had been effected before the arrival in April of a confidential despatch from the Colonial Office embodying the recommendations of the

Advisory

Advisory Medical and Sanitary Committee for Tropical African Dependencies, the Committee advocated [illegible] that Kenya and Uganda should be activated preferably in Uganda, and, as a temporary expedient, that seed lymph should be sent from England for vaccination of paste calves, only lymph from such calves being issued to the public. The strain previously in use in B.E.A. at the same time was to be maintained only for further investigation.

Further recommendations were made in regard to the preparation of the lymph, but as all these had already been carried out with one exception, it is unnecessary to detail them. The exception was in regard to the storage of the Lymph. Dr. Ross was so convinced that the potency of lymph was maintained by storing the pulp unground with glycerine and water that this method was retained, but on the receipt of the despatch, the method advocated of grinding the pulp immediately after collection was substituted. No statistics are available to judge the relative value of the two methods.

The methods of vaccination of calves now employed in the Laboratory is as follows:-

(1). Heifers 6-12 months old are kept a week or more for feeding up and to determine freedom from disease.

(2). The abdomen of the calf is shaved, scarified and seed lymph rubbed in.

(3). After 72 hours, the heifers are examined at 24 hours intervals to determine maturation of the vesicles.

Advisory Medical and Veterinary Committee for Tropical Africa. This Committee advocated a Central Lymph Laboratory for East Africa and Uganda to be situated preferably in Uganda, and as a temporary expedient that seed lymph should be sent from England for vaccination of paste calves, only lymph from such calves being issued to the public. The strain previously in use in B.E.A. at the same time was to be maintained only for further investigation.

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(2). The abdomen of the calf is shaved, scarified and seed lymph rubbed in.

(3). After 72 hours, the heifers are examined at 24 hours intervals to determine maturation of the vesicles.

(4). When the vesicles are matured, usually about the [illegible] after vaccination, they are [illegible] removed from the vesicles and vesicles collected.

(5). The pulp so obtained is mixed with twice its weight of glycerine and twice its weight of water, and ground.

(6). The ground lymph is kept in bulk for six days at room temperature, and following this for five weeks at 5° C in the ice chest.

(7). The lymph is then filled into capillary tubes as required for issue.

[redacted]

It is difficult to judge the lymph in the absence of reports. Only one unfavourable one has been received however, and there is strong reason to believe that the technique of vaccination was at fault and not the lymph. From conversations on the subject with a few medical officers, the lymph is apparently taking quite satisfactorily though there is no information available as to its immunising qualities.

The question of a combined Lymph Institute for East Africa and Uganda is a question which needs serious consideration. There is no doubt that it would economise staff, but whether it would produce [illegible] lymph

(4). When the vesicles are matured, usually about 120 hours after vaccination, the scab is carefully removed from [illegible] and vesicles collected.

(5). The pulp so obtained is mixed with twice its weight of glycerine and twice its weight of water, and ground.

(6). The ground lymph is kept in bulk for six days at room temperature, and following this for five weeks at 5° C in the ice chest.

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~~[illegible]~~

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The question of a combined Lymph Institute for East Africa and Uganda is a question which needs serious consideration. There is no doubt that it would economise staff, but whether it would produce

a lymph

a lymph equally potent in the hot climate of Uganda and in the cold parts of the Mountain areas of East Africa is open to grave doubt. Uganda has consistently complained of the lymph produced in Nairobi both as regards its taking and immunising qualities.

The Medical Officer of Health Kampala states that he had better results with the Dar-es-Salaam lymph. Uganda is now making its own lymph, so no reports on Nairobi lymph since improvements were introduced in its manufacture, are available. It is suggestive however that lymph prepared in a hot climate such as that of Dar-es-Salaam works better in the rest of Uganda than lymph produced in the cool climate of Nairobi. Dar-es-Salaam lymph in Nairobi however has been tried and proved to be ineffective. It seems possible therefore that lymph produced in a hot climate is unsuitable for use in a cool climate. Certainly it is a matter to be enquired into before attempting to produce a lymph for E.A.A. in a Central Lymph Institute situated in Uganda. Otherwise E.A.A. might be in the same position that Uganda was with Nairobi lymph. Another fact which has been recorded by Medical Officers both in Uganda and in E.A.A. is that cases who have previously had small-pox, have been successfully vaccinated. The writer himself has seen two cases of confluent small-pox in natives well marked by an attack of small-pox only two and three years previously, one of these cases dying. In view of

these

these observations, it is within the bounds of possibility that a new strain of calf lymph exists, and this matter also requires investigation before it can be decided that one strain of calf lymph will serve the needs of Uganda and British East Africa.

One of the main problems in connection with calf lymph is its transport from the Laboratory to the centres where it is used. It is well known that glycerinated lymph rapidly loses its potency when taken off the ice and exposed to the air temperature. Dr. Ross introduced lymph dried in vacuo over concentrated sulphuric acid by the method of Achalme & Marie Phisalix and put up in exhausted sealed ampoules. This lymph has been found to retain its taking properties for two years even when kept at room temperature. It has been issued to the posts in the Northern Frontier Dist. now for some considerable time, and has apparently given satisfaction. It has also been supplied to the Administration, Tanganyika Territory from June 1919 to date. It is however more wasteful in use and requires more skill in making up on the part of the vaccinator. It has therefore not attained any great popularity in places where glycerinated lymph has been in use. One of the disadvantages that has occurred has been the breaking of the exhausted ampoules in the post. This I hope to rectify shortly by filling the ampoules with an inert gas after exhaustion. In the West African Colonies lanolinated lymph has been much used and is apparently more resistant to heat than glycerinated

lymph

lymph. An attempt was therefore made to manufacture it in Nairobi. Only a small quantity was produced as only commercial lanoline was available, and although it was purified as far as could be done with the apparatus available, grave doubts existed as to its freedom from chlorine and free acid. Apparently the doubts were justified as it was a complete failure. It is however hoped to make a further attempt as soon as pure lanoline is available from England.

E. MALARIA.

The attached table shows the incidence of malaria month by month in relation to the rainfall. As previously noted in the Annual Reports from this Laboratory, there was a large increase in number of cases of malaria following the long rains in March and April. Usually there is another increase following the short rains, but as these rains were very light in 1919 there is no apparent effect on the malaria curve.

As regards the varieties of malaria, there is a very marked fall in the number of cases of the [illegible] type. In 1918 there were 308 cases of Benign Tertian malaria and 435 cases of Subtertian malaria. In 1919 there were 90 cases of the former, and 540 cases of the latter. This change in type is probably due to the departure of military units, amongst whom the incidence of Benign Tertian malaria was formerly very high.

A survey

A survey of the Nairobi water supply, and of the various canals in the country is very necessary, as also an Entomological survey showing the distribution of the various mosquitoes particularly the varieties known to carry malaria.

	Benign Tertian Malaria	Quartan Malaria	Subtertian Malaria	Crescents	Large Mononuclear Increase & Pigmented Leucocytes.	Total cases showing parasites or evidence of Malaria.	Total rainfall Nairobi in inches.
January	7	-	17	1	2	28	0.24
February	6	-	32	4	-	41	3.22
March	5	-	39	4	-	45	7.69
April	6	-	35	2	1	43	6.88
May	4	-	38	1	-	42	3.46
June	13	4	154	2	2	173	0.22
July	18	-	100	4	4	122	2.43
August	5	2	50	3	1	58	1.12
September	7	1	31	3	1	42	2.14
October	9	1	18	2	2	30	3.64
November	6	-	12	2	-	18	3.35
December	1	1	13	1	7	22	1.85
TOTAL ...	90	12	540	31	22	664	36.24

[illegible] yielded B. typhosus on cultivation of the blood. The method used was to add 5 c.c. of the patient's blood drawn aseptically from a vein to 10 c.c. of sterilised ox bile in a test tube, incubating for 24 hours at 37° C, plating out a loopful of the culture on to a MacConkey plate and testing any resultant growth against a known B. typhosus serum, and by sugar reactions. A diagnosis could thus be given in 48 hours and therefore if the blood was taken in the early days of the disease, much earlier than the Widal reaction. The agglutination test (Widal reaction) for typhoid and allied fevers has given much ground for thought during the year. It is the exception rather than rule, in the cases tested, to find a positive result with the test before the end of 14 days even in the cases where B. typhosus has been isolated from the blood at an earlier date. For some reason there is an apparent delay in the production of the agglutinins in the blood in this country. In some cases the Widal reaction has not appeared till the third week of the disease when the temperature was falling. In one case the patient ran a temperature of 101 to 102° F. for three weeks. During this time she felt quite fit. The spleen was enlarged. No malaria parasites were found in the blood, and a differential leucocyte count was normal. At the end of this period the temperature came down for a couple of days, then rose again. A week later there was a positive Widal reaction (up to this time

quite sensitive in a dilution of 1/100, the spleen which had almost disappeared, enlarged, and rose spots appeared. In the Spring epidemic the disease was marked by the early appearance and severity of the toxic symptoms, and at that time the delayed Widal reaction was considered to be an indication of the failure of the tissues to react to the disease. The delayed reaction also occurred however in the mild cases which have appeared since, and this explanation must therefore be considered insufficient. Furthermore some cases do not show delay. This phenomenon was noted both with microscopic and macroscopic methods of testing the reaction.

Of the European cases which were positive by a blood culture yielded a bacillus agglutinating in high dilution with the standard anti-typhoid serum and giving the sugar reactions of a typical B. typhosus. The remaining European cases which were diagnosed by the results of the agglutination reaction gave positive reactions with B. typhosus only.

During the year there were four cases of para-typhoid fever diagnosed by the Widal reaction, two being positive to B. paratyphosus A and two B paratyphosus B. All four cases were in natives and blood cultures were unsuccessful.

E. DYSENTERY.

The number of cases of dysenteric stools sent to the Laboratory for examination has markedly diminished during this year, and this is apparently coincident with a

diminished

diminution in the incidence of the disease in Nairobi [illegible] as far as can be seen. Possibly it may be associated with the closing of the military camps and hospitals. This however would account only for a diminution in the number of imported cases, not for the lessened incidence amongst the civil population which has actually occurred. The epidemiology of the disease in this country still requires working out. Every facility apparently exists in Nairobi for its spread, yet some years there are but few cases and in other years there are many. There are undoubtedly many carriers both of amoebic and bacillary dysentery present among the population, particularly Asiatics and Africans. The sanitary system or lack of system lends itself to the diffusion of the excreta of these carriers. Flies are always present. Possibly there exists another factor necessary for the propagation of the disease.

The type also of dysentery has altered. During the period of the war, the prevailing type of dysentery was bacillary in origin. This has gradually diminished, so that during the whole of 1919, only one dysentery bacillus was isolated. This was a B. dysenteriae Flexner. On the other hand 32 cases showed Ent. Histolytica. The protozoon was only diagnosed when an amoeba corresponding in size and appearance to E. histolytica and containing red blood corpuscles was found. No amoebae corresponding

to

to 2. cases were seen. E. coli was found in 14 cases. It is probable that the number of dysenteric cases seen was in far excess of the [illegible] is a true criterion of the occurrence of dysentery throughout the country. The large increase of dysentery in Nairobi occurred at the time when there was a large military population in the town, mainly made up of African troops and carriers. Amongst these men dysentery was rife. Now of course these men are back for the most part in their own country and returns from the outside districts are hard to obtain for such a disease. The question of dysentery and dysenteric carriers in the native reserves is one requiring investigation, particularly as to the amount of disability it causes, and as to the type of the disease, amoebic or otherwise. Until that is done we can form no true opinion on the epidemiology of the disease and its prevention.

E. HELMINTHIASIS.

This is a question of the utmost importance to the health of the native. It has not yet been realised to what an extent natives harbour intestinal parasites, and the amount of disability arising therefrom. Of 200 persons examined at Kisumu in 1913 by Dr. Jewell 84.5 % were infected with worms. In 282 post mortems performed at the Carrier Corps Hospital Nairobi, 67 % showed helminths. In 146 native police examined by Dr. Shircore 72.6% were infected. In a series of 745 dysentery cases examined by Dr. [illegible] 20.5% showed infection,

while

[illegible] in 200 [illegible] non-dysenteric cases, he found helminths in [illegible] Indian [illegible] recruits (i.e., men who had just come from the reserves and been passed as fit for active service) who contracted dysentery, he found 91% were infected with hook worms. Out of 819 stools examined for helminths in the Laboratory during 1919, 39.9 % gave positive results. This percentage is low, however, since the negative results were increased by stools being sent in again for examination after anti-helminthic treatment, the majority of cases being then negative. Although it is extraordinary how little some natives seem to be affected even by very heavy worm infections, yet there is little doubt that such infections reduce markedly the man's resistance to disease, particularly to intestinal disease, and also reduce a man's capacity for hard work. The subject is one which requires a considerable amount of investigation, not only as to the actual incidence of infection amongst the natives in the reserves, but also as to the intermediate hosts. Undoubtedly many natives infected with ankylostomes while on active service carried the worm back to the reserves, and it would seem that before long we may be faced with the same problem that ankylostomiasis has presented in other parts of the world.

As regards the actual findings in the Laboratory during 1919, the number of stools in which the various

944

Various worms were found thus as follows:-

Of 819 stools examined,

Ova of A. duodenale were found in 181 cases = 22.1%

Ova of T. saginata were found in 123 cases = 15.0%

Ova of T. trichiura were found in 75 cases = 9.2%

Ova of A. lumbricoides were found in 31 cases = 3.8%

Ova of S. mansoni were found in 15 cases = 1.8%

Larvae of S. stercoralis were found in 9 cases = 1.1%

Double infections occurred in 54 cases = 6.6%. They were as follows:-

Ova of A. duodenale & T. saginata 32 cases

" " A. duodenale & T. trichiura 9 cases

" " T. saginata & T. trichiura 7 cases

" " A. duodenale & A. lumbricoides 5 cases

" " A. lumbricoides & T. trichiura 1 case

Triple infections occurred in 18 cases = 2.2%

They were as follows:-

Ova of A. duodenale, T. saginata and T. trichiura 15 cases

Ova of A. duodenale, A. lumbricoides and T. trichiura 3 cases

At the beginning of the year the occurrence of Bilharzia in natives living close to Nairobi on shambas suggested the possibility of their infection in the local streams and the systematic examination of the streams around Nairobi was commenced.

This

This persisted ceased in November when the duties of R.S.O. European Hospital fell on the Senior Bacteriologist. Up to that time however the search for infected snails was abortive, all examined proving negative.

F. PYREXIAS.

During the year there have occurred several cases of fever, in which the pyrexia has lasted for three or more weeks. In some the initial pyrexia was high about 103° F. and this was especially the case with children. In other cases the pyrexia was comparatively low running about 100° - 101° F. In all these cases, except for a slightly enlarged and tender spleen, there were very few other symptoms. Slight headache, slightly furred tongue, and in few cases a slight feeling of malaise were all the symptoms that were noticed. The Widal reaction was consistently negative to B. typhosus, to B. paratyphosus A and B, and to M. melitensis. Blood cultures failed in every case, except for one child from whose blood a staphylococcus was isolated. This was agglutinated by the patient's serum. As the staphylococcus corresponded to S. albus, it may have been a contamination and the high agglutinin content of the patient's serum a coincidence. It is intended to conduct further investigations into these anomalous fevers as soon as staff and accomodation is available.

G. [illegible] ARTHRITIS.

[illegible] ATROPHIC ARTHRITIS.

This subject is still under investigation. Five cases have come up for vaccine treatment during the year. The first of these was in a young man who had suffered for some years, and was getting progressively worse. The left shoulder was unmovable, his right wrist had practically no movement, and his elbows were only movable to a limited extent. His feet had become so painful at times as to prevent him walking. His pain and disability were worse in wet weather. There was no sign of pyorrhoea or gonorrhoea, and no history of any previous venereal disease. From his stool eight or nine lactoe fermenting bacilli were isolated. These were tested against the patient's serum, and one of them was agglutinated in a dilution of 1 in 300 of the serum. From this bacillus a vaccine was made up and inoculations were commenced with a dose of 50 million bacilli. In a week's time the dose was doubled, and the doubling of the dose was continued at intervals of 10 to 14 days. After four injections the patient said he felt better, after six injections there was a little increase in movement in the affected joints and after ten injections the amount of recovery in the joints was remarkable. At the same time weather conditions ceased to affect the pain. After 20 injections the patient was feeling very fit, he had recovered a considerable amount of movement in his arms, and all pain had disappeared. Some time after this patient began to recover, a lady came in the

early stages of rheumatoid arthritis. A bacillus was isolated from her stool which was agglutinated 1 in 250 by her blood serum. Three injections cured this case completely. No pain and no disability remained. Shortly after this three more cases arrived in rapid succession. These were all much more advanced ones, almost as much so as the first case. They are still under treatment, but already exhibit a good deal of improvement. In all three the vaccine made was from the bacillus in the stool which was agglutinated by the individual's serum. It would seem that here the arthritis was due to infection from the intestine by a definite bacillus and that such infection could be dealt with by a vaccine. Naturally once bony changes have taken place in a joint, the most that can be hoped for is the stopping of the disease from further progress, and partial recovery from the disability. Five cases are of course too few to judge from and much more work must be done before one can draw any certain conclusions.

H. WATER ANALYSES.

As stated above these have occupied much time and thought during the year. The number of such analyses which had been previously carried out were very few, and had been limited practically to plating out on MacConkey's lactose bile salt neutral red agar and then isolating lactose fermenters therefrom. When the question of a bacteriological examination

of the

of the Nairobi water supply came up, it seemed necessary to elaborate the technique especially as the Principal Sanitation Officer requested that the water might be examined at regular intervals. Consequently it was decided to make the tests as exhaustive as possible without taxing the Laboratory Staff and equipment too much. Naturally the whole labour of the Analyses fell on the Bacteriologist as it was obviously work which could not be left to Indian Assistants unaccustomed to it.

The first examination of the Nairobi water supply was made soon after the reservoir was cleaned out. The supply is obtained from a number of springs at Kikuyu (roughly sixteen miles from Nairobi) and the water is collected in a small valley which has a dam built across it.

The actual reservoir which is formed by the floor of valley, is surrounded by a cement catchment drain to collect surface water. This catchment drain at the time of the first examination of the water was in bad repair and allowed surface water to leak into it. The sides of the valley were covered by long grass and bush. A corrugated iron fence ran round the valley, not at the top of the slope but at a little distance down. Outside this corrugated iron fence, there was a horse boma full of dung. The surface water from this was bound to travel down into the valley whenever there was heavy rain. On the top of the hill is situated Kikuyu Station with a number of native huts. The water from the reservoir passes

unfiltered

unfiltered into the main to the distributing tanks in Nairobi. The reservoir which open requires cleaning every year owing to the growth of algae and aquatic plants. The cleaning was accomplished by running off most of the water and sending in a number of natives who paddled about in the pools left, pulled up the plants and usually remained in the reservoir the whole day. ~~I am informed by eye~~ witnesses that urination and defaecation actually took place into the reservoir ~~by these natives~~. The reservoir was then allowed to fill again, and left for another year. Naturally when an outbreak of typhoid occurred in Nairobi soon after the cleansing of the reservoir, the water was suspected. B. typhosus however was never found, but the examination showed so bad a state of the water that various plans were proposed for its improvement. It was decided as an experiment that bleaching powder should be added in certain proportions to the water and the free chlorine removed by the addition of sodium sulphite to the water in the main just beyond the reservoir. This plan has not yet been carried out, as no supply of bleaching powder has been available. The next article to which attention was drawn was the soda water from the various factories in Nairobi. Some of these factories seem fairly reliable from the sanitary point of view, others were not so good. Examination of the soda water showed in most cases however a high bacterial content with an unsatisfactory B. coli count, indeed many

indeed many of the samples were somewhat worse than the water from the Nairobi municipal river supply in spite of filtration. The source of the additional contamination was sought, and the two points at which it apparently occurred were in the storage of the water after filtration in an open tank exposed to dust, etc., and in the use of bottles cleaned out with Nairobi water with a wire brush of doubtful cleanliness. Since the discovery that the soda water was liable to contamination, control of the factories has been maintained by bacteriological examinations at regular intervals.

The main difficulty has been the fixing of some standard by which the purity of the water could be judged. It is obvious that the number of B. coli may be large owing to their entrance into water from bird droppings, vegetation etc. but in a water undoubtedly liable to pollution from human sources, it would be unsafe to pass as satisfactory a large B. coli count on these grounds. Rather than give a false sense of security by presenting satisfactory reports, it seems better to maintain a high standard and hope that the water may come to conform to it either by the provision of a proper storage reservoir followed by filtration, or by chemical disinfection. Thresh lays down in his book " The Examination of Waters and Water Supplies " that

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the

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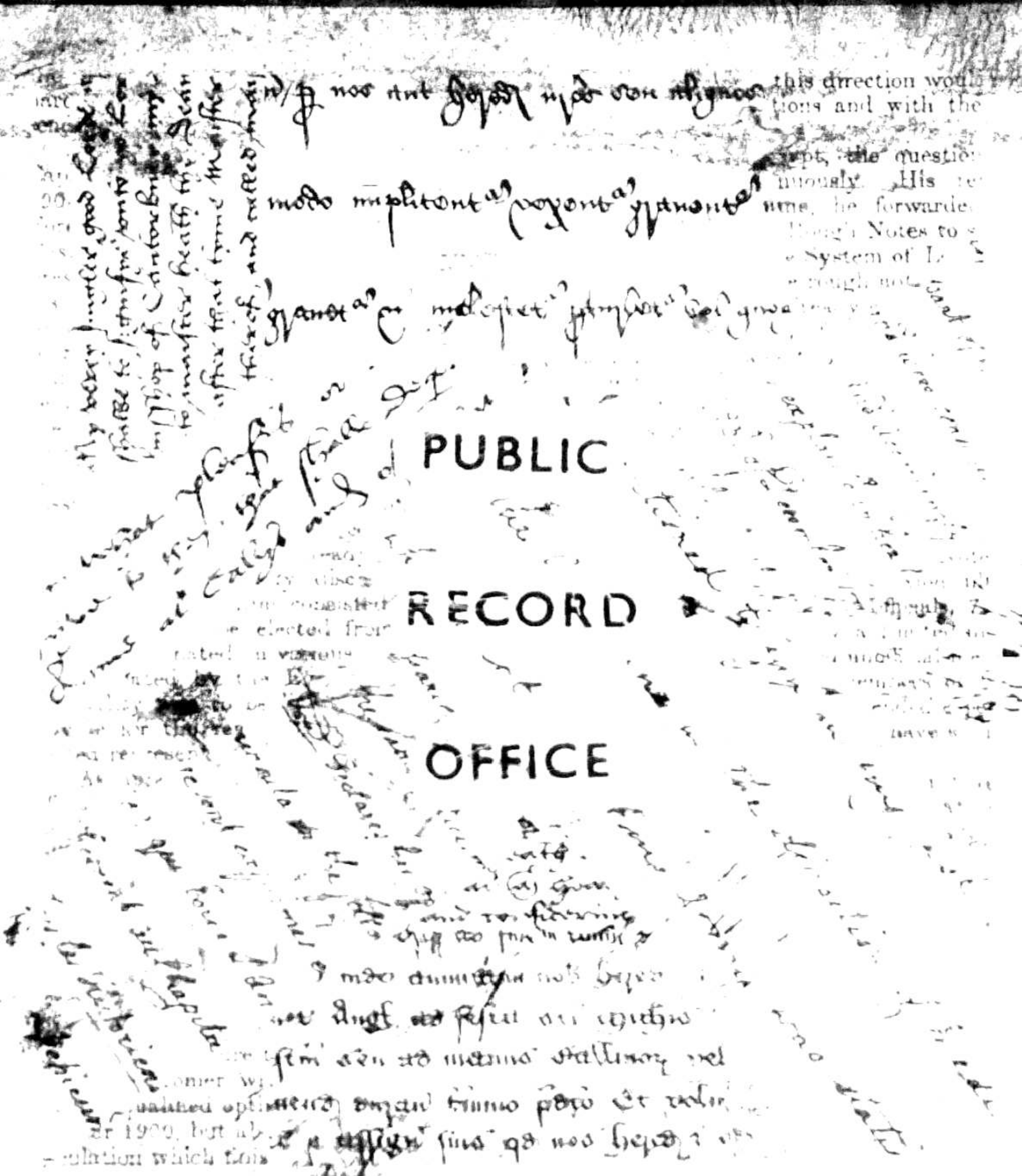
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