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UGANDA PROTECTORATE.



—●—
ANNUAL

MEDICAL AND SANITARY REPORT

FOR THE

YEAR ENDED 31ST DECEMBER, 1920.

Published by Command of His Excellency the Governor.



ENTEBBE :

PRINTED BY THE GOVERNMENT PRINTER, UGANDA.

1921.

EGYPTIAN PROTECTORATE

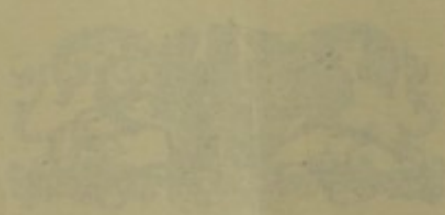


ANNUAL

MEDICAL AND SANITARY REPORT

Year ended 31st December 1901

Compiled by the Inspector of the Egyptian Protectorate



PRINTED

at the Egyptian Protectorate Press, Cairo

1902

PRINCIPAL MEDICAL OFFICER'S OFFICE,

ENTEBBE, UGANDA,

25th April, 1921.

SIR,

I have the honour to submit, for the information of His Excellency the Governor and for transmission to the Right Honourable the Secretary of State, the Medical Report on the health and sanitary condition of the Uganda Protectorate for the year 1920, together with the Returns, etc., appended thereto.

I have the honour to be,

Sir,

Your obedient servant,

C. A. WIGGINS,

*Principal Medical Officer,
Uganda Protectorate.*

THE HONOURABLE

THE CHIEF SECRETARY TO THE GOVERNMENT,

ENTEBBE.

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UGANDA PROTECTORATE.

ANNUAL MEDICAL REPORT

FOR THE

YEAR ENDED 31st DECEMBER, 1920.

Section I.

ADMINISTRATIVE.

(A) Medical Staff.

(1) THE ESTABLISHMENT FOR 1920 WAS:—

EUROPEAN.

Principal Medical Officer.	1 Sanitation Officer.
Deputy Principal Medical Officer.	3 Medical Officers of Health.
Principal Sanitation Officer.	1 Dental Surgeon.
Specialist Officer, Venereal Diseases.	1 Matron.
4 Senior Medical Officers.	4 Nursing Sisters.
22 Medical Officers.	1 Laboratory Assistant.
1 Bacteriologist.	1 European Sleeping Sickness Inspector.
1 Entomologist.	1 European Sleeping Sickness Inspector (Temporary).

ASIATIC.

1 Assistant Surgeon.	22 Sub-Assistant Surgeons.
2 Senior Sub-Assistant Surgeons.	8 Compounders.

NATIVE.

A varying number of Native Attendants including:—

Hospital and Dispensary Attendants, etc.	Plague Inspectors.
Isolation Hospital and Camp Attendants.	Sleeping Sickness Inspectors.
Clerks and Interpreters.	Menial Staff.
Native Vaccinators.	

(2) SHORTAGES ON ESTABLISHMENT:—

(a) *European.* At the beginning of the year there were 13 Medical Officers on the Staff List instead of 22. Two vacancies were filled during the year and the new men arrived in November. No Medical Officers of Health were appointed during the year. There were thus 12 vacancies for practically the whole year.

(b) *Asiatic.* There were 12 vacancies in the establishment of 22 Sub-Assistant Surgeons throughout the year. The three vacancies in the establishment of eight Compounders were filled during the year but two of the newly appointed men were unsatisfactory.

(3) CLERICAL STAFF AT HEADQUARTERS:—

European:—Office Superintendent, Clerk, Medical Storekeeper.

Asiatic:—Four 3rd Grade Clerks, one 4th Grade Clerk, one Temporary Clerk.

African:—One Native Clerk.

(4) APPOINTMENTS, CHANGES, ETC., IN STAFF:—

<i>Appointments</i> —Dr. J. H. Neill, Medical Officer	....	....	26- 7-20
Dr. S. R. Eccles-Davies, Medical Officer	....	....	19-10-20
Mr. C. O'Connor, Temporary Sleeping Sickness Inspector	....	....	22- 3-20
Mr. C. E. Haddon, Laboratory Assistant	....	....	31-12-20*
Mr. T. G. A. Rodrigo, 4th Grade Asiatic Clerk, P.M.O.'s Office (Temporary)	....	....	22- 5-20

* Did not arrive in Uganda until 3rd January, 1921.

	Mr. K. J. Raja, Sub-Assistant Surgeon	....	27-12-20
	Mr. Govardhana Row, Compounder	....	24- 2-20
	Mr. Aziz Ahmed, do	....	24- 7-20
	Mr. Balmukand Gopal, do	....	13- 8-20
	Mr. Verhomal Lokhmal, do	....	13- 8-20
<i>Promotions—</i>	Dr. C. H. Marshall, to be Senior Medical Officer	31-	3-20
	Major H. B. Owen, D.S.O. do do	....	1- 4-20
	Dr. G. D. H. Carpenter, M.B.E. do do	....	1- 4-20
	Dr. J. A. Taylor, do do	....	3-10-20
	Miss E. M. Pratt, Nursing Sister, to be Matron	....	1- 5-20
<i>Resignation—</i>	Mr. Govardhana Row, Compounder	....	23-10-20
<i>Dismissal—</i>	Mr. Aziz Ahmed, Compounder	....	14- 9-20
<i>Retirement—</i>	Major H. B. Owen, D.S.O., Senior Medical Officer, on Pension	....	2-10-20
<i>Invalidings—</i>	Major H. B. Owen, D.S.O., Senior Medical Officer. Miss B. Petherbridge, Matron.		
<i>Deaths—</i>	Nil.		

(5) LEAVE :—

The following were on leave during the period stated opposite their names :—

	<i>From</i>	<i>To</i>
Dr. C. J. Baker, P.S.O. ...	1- 1-20	1- 2-20
Major G. J. Keane, D.S.O. ...	1- 1-20	17- 8-20
Dr. R. A. L. van Someren ...	1- 1-20	24- 4-20
Major H. B. Owen, D.S.O. ...	1- 1-20	2-10-20 (Retired on Pension).
Dr. C. H. Marshall, S.M.O. ...	5-11-20	End of year
Dr. J. A. Taylor, S.M.O. ...	1- 1-20	End of year †
Dr. G. D. H. Carpenter, M.B.E., S.M.O. ...	1- 1-20	19- 9-20
Dr. J. M. Collyns, Sanitation Officer... 12-	4-20	End of year
Major G. Lane, R.A.M.C. (B) ...	19-12-20	End of year
Dr. J. H. Goodliffe ...	1- 1-20	End of year
Dr. J. E. Hailstone ...	9- 2-20	End of year
Dr. R. E. McConnell ...	15- 6-20	End of year
Dr. H. R. Neilson ...	8- 2-20	End of year
Dr. W. L. Webb ...	1- 1-20	11- 1-20
Dr. R. S. Taylor ...	1- 1-20	19- 9-20
Dr. W. L. Peacock ...	1- 1-20	23- 3-20
Mr. G. Bateman, Dental Surgeon ...	1- 1-20	6- 3-20
Miss B. Petherbridge, Matron ...	1- 1-20	30- 4-20 (Retired on Pension).
Miss E. M. Pratt, Matron ...	8- 2-20	End of year
Mr. H. Flint, Office Superintendent... 30-	3-20	End of year
Mr. C. W. V. Gittins, S.S. Inspector... 10-	5-20	End of year
Senior S.A.S. K. R. Kanade ...	1- 1-20	23- 3-20
S.A.S. Gokal Chand ...	1- 1-20	23- 3-20
S.A.S. Ram Chand ...	11- 7-20	End of year
S.A.S. Ahmed Din ...	15- 5-20	3-12-20
Compounder Ghulam Haider ...	1- 1-20	19- 5-20
Mr. Sohan Singh Sandhu, 3rd Grade Clerk ...	1- 1-20	26- 1-20
Mr. M. P. D. D'Souza, 3rd Grade Clerk	1- 1-20	23- 3-20
Mr. M. N. D'Souza, 3rd Grade Clerk	2- 5-20	8-10-20
Mr. C. Moniz, 3rd Grade Clerk ...	9-10-20	End of year

The shortage of European Staff was again serious for the greater part of the year, partly due to the difficulty experienced in filling vacancies and partly due to the large number of the staff who were on leave working off arrears due to the war.

The shortage of Asiatic Assistants remains as great as before. On September 1st, 1919, the minimum rate of pay of Sub-Assistant Surgeons was increased but this has not proved sufficient to attract candidates.

Again it has to be reported that no start has been made with the Medical School, and the Mengo Medical School was closed throughout the year.

The Office Superintendent was absent on leave for 9 months and the whole of his work has been thrown on to the shoulders of the European Clerk, Mr. Bott, who has done extraordinarily well.

† Transferred from Federated Malay States to Uganda Protectorate.

(B) Financial.

Estimated Expenditure for period 1st April, to 31st December, 1920.

Medical Division.

PERSONAL EMOLUMENTS.—	£
Principal Medical Officer and Deputy Principal Medical Officer	1,359
Clerical Staff, Medical Storekeeper, Packers, Messengers, etc.	966
Medical Officers	8,301
Senior Medical Officer, Entomologist and Subordinate Staff for the suppression of Sleeping Sickness	1,400
Specialist Officer and Subordinate Staff for the suppression of Venereal Diseases	2,173
Dental Surgeon	470

Sanitation Division.

Principal Sanitation Officer, Sanitation Officer, Medical Officers of Health and Subordinate Staff for the suppression of Epidemic Diseases	3,699
---	-------

Laboratory Division.

Bacteriologist and Subordinate Staff	830
TOTAL PERSONAL EMOLUMENTS	£19,198

OTHER CHARGES.—

Administrative Division—Incidental expenses	250
Medical Division—General—Miscellaneous	3,696
For the suppression of Sleeping Sickness	1,777
For dealing with Venereal Diseases	820

Sanitation Division.

Anti-Malarial Measures (petty)	450
Equipment and Upkeep of Infectious Hospitals and Camps	1,000
Miscellaneous	1,100
Laboratory Division—Miscellaneous	887
TOTAL OTHER CHARGES	£9,980

Special Expenditure.

Furniture, Equipment and Fittings for Venereal Diseases Treatment Centres	400
Furniture and Equipment of Native Hospitals	300
Furniture and Equipment of European Hospitals	100
Travelling Equipment for District Medical Officers, 6 @ £100 each	600
Motor Launch for Sleeping Sickness Patrol Work	1,000
Experiments in the permanent eradication of buck and fly in the riparian belt through close grazing by cattle and goats	375
Experiments in control of game and other large animals on fly infested islands	70
	£2,845

Hospitals and Dispensaries.

PERSONAL EMOLUMENTS.—

Nursing Staff	668
Indian Medical Assistants	2,955
Native Attendants	900
Miscellaneous Allowances	38
	£4,561

OTHER CHARGES.—

Medical and Surgical Stores	3,750
Upkeep and Equipment of Hospitals	1,025
Miscellaneous Charges	1,460
	£6,235

N.B.—Owing to the change in sterling value of the Rupee from 1/4 to 2/-. 50 % for conversion at Rupees Ten to the £ was subsequently added (less various items for stores and equipment purchased at Home and which were estimated in sterling) making the total estimated Expenditure for the period under review, viz., April 1st—December 31st, only £60,554.

Section II.

PUBLIC HEALTH.

(A) Vital Statistics.

The Births and Deaths for the five Kingdoms—Buganda, Busoga, Bunyoro, Ankole and Toro, are given in Tables IIIA, B, C and D.

As in former years, the diagnoses in Table IIIA may not be correct, but the Administrative Officers consider that the total figures in all the Tables may be accepted as fairly accurate.

For the first time for four years the number of births exceeds the number of deaths, and it is hoped that this relation will be maintained in the future.

Compared with 1919, there is a decrease in the number of deaths of 7,563, and an increase in the number of births of 5,600, thus a welcome change is made from a total decrease of 12,951 to a total increase of 212. One of the chief causes of a decrease in the number of deaths is the decline of Influenza, 7,893 less deaths being reported.

Of the three other deadly Epidemic Diseases, Plague shows an increase due to an outbreak in Busoga, Smallpox shows a slight reduction, and Cerebro Spinal Fever a slight increase.

All the Districts show an increased number of births over the figures for 1919 except Toro, and the increase in Buganda, Busoga and Ankole are all substantial ones, the total increase being 5,600.

The number of still-births is still very high but the percentage of still-births to total births is lower than in 1919.

In last years' Report I wrote "If this state of affairs is to be remedied action must be taken at once." With the still existing shortage of Staff things are bound to move slowly. I am glad to be able to report however that a start is being made.

Major Keane, D.S.O., the Specialist Officer in charge of the Anti-Venereal campaign, returned from leave in August, but owing to lack of accommodation was unable to open the Treatment Centre at Mulago before the end of the year. Dr. Webb was seconded to assist him in December to open the Venereal Diseases Laboratory, and a definite start should be made in two or three months time.

The establishment of Branch Dispensaries has not yet materialised but some are now in course of erection and their equipment is on order.

The long-wished-for Medical School is now sanctioned, the money is definitely promised for 1921, an excellent site has been chosen and approved, and a Central Technical Education Board has been formed to plan a scheme for the education of natives for work in all the main Government Departments.

The saving of time that will be afforded to a Medical Officer by a boy trained in Microscope work is enormous. Some natives show great aptitude for this work, and the returns will be of far more value directly we have a trained youth at each Dispensary.

The Mengo Medical School attached to the widely known C.M.S. Hospital at Namirembe was unfortunately closed throughout the year owing to lack of European teaching staff.

The new building for the Lady Coryndon Maternity Training School was started early in the year and excellent progress has been made so that this should be opened and training started in the new quarters by the middle of 1921.

Five of the first batch of Native Midwives to earn a Certificate were located in outlying districts during the year and did good work under the supervision of members of the Church Missionary Society, but it will take some time before this innovation is accepted by the general population.

The great need now is for—

(1) Medical Officers of Health. There should be one in each District, but there is not one in the Protectorate. Table III shows the distribution of the Staff on December 31st, 1920.

(2) Hospital Buildings, both for general and infectious cases. In this a start will be made during 1921, £9,200 being allocated for this purpose out of the Loan.

(3) Lunatic Asylum. It is much to be regretted that this has again been postponed, and that it is not included in the Estimates for 1921.

TABLE IIIA.—TABLE OF DEATHS FOR THE FIVE DISTRICTS OF BUGANDA, BUSOGA, BUNYORO, ANKOLE AND TORO FOR THE YEAR 1920.
CAUSE OF DEATH.

COUNTY.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Influenza.	C. S. M.	Fever.	Sleeping Sickness.	Plague.	Small-pox.	Measles.	Syphilis.	Gonorrhoea.	Dysentery.	Diarrhoea.	Leprosy.	Cancer.	Tuberculosis.	Malaria or Bilharzia (Malaria Fever)	Dropsy.	Chest Complaints.	Pits.	Paralysis.	Abscess.	Wounds and Injuries.	Snake-bite.	Child-birth.	Other Causes.	Total Deaths.	Total Births.	Still-Births.
Buganda ...	1,171	1	3,264	—	227	16	5	1,192	1,142	55	183	128	328	392	321	131	1,513	91	1,108	82	31	47	199	2,809	14,469	12,265	1,127
Busoga ...	—	—	324	28	725	288	72	407	182	231	511	90	17	8	130	105	873	57	568	44	1	17	145	2,162	6,940	9,005	484
Bunyoro ...	117	2	95	2	—	1	3	91	62	49	134	32	62	79	62	42	633	33	104	14	16	7	50	889	2,669	1,597	953
Ankole ...	822	318	1,752	10	98	—	15	585	34	77	83	36	148	383	209	39	94	35	131	17	20	41	150	933	6,093	6,529	773
Toro ...	202	340	123	17	2	2	6	74	60	91	7	14	56	116	188	115	115	9	3	8	4	26	96	586	2,260	3,107	1,478
TOTALS ...	2,345	651	5,558	57	1,052	302	101	2,349	1,480	508	918	300	611	978	910	492	3,258	225	1,917	165	72	138	640	7,379	32,351	32,563	4,815

TABLE III B.—NATIVE POPULATIONS—BIRTHS, DEATHS AND RATES PER 1,000 FOR PROVINCES OR DISTRICTS FOR WHICH RETURNS MADE, AND PERCENTAGE OF STILL-BIRTHS TO TOTAL BIRTHS.

1920.	BUGANDA.	BUSOGA.	BUNYORO.	ANKOLE.	TORO.	TOTALS.
Population ...	791,218	247,645	92,660	266,606	126,125	1,594,254
	Births (living)	Births (living)	Births (living)	Births (living)	Births (living)	Births (living)
	12,265	9,005	1,597	6,529	3,167	32,563
	Deaths	Deaths	Deaths	Deaths	Deaths	Deaths
	14,469	6,980	2,609	6,083	2,260	32,351
Rates per 1,000 ...	15.50	36.36	17.23	24.48	25.11	21.96
	18.28	28.18	28.15	22.62	17.92	21.22
Still-Births per cent of Total Births and Still-Births	1,127 = 8.23 per cent	484 = 5.10 per cent	953 = 37.37 per cent	773 = 10.58 per cent	1,478 = 31.81 per cent	4,815 = 12.98 per cent

TABLE IIIc.

SHOWING THE NUMBER OF BIRTHS, DEATHS AND STILL-BIRTHS IN THE SAME FIVE DISTRICTS FOR THE LAST SEVEN YEARS.

BIRTHS (LIVING).

	BUGANDA.	BUSOGA.	BUNYORO.	ANKOLE.	TORO
1914	9,061	9,470	4,737	5,863	3,933
1915	8,319	9,634	3,081	5,577	3,739
1916	9,737	12,093	1,763	5,877	3,509
1917	8,818	11,132	1,680	6,214	3,029
1918	10,287	10,782	1,649	6,615	3,729
1919	9,512	6,918	1,284	5,518	3,731
1920	12,265	9,005	1,597	6,529	3,167
TOTALS ..	67,999	69,034	15,791	42,193	24,837

DEATHS.

1914	10,949	7,770	4,852	4,290	1,729
1915	12,231	7,228	3,043	5,434	1,474
1916	12,802	7,771	2,280	5,079	1,645
1917	13,203	8,892	3,126	5,357	1,446
1918	14,160	9,229	4,500	5,839	2,072
1919	15,221	10,053	3,345	7,388	3,907
1920	14,469	6,980	2,609	6,033	2,260
TOTALS ..	93,035	57,923	23,755	39,420	14,533

STILL-BIRTHS.

1914	976	360	1,566	622	1,659
1915	978	480	1,217	711	1,391
1916	968	548	841	787	1,473
1917	971	726	806	763	1,211
1918	1,082	669	893	820	1,510
1919	1,009	319	638	750	1,767
1920	1,127	484	953	773	1,478
TOTALS ...	7,111	3,586	6,914	5,226	10,489

TABLE IIIc.

SHOWING INCREASE OR DECREASE OF BIRTHS OVER DEATHS DURING THE LAST SEVEN YEARS.

	BUGANDA.	BUSOGA.	BUNYORO.	ANKOLE.	TORO.	Total Increase.	Total Decrease.
1914	-1,888	+1,700	- 115	+1,573	+2,204	3,474	—
1915	-3,912	+2,406	+ 38	+ 143	+2,265	940	—
1916	-3,065	+4,322	- 517	+ 798	+1,864	3,402	—
1917	-4,385	+2,240	-1,466	+ 857	+1,583	—	1,171
1918	-3,873	+1,553	-2,851	+ 776	+1,657	—	2,738
1919	-5,709	-3,135	-2,061	-1,870	- 176	—	12,951
1920	-2,204	+2,025	-1,012	+ 496	+ 907	212	—
TOTAL Increase	—	11,111	—	2,773	10,304	}	8,832
Decrease	25,036	—	7,984	—	—		

(B) General Remarks.

The total number of cases treated at Government Hospitals and Dispensaries was 62,405 with 742 deaths, as against 58,137 with 834 deaths in 1919.

The Influenza epidemic of 1919 persisted into 1920 and caused 2,352 deaths in the five kingdoms but apart from this, and an epidemic of Plague in the latter half of the year, the Protectorate has been less subject to severe epidemics than usual.

There has been Plague at Kampala and Jinja throughout the year, odd cases occurring after an interval of a week or ten days. But the number of cases of C.S.M. and Smallpox has decreased in both these stations. Entebbe has kept free from all three diseases.

The following Table shows the number of cases of Plague, Cerebro-Spinal Fever and Smallpox in the Townships and surrounding districts of Entebbe, Kampala and Jinja, for the last six years.

TABLE A.

	PLAGUE.						CEREBRO-SPINAL MENINGITIS.						SMALL-POX.					
	1915	1916	1917	1918	1919	1920	1915	1916	1917	1918	1919	1920	1915	1916	1917	1918	1919	1920
ENTEBBE Cases ...	...	2	36	...	...	...	1	18	14	...	...	...	41	8	16	151	37	...
Deaths ...	...	1	33	...	...	...	1	7	7	...	...	...	4	4	3	38	9	...
KAMPALA Cases ...	...	238	122	...	8	72	...	21	141	3	...	3	46	40	331	414	27	...
Deaths ...	...	216	110	...	3	62	...	13	106	1	...	3	9	9	67	128	...	...
JINJA Cases ...	1	62	8	...	15	87	1	18	4	3	8	2	41	24	113	140	1	4
Deaths ...	1	54	7	...	15	85	1	15	4	3	8	...	14	7	30	47	...	...
TOTAL Cases ...	1	302	166	...	23	159	2	57	159	6	8	5	128	72	460	705	65	4
Deaths ...	1	271	150	...	18	147	2	35	117	4	8	3	27	20	100	213	9	...

COMMUNICABLE DISEASES.

1. MOSQUITO OR INSECT BORNE.

Malaria.—4,490 cases were treated with 17 deaths as compared with 4,352 cases with 10 deaths in 1919. 1,516 cases with 7 deaths occurred in Kampala, where the diagnosis is confirmed by slide examination in every case.

Blackwater Fever.—49 cases with 5 deaths were returned from Government Hospitals, and 7 cases with 2 deaths from the Church Missionary Society's Hospitals. This shews a decrease in the figures for 1919 of 19 cases with 7 deaths in Government Hospitals and 8 cases with 4 deaths in the Church Missionary Society's Hospitals. A full report on this disease is given in Appendix I.

Relapsing Fever.—Continues to shew an increase, 244 cases with 2 deaths being treated as compared with 143 cases with 4 deaths in 1919 and 65 cases with 3 deaths in 1918. This is not necessarily a proof that the disease is on the increase in the Protectorate, but an increasing number of natives from the outlying areas where this disease is endemic now come under the Medical Officers at the Government stations owing to the large increase in Kasavu labour. The temporary camps on the main roads are systematically destroyed and a new pattern porters' camp is now on trial in Ankole. In the endemic area which is practically untouched and practically never visited by a Medical Officer, the effects of this disease are undoubtedly very serious.

Trypanosomiasis.—153 cases with 12 deaths were returned as against 51 cases with 8 deaths in 1919. 139 of these are from Bukedi district and include suspected cases as well as those in which the *trypanosomes* were found. This large number is due to the systematic hunt for cases made among the general population living in the neighbourhood of the Mpologoma infected area, over 10,000 people having been examined. There is little doubt that large numbers of cases and deaths are occurring and have occurred for years in the neighbourhood of the Nile from Lake Albert to Nimule, and as *G. palpalis* occurs on almost every river for miles inland (they have been caught close to Arua) the need for additional medical staff and supervision can readily be understood. It is hoped that during 1921 Dr. Carpenter will be enabled to complete a thorough survey of the whole Protectorate. One case occurred in a European Official, while at Gulu, but the infection was probably contracted in the Mpologoma area where he had been on tour with the Acting Senior Medical Officer in charge Sleeping Sickness Measures. He was treated by Dr. Marshall on his way home and recent reports on his health are satisfactory. Dr. G. D. Hale Carpenter arrived from leave on 19th September, 1920, and took up his duties as Senior Medical Officer in charge Sleeping Sickness Measures. Before the end of the year he made an extended tour of the infected area in the neighbourhood of Lake Edward, Lake George and Lake Katwe.

Drs. Marshall and Vassallo have written a further paper on the treatment of Sleeping Sickness by salvarsanised serum (*see* Appendix VI).

In the Lake Victoria area Mr. Fiske has been in charge and his report is attached (*see* Appendix IV).

The following table shews the number of cases reported during the last 16 years:—

TABLE B.—SHEWING THE DISTRIBUTION OF DEATHS ATTRIBUTED TO SLEEPING SICKNESS IN COMBINED NATIVE AND OFFICIAL RETURNS SINCE 1905.

YEAR.	PROVINCES OR DISTRICTS.									Totals.
	Buganda.	Busoga.	Bunyoro.	Ankole.	Toro.	Nile Province.	Bukedi.	Lango.	County Unknown.	
1905	8,003	No record	No record	No record	No record	No record	No record	No record	No record	8,003
1906	5,304	849	369	...	...	...	...	...	...	6,522
1907	3,407	593	170	...	...	5	...	...	...	4,175
1908	1,723	1,478	461	...	...	...	...	...	...	3,662
1909	925	603	254	...	...	...	...	...	...	1,782
1910	527	698	277	37	...	7	...	...	...	1,546
1911	253	1,013	168	6	46	1	...	...	...	1,487
1912	82	747	84	11	5	...	...	...	3	932
1913	57	554	41	21	29	...	...	...	6	708
1914	24	354	15	65	8	...	...	...	...	466
1915	3	244	11	88	4	2	...	...	...	352
1916	2	155	7	37	8	...	...	...	...	209
1917	...	118	8	84	4	13	...	...	2*	229
1918	...	75	5	55	100	...	...	...	...	235
1919	...	12	5	35	48	1†	7†	...	1*	109
1920	1	28	2	10	17	2	8	1	...	69
TOTAL	20,311	7,521	1,877	449	269	31	15	1	12	30,486

* In Kyetume Camp.

† Hospital Return (7 at Mbale, 1 at Gulu).

Pyrexia of uncertain origin shews a slight increase from 3,558 cases with 6 deaths in 1919 to 3,658 cases with 38 deaths in 1920. Some of these are undoubtedly due to such diseases as Dengue, Sand Fly Fever, etc., as at Kampala where 683 cases are reported but the great majority might prove to be Malaria or Relapsing Fever were it possible to have microscopic examination of each case done as a routine measure at all stations. 869 reported from Masaka and 793 from Mbarara doubtless contain many *Spirillum* cases.

2. INFECTIOUS OR EPIDEMIC DISEASES.

Anthrax.—No cases were reported during the year.

Beri-Beri.—23 cases with 7 deaths were reported as compared with 43 cases and 3 deaths during 1919. Of this year's cases 9 with 2 deaths are reported from Mbale, 9 with 2 deaths from Soroti, and 5 with 3 deaths from Lira.

Cerebro-Spinal-Meningitis.—69 cases with 31 deaths were treated during the year as compared with 19 cases with 15 deaths during 1919 and 68 cases with 43 deaths during 1918. Native returns from the five Kingdoms record 661 deaths as compared with 587 deaths during 1919. Little weight however can be attached to native returns with regard to this disease. Two districts alone (Ankole and Toro) return 658 of the 661 deaths, and it is probable that this estimate is too high whereas from Buganda, Busoga and Bunyoro only 3 deaths in all are returned, and it is obvious that many deaths really due to Cerebro-Spinal Meningitis must have been included under other diseases such as Influenza, Plague and Fever.

Dysentery.—In the number of cases treated there was a decrease from 1,484 with 372 deaths in 1919 to 430 with 20 deaths in 1920. The large number of cases in 1919 was attributed to a wide-spread famine in the Eastern Province where 1,110 were reported as compared with only 118 cases this year.

Enteric Fever.—14 cases with no deaths were treated as compared with 26 cases with 6 deaths in 1919. For further Report *see* Appendix II.

Erysipelas.—12 cases were recorded.

Gonorrhœa.—1,483 cases with 1 death were recorded, being an increase of 336 on the figures for 1919.

Influenza.—633 cases with 7 deaths were recorded, as compared with 1,958 cases with 57 deaths in 1919.

Leprosy.—18 cases were recorded, 11 Nodular and 7 Anæsthetic. There are 21 patients in the Leprosy Camp at Vugamira.

Measles.—40 cases were recorded.

Plague.—420 cases with 368 deaths were reported from the Hospitals as compared with 23 cases and 20 deaths in 1919. For Special Report on the outbreak in Kampala see Appendix V. The Native Returns summarized in the following table show an increase of 710 cases over the previous year. Little reliance however can be placed upon some of the native returns with regard to Plague as any rapidly fatal illness is usually included under this heading.

TABLE C.—SHOWING THE NUMBER OF DEATHS FROM PLAGUE ACCORDING TO NATIVE RETURNS INCLUDING RETURNS BY NATIVE INSPECTORS FOR THE LAST SIX YEARS.

DISTRICT.	1920	1919	1918	1917	1916	1915
Buganda ...	227	75	177	238	220	227
Busoga ...	725	447	485	518	462	273
Bukedi ...	485	208	1,052	1,661	2,562	1,912
Teso ...	129	69	698	594	458	615
Lango ...	66	201	no returns	753	627	951
Bunyoro ...	nil	1	nil	18	17	4
Toro ...	2	4	nil	48	4	2
Ankole ...	98	17	81	201	34	44
Nile ...	no returns	no returns	no returns	no returns	no returns	no returns
TOTALS ...	1,732	1,022	2,493	4,031	4,384	4,028

Pneumonia.—The figures for the last three years are as follows:—

Year	Cases	Deaths
1918 ...	139	27
1919 ...	169	66
1920 ...	192	46

Small-pox.—Admissions to Government Isolation Hospitals during the last three years were as follows:—

Year	Cases	Deaths
1918 ...	1,374	392
1919 ...	151	40
1920 ...	41	7

There has thus been a most satisfactory reduction in this disease both in the neighbourhood of the stations but also, as shewn in Table D, given below, in the deaths reported from outlying districts. Small-pox is so well known to the native that, although some cases of severe Chicken-pox may be included, the native returns can on the whole be taken as fairly accurate. This disease is more comprehensively dealt with in the Sanitation Report page 26.

TABLE D.—SHOWING THE NUMBER OF DEATHS FROM SMALL-POX ACCORDING TO NATIVE RETURNS INCLUDING RETURNS BY NATIVE INSPECTORS FOR THE LAST SIX YEARS.

DISTRICT.	1920	1919	1918	1917	1916	1915
Buganda ...	16	62	1,155	569	111	537
Busoga ...	283	232	1,598	1,199	334	210
Bukedi ...	96	885	1,483	1,527	1,537	815
Teso ...	180	585	1,688	674	54	370
Bunyoro ...	1	51	1,110	191	—	1
Toro ...	2	22	266	2	5	4
Ankole ...	—	3	62	16	77	4
Lango ...	—	—	908	no returns	no returns	no returns
Nile ...	no returns	no returns	no returns	..	..	..
TOTALS ...	578	1,840	8,270	4,178	2,118	1,941

Syphilis.—The cases treated at Government Hospitals and Dispensaries during the past three years were as follows:—

Year	Cases	Deaths
1918	2,991	6
1919	2,497	8
1920	3,860	11

Taken by itself the increase shewn above might be attributed to a larger number of natives with Syphilis seeking treatment this year, but taken in conjunction with the increased number of deaths recorded in native returns (Table E) can only point to a disquieting extension of this disease among the general population. This is confirmed from other sources. Reference has already been made (page 8) to the steps to be taken to combat venereal disease but no noticeable improvement in statistics can be anticipated for some years.

TABLE E.—SHOWING THE NUMBER OF DEATHS DUE TO SYPHILIS ACCORDING TO NATIVE RETURNS FOR THE LAST SEVEN YEARS.

DISTRICT.	1920	1919	1918	1917	1916	1915	1914
Buganda	1,192	786	766	760	603	413	427
Busoga	407	408	571	557	539	465	426
Bunyoro	91	40	119	84	148	230	595
Ankole	585	447	617	534	631	725	593
Toro	74	133	182	151	128	135	161
TOTALS	2,349	1,814	2,255	2,086	2,049	1,968	2,202

Tuberculosis.—A few more cases were seen this year. The figures for the last three years are as follows:—

Year	Cases	Deaths
1918	8	1
1919	16	2
1920	22	3

Typhus.—2 cases were recorded from the Teso district, but in my opinion the diagnosis is doubtful. One of the cases was a European (a Missionary). Both cases were fatal.

Yaws.—The figures for the last 3 years are as follows:—

Year	Cases	Deaths
1918	303	—
1919	190	1
1920	502	1

This does not mean that Yaws has increased. It is a very widely spread disease throughout the Protectorate, but more cases have been brought in for treatment now that the result of treatment by Salvarsan, etc., is known. The Native Government of the Eastern Province has voluntarily voted £600 for the purchase of Novarsenobenzol, Neokharsivan, etc., and an order for this has been sent home.

3. HELMINTHIC DISEASES.

Year	Cestoda	Nematoda
1918	25	48
1919	49	170
1920	42	115

with 1 death.

(C) European Officials.

As compared with the three previous years the number of cases of sickness from all causes, the number of deaths and the number of illnesses for which officials were placed off duty this year were as follows:—

Year	Cases	Deaths	No. of illnesses for which placed off duty.
1917	383	2	359
1918	380	1	319
1919	516	2	479
1920	473	2	432

There has therefore been a considerable improvement this year as compared with 1919 and especially so when an increase in the number of officials from 307 to 350 is taken into account. Of the two deaths one was due to Liver Abscess and the other to Heart Disease, the latter in an elderly person who had spent many years in Uganda and was only temporarily employed in Government service.

In accordance with the decision of the Committee of the Medical Advisory Board the following Table is this year compiled for the whole Protectorate instead of for

separate stations. The first two columns cannot be compiled by merely adding together the station returns as the total thus arrived at would be far in excess of the total number of Officials in the Protectorate. For instance this year the totals from the different stations amount to 595 whereas the whole European staff is approximately 350. It will therefore be obvious that no useful comparison can be made between some of the columns in this year's table and the totals shewn in previous reports.

The figures rendered this year, 350 as total number resident and 280 for average number resident, can only be taken as approximate (they are probably within two or three of the correct number) but it is hoped that in future years exact figures may be obtainable.

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES OF EUROPEAN OFFICIALS DURING 1920.

	Total number of Officials resident.	Average number resident.	Total number on sick list.	Total number of days on sick list.	Average daily number on sick list.	% of sick to average number resident.	Average number of days on sick list for each patient.	Average sick time to each resident.	Total number invalided.	% of invalidings to total residents.	Total deaths.	% of deaths to total residents.	% of deaths to average number resident.	Number of cases of sickness contracted away from station.
UGANDA PROTECTORATE....	350	280	432	2,343	6'42	2'3	5'42	8'36	11	3'14	2	'57	'71	32

The principal causes of sickness were:—

Dysentery	...	...	5	Blackwater Fever	...	5
Influenza	...	...	23	Respiratory Diseases	...	22
Malaria	...	...	170	Digestive Diseases	...	101
Debility	...	...	15	Injuries	...	37

Invalidings.—The number of invalidings shewn in the above table includes all Officials upon whom Medical Boards have been held resulting in recommendations being made either (a) to be permanently invalided or (b) to proceed at once to England for treatment and further examination and consideration.

The illnesses upon which these recommendations were made were as follows:—

(a) To be permanently invalided, 5.

Neurasthenia	...	...	4
Villous Papilloma of Bladder	...	...	1

Two of the above suffered from disabilities due to military service.

(b) To proceed to England for treatment and reconsideration, 6.

Debility	...	...	1	Neurasthenia	...	...	1
Phthisis	...	...	1	Rheumatism	...	...	1
Blackwater Fever	...	...	1	Malaria and Debility	...	...	1

It is therefore probable that some of the above may be able to return to duty and corresponding reductions in the preceding and following tables be produced.

TABLE SHOWING THE CAUSE OF INVALIDING AMONGST EUROPEAN OFFICIALS DURING THE PAST SIX YEARS.

DISEASES.	1920	1919	1918	1917	1916	1915	TOTALS.
Blackwater Fever	1	1	1	1	1	—	5
Circulatory Affections	—	—	1	—	1	1	3
General Debility	1	4	1	1	1	—	8
Nervous and Mental Diseases	—	1	1	1	—	—	3
Neurasthenia	5	—	2	1	1	—	9
Tuberculosis	1	—	1	1	—	—	3
Digestive Disorders	—	—	1	—	—	2	3
Carcinoma	—	—	2	1	—	—	3
Alcoholic Neuritis	—	—	—	1	—	—	1
Neuritis	—	—	—	1	—	—	1
Amoebic Dysentery	—	1	2	—	—	—	3
Adenitis	—	—	1	—	—	—	1
Anæmia and Chronic Bronchitis	—	1	—	—	—	—	1
Cardiac Debility	—	1	—	—	—	—	1
Eczema	—	1	—	—	—	—	1
Malaria	1	2	—	—	—	—	3
Rheumatism	1	—	—	—	—	—	1
Villous papilloma of Bladder	1	—	—	—	—	—	1
	11	12	13	8	4	3	51

European Non-Officials.

As compared with ten deaths among European non-officials during 1919 there were this year six deaths from the following causes:—

Blackwater Fever	1	*Typhus Fever	1
Malignant Malaria	1	Phthisis	1
Alcoholism	1	Appendicitis	1

of the above, 5 were males and one a female (Phthisis).

Many non-officials are treated elsewhere than at Government Hospitals and Dispensaries from where no records are obtainable; but as far as can be determined from the reports available there has been some improvement in the general health during the past year chiefly no doubt due to the decreased virulence of the Influenza epidemics.

The total number of cases treated at Government Hospitals and Dispensaries during this year was 383, the principal causes of sickness being:—

Influenza	10	P. U. O.	12
Malaria	127	Respiratory Diseases	10
Blackwater Fever	7	Digestive	17
Debility	23	Injuries	25

(D) Asiatic Officials.

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES OF ASIATIC OFFICIALS DURING 1920.

	Total number of Officials resident.	Average number resident.	Total number on sick list.	Total number of days on sick list.	Average daily number on sick list.	% of sick to average number resident.	Average number of days on sick list for each patient.	Average sick time to each resident.	Total number invalided.	% of invalidings to total residents.	Total deaths.	% of deaths to total resident.	% of deaths to average number resident.	Number of cases of sickness contracted away from station.
UGANDA PROTECTORATE	300	250	1,136	3,776	10.31	4.12	3.32	15.1	5	1.66	2	.66	.8	28

The remarks made with regard to the compilation of the corresponding table for European Officials apply also to the above. With the Asiatic Officials however a less approximate estimate of the total and average number resident is possible. Any Asiatic employed in Government service is included in the Hospital returns as an official when medically treated and many of these such as Artizans, perhaps only temporarily employed locally, are not included in the estimates obtainable from other sources.

The estimate of 300 as the total number and 250 as the average number of resident Asiatics employed in Government service is therefore only a very rough one.

The total number of cases treated among the above during the year was 1,136 with two deaths as compared with 1,006 cases and six deaths during 1919. The increase in cases can be explained by the considerable increase during the year in the number of Asiatic Officials. There is considerable difficulty in persuading Asiatics to take sufficient quinine during and after an attack of fever.

The principal causes of sickness were:—

Malaria	569	Plague	1 with 1 death
Blackwater Fever ...	13 with 1 death	Respiratory Diseases	54
Pyrexia of uncertain origin	98	Digestive Diseases ..	117

Invalidings—Medical Boards were held on five Asiatic Officials during the year and the following recommendations made:—

- (a) To be permanently invalided, 3.
- | | | | | |
|---------------------------|-----|-----|-----|---|
| Blackwater Fever | ... | ... | ... | 1 |
| Premature Senile Debility | ... | ... | ... | 1 |
| Debility—Neurotic | ... | ... | ... | 1 |
- (b) Leave to India and to be re-examined before being allowed to return to Uganda, 2.
- | | | | | |
|-------------------------|-----|-----|-----|---|
| † Hemianæsthesia | ... | ... | ... | 1 |
| Anæmia | ... | ... | ... | 1 |

* Diagnosis doubtful.

† No organic disease.

Section IV.

METEOROLOGY.

All available information under this head is embodied in the Blue Book.

The Lake level records at Entebbe for the year are as follows:—

			<i>Highest.</i>	<i>Lowest.</i>
January	...	...	10·47	10·41
February	...	...	10·41	10·34
March	...	...	10·44	10·32
April	...	...	10·62	10·44
May	...	...	10·65	10·56
June	...	...	10·65	10·60
July	...	...	10·60	10·43
August	...	...	10·42	10·34
September	...	...	10·35	10·22
October	...	...	10·22	10·20
November	...	...	10·24	10·20
December	...	...	10·34	10·24

Note—The zero of the gauge is 3,686·53 feet above the mean sea level.

Section V.

HOSPITALS AND DISPENSARIES.**Accommodation.**

The Hospital Accommodation is as shewn in the Annual Report for 1917. Nothing has been added during 1918, 1919 or 1920, except an additional grass banda for overflow patients at Mbale. The progress made with the new European Hospital has been very disappointing, the work being held up for months either for lack of staff or of labour, or of material. There is no prospect of even the central block being opened for at least six months. More progress has been made at Mulago with the Venereal Diseases buildings but this, too, has been very slow and treatment could not be started. Table III shows the Hospital Accommodation in each district with staff attached.

A full report on the gaols of this Protectorate was made during the year by a Board consisting of the Medical Officer and the District Commissioner of each district with myself as Chairman. This report was sent in on 30th September, 1920, and included four Native Prisons and the temporary Lunatic Asylum.

TABLE A.

The following Table shews, by stations, the total number of cases treated, with deaths, at Government Hospitals and Dispensaries during the years 1920, 1919, 1918:—

	1920		1919		1918	
	Total Cases.	Total Deaths.	Total Cases.	Total Deaths.	Total Cases.	Total Deaths.
Arua ...	4,081	8	1,240	12	...	...
Bombo—Civil ...	2,201	16	845	2	...	...
Military ...	1,326	2	...	...	...	...
Butiaba ...	857	...	1,850	3	1,556	29
Entebbe—European Hospital ...	111	1	182	1	151	1
Civil Hospital ...	4,524	18	5,082	24	5,448	83
Gulu ...	3,423	26	3,422	13	2,398	61
Hoima ...	1,165	2	...	...	2,636	55
Jinja—European Hospital ...	24	1	156	...	124	...
Civil Hospital ...	4,978	152	5,901	135	5,130	152
Kampala—Civil Hospital ...	11,072	330	11,801	59	13,621	165
Gaol and Police ...	2,679	8	...	...	1,542	52
Kitgum ...	...	...	1,930	34	1,058	16
Lira ...	2,812	23	1,918	64	2,433	3
Masaka ...	5,608	19	3,782	26	3,117	7
Masindi ...	5,287	21	5,560	17	8,536	101
Mbale ...	3,882	71	3,865	342	1,844	21
Mbarara ...	4,533	12	6,259	32	5,948	18
Namasagali ...	1,486	2	1,540	14	1,534	23
Scroti ...	2,356	30	2,804	56	3,205	37
TOTALS ...	62,405	742	58,137	834	60,281	824

Lunatic Asylum.

The erection of a Lunatic Asylum has been again postponed. The lunatics are still confined in a part of Hoima gaol, which is a most unsatisfactory arrangement and the supervision is inadequate.

£ 11,000 is allocated for this purpose out of the Loan but none during 1921.

BUILDINGS.

STATEMENT OF WORK CARRIED OUT DURING 1920.

					<i>Fls. Cts.</i>
<i>Entebbe.—</i>					
Minor Repairs and Improvements	...	...	...	...	1,110 26
Laboratory Extension	...	...	...	...	5,718 29
Petrol and Tool Store for Motor Boat	...	...	...	...	301 33
<i>Masaka.—</i>					
Minor Repairs and Improvements.	...	...	...	...	163 00
<i>Kampala.—</i>					
Minor Repairs and Improvements	...	...	...	...	38 26
European Hospital	...	...	...	...	26,972 87
Anti-Venereal Buildings	...	...	...	...	20,470 87
Water Supply to Venereal Diseases Buildings, Mulago	...	...	...	...	538 78
<i>Mubendi.—</i>					
Huts for Hospital	...	...	...	...	199 99
<i>Jinja.—</i>					
Minor Repairs and Improvements	...	...	...	...	251 29
<i>Namasagali.—</i>					
General Repairs	...	...	...	...	301 70
<i>Mbale.—</i>					
Removal of old and Erection of new Incinerator	...	...	...	...	300 00
Temporary Hospital Ward and Suspect Banda	...	...	...	...	492 00
TOTAL.					56,858 64

Registration of Medical Practitioners and Dentists.

The Ordinance governing Registration came into force on July 1st, 1913, since when and up to December 31st, 1920, the following have been placed on the Register:—

Registered Medical Practitioners	...	...	...	52
Dentists	...	...	...	1
Licensed Medical Practitioners	...	...	...	33

The numbers actually on the Register on December 31st, 1920, were as follows:—

Registered Medical Practitioners	...	...	...	32
Dentists	...	...	...	1
Licensed Medical Practitioners	...	...	...	18

Of the above 32 Registered Medical Practitioners, 6 belong to the Church Missionary Society; the remainder are in Government Service.

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

Major C. A. Wiggins, *President and Registrar.*
 Dr. C. J. Baker.
 Dr. A. R. Cook.
 Dr. J. Hope Reford.

The Board held two meetings during the year.

C. A. WIGGINS,

Principal Medical Officer, Uganda Protectorate.

TABLE I.—RETURN SHOWING THE MEDICAL STAFF AND THE PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF.

Name and Qualifications.	Rank of Appointment.	Where stationed on 31st December, 1920.	Remarks.
Hon. Major C. A. Wiggins, M.R.C.S., L.R.C.P., F.R.S. ...	Principal Medical Officer	Entebbe	
J. H. Reford, B.A., M.D., B.Ch., B.A.O., L.M. (Dub.), D.T.M. (Liverp.)	Deputy P.M.O. ...	Entebbe	
R. A. L. van Someren, M.D., Ch.B., D.P.H. (Edin.) ...	S. M. O. ...	Jinja	Also acting M.O.H., Jinja.
C. H. Marshall, M.R.C.S., L.R.C.P., M.B. (London.) ...	Do ...	On leave	
G. D. H. Carpenter, M.B.E., B.A., M.D., B.Ch. (Oxf.), M.R.C.S., L.R.C.P.	Do ...	Entebbe	In charge S. S. Measures.
J. A. Taylor, M.B., Ch.B. (Edin.), L.M., (Dub.), D.T.M. (Liverp.)	Do ...	On leave	
J. H. Goodliffe, M.D., C.M. (Aberdeen.) ...	Medical Officer ...	Do	Retiring on 26/1/21.
Major G. Lane, R.A.M.C. (B), L.R.C.S. & F. (Edin.), L.F.P.S. (Glas.)	Do ...	On leave	Retiring on 14/4/21.
J. E. Hailstone, M.A. (Camb.), M.R.C.S., L.R.C.P. ...	Do ...	Do	
R. E. McConnell, B.A., M.D., C.M. (Montreal), D.T.M. (Liverp.)	Do ...	Do	
Capt. A. H. Owen, M.R.C.S., L.R.C.P., D.T.M. & H. (Camb.) ...	Do ...	Entebbe	Also acting M.O.H., Entebbe.
H. R. Neilson, M.B., Ch.B. (Aberdeen.) ...	Do ...	On leave	
Major R. J. A. Macmillan, D.S.O., M.B., Ch.B. (Edin.), D.T.M. (Liverp.)	Do ...	Masindi	
W. L. Webb, M.R.C.S., L.R.C.P., M.B., B.S. (London), D.P.H.	Do ...	Kampala	
R. S. Taylor, B.A., M.B., B.C. (Camb.), M.R.C.S., L.R.C.P. ...	Do ...	Soroti	
W. L. Peacock, M.B., Ch.B. (Glas.) ...	Do ...	Kampala	
S. M. Vassallo, M.D. (Malta) ...	Do ...	Mbale	
J. A. Quin, M.D., B.Ch., B.A.O. ...	Do ...	Kampala	
F. O. Simpson, M.R.C.S., L.R.C.P., D.P.H. (Ireland)	Do ...	Mbarara	
J. H. Neill, M.B., Ch.B. (Edin.) ...	Do ...	Arua	
S. R. Eccles-Davies, B.A. (Camb.), M.R.C.S. (Eng.), L.R.C.P. (London)	Medical Officer ...	Kampala	
Major G. J. Keane, D.S.O., R.A.M.C. (B), M.D., Ch.B., D.P.H., D.T.M. (Liverp.)	Specialist Officer, V. D.	Mulago, Kampala	
Mr. W. F. Fiske ...	Entomologist ...	Entebbe	Sleeping Sickness Investigations.
C. J. Baker, M.R.C.S., L.R.C.P. ...	Principal Sanitation Officer	Kampala	Also acting M.O.H., Kampala.
J. M. Collyns, M.B., D.P.H. (London), M.R.C.S., L.R.C.P. ...	Sanitation Officer ...	On leave	
H. L. Duke, O.R.E., B.A., M.D., B.C., D.T.M. & H. (Camb.) ...	Bacteriologist ...	Entebbe	
Mr. J. Stewart ...	Laboratory Assistant	Entebbe	
Mr. E. C. Haddon ...	Do ...	<i>En route</i> Uganda	
G. S. Bateman, L.D.S.R.C.S. (Eng.) ...	Dental Surgeon ...	Entebbe	
Miss E. M. Pratt, A.R.R.C. ...	Matron ...	On leave	
Miss D. M. Ivers ...	Nursing Sister ...	Jinja	
Miss A. Mason ...	Do ...	Entebbe	
Miss N. M. Adams ...	Do ...	Do	
Mr. H. Flint ...	Office Superintendent	On leave	
Mr. H. T. Bott ...	Assistant Clerk ...	Entebbe	Also Secretary to Factories Board.
Mr. P. J. L. Waters ...	Medical Storekeeper	Do	
Mr. C. W. V. Gittins ...	Sleeping Sickness Inspector	On leave	On Agreement.
Mr. C. O' Connor ...	Do ...	Mbale	Temporary local Agreement.

TABLE I(a)—RETURN SHOWING THE ASIATIC MEDICAL AND CLERICAL STAFF.

Name.	Rank.	Where stationed on 31st December, 1920.	REMARKS.
Achhru Ram ...	Assistant Surgeon	Kampala	Seconded from I. M. D.
Kanade, K. R. ...	Senior Sub-Assistant Surgeon	Mbale	
Karkhanis, A. D. ...	Do	Jinja	
Gokal Chand ...	Sub-Assistant Surgeon	Mbarara	
Hukam Singh, I.O.M. ...	Do	Entebbe	Seconded from I. M. D.
Diwan Chand ...	Do	Bombo	do
Basant Singh ...	Do	Masaka	do
Ram Chand ...	Do	On leave	
Nayar, H. C. ...	Do	Namasagali	Seconded from Civil Punjab.
Mangal Sain ...	Do	Jinja	
Maqbul Haqq ...	Do	On leave	
Andrews, C. P. ...	Do	Lira	Proceeding on Leave.
Ahmed Din ...	Do	Do	
Raja, K. J. ...	Do	<i>En route</i> Uganda	
Faqir Chand ...	Compounder	Gulu	
Karam Dad ...	Do	Masindi	
Ghulam Haider ...	Do	Soroti	
Fernandes, E. F. X. ...	Do	Hoima	
Mela Ram ...	Do	Arua	
D'Souza, M. N. ...	Clerk	Entebbe	
D'Souza, M. P. D. ...	Store Clerk	Do	
Sohan Singh Sandhu ...	Clerk	Do	
Moniz, C. ...	Do	On leave	
Gunewardene, D. J. ...	Do	Entebbe	
Rodrigo, T. G. A. ...	Do	Do	

TABLE III.
SHOWING PRESENT STAFF AND HOSPITAL ACCOMMODATION FOR EACH DISTRICT, 1920
(MEDICAL AND SANITARY BRANCHES COMBINED).

BUGANDA KINGDOM.

	ENTEBBE DISTRICT.	MASAKA DISTRICT	MENGO DISTRICT.	MUBENDI DISTRICT.
Area in Square Miles	5,486	4,602	6,659	5,623
Population	100,800	140,000	404,500	146,000
European Staff	1 M. O.	—	1 M. O.	—
Asiatic Staff	1 S. A. S.	1 S. A. S.	1 M. O. H. 1 A. S. 1 S. A. S.	—
Native Staff—Dressers, etc.	13	3	31	1
Plague Inspectors and Vaccinators	2	2	25	1
S. S. Inspectors	5	2	2	2
Clerk	1	—	1	—
Menial	30	1	30	—
Number of Beds, Medical and Surgical	31	9	76	—
Isolation	—	—	—	—

Entebbe Column includes European, Goan and Native Hospitals.

Mengo Column includes S.S. Camp, Kyetume and Military Hospital, Bombo.

N.B.—Owing to shortage of staff the Masaka District is put under the Medical Officer, Entebbe, and the Mubendi District under the Medical Officer, Kampala.

EASTERN PROVINCE.

	BUSOGA.	BUKEDI.	TESO.	LANGO.
Area in Square Miles	10,771	3,354	4,738	5,099
Population	247,600	433,900	287,200	362,100
European Staff	1 S. M. O. *	1 M. O.	1 M. O.	—
Asiatic Staff	2 S. A. S's. 1 Compounder	1 S. A. S.	1 Compounder	1 S. A. S.
Native Staff—Dressers, etc.	10	9	5	2
Plague Inspectors and Vaccinators	7	12	7	3
S. S. Inspectors	—	2	—	—
Clerk	1	—	—	—
Menial	9	8	12	5
Number of Beds, Medical and Surgical	32	8	13	—
Isolation	—	—	—	—

* Also Acts as M. O. H.

N.B.—Owing to shortage of staff the Lango District is put under the Medical Officer, Teso.

WESTERN PROVINCE.

	ANKOLE.	TORO.	KIGEZI.
Area in Square Miles	6,131	5,579	2,056
Population	266,500	126,100	150,000
European Staff	1 M. O.	—	—
Asiatic Staff	1 S. A. S.	—	—
Native Staff—Dressers	3	—	1
Plague Inspectors and Vaccinators	1	—	1
S. S. Inspectors	4	—	—
Menial	3	—	—
Number of Beds, Medical and Surgical	7	—	—
Isolation	—	—	—

N.B.—Owing to shortage of staff Kigezi District is put under the Medical Officer, Ankole, while Dr. Ashton Bond of the C.M.S. attends to urgent cases in Toro.

NORTHERN PROVINCE.

	BUNYORO*	GULU.	CHUA.	WEST NILE.
Area in Square Miles	5,619	6,995	7,007	4,113
Population	92,600	98,000	85,200	227,500
European Staff	1 M. O.	—	—	1 M. O.
Asiatic Staff	2 Compounders	1 Compounder	—	1 Compounder
Native Staff—Dressers	12†	6	3	4
Plague Inspectors and Vaccinators	3	2	—	1
S. S. Inspectors	3	1	2	—
Clerk	1	—	—	—
Menial	12	6	1	5
Number of Beds, Medical and Surgical	19	6	—	—
Isolation	—	—	—	—

* Includes 3 Stations, viz.:—Masindi, Hoima and Butiaba.

† Includes attendants at Asylum.

N.B.—Owing to shortage of staff Gulu and Chua Districts are put under the Medical Officer, West Nile.

TABLE VI.
RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1920.

Diseases.	Remaining in Hospital at end of 1919.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at end of 1920.
		Admissions.	Deaths.		
Infective Diseases:—					
Beri-Beri	2	17	6	19	...
Cerebro-Spinal Fever	1	62	31	63	...
Chicken-pox	...	23	...	23	6
Dysentery	6	84	16	90	1
Enteric	...	6	1	6	...
Erysipelas	...	3	...	3	...
Gonorrhoea	6	187	1	193	18
Influenza	2	59	7	61	3
Leprosy-Anaesthetic	1	...	...	1	...
Malaria (a) Tertian	...	148	1	148	3
(b) Aestivo-autumnal	...	184	8	184	3
(c) Chronic Malaria	...	7	...	7	1
(d) Black-water	...	14	1	14	1
Measles	...	20	...	20	3
Plague	...	208	125	208	1
Pneumonia	1	114	36	115	5
Relapsing Fever	...	47	2	47	...
Mumps	...	1	...	1	...
Spirillum Fever	...	1	...	1	...
Septicæmia	...	7	4	7	...
Trypanosomiasis (Sleeping Sickness)	2	89	11	91	1
Small-Pox	4	41	7	45	2
Syphilis (a) Primary	6	91	...	97	7
(b) Secondary	23	249	2	272	38
(c) Tertiary	16	220	9	236	28
(d) Inherited	5	10	...	15	1
Tuberculosis	...	3	...	3	...
Yaws	...	112	1	112	11
Tetanus	1	1	...	2	...
P. U. O.	3	290	28	293	5
Others	...	5	1	5	2
Intoxications:—					
Alcoholism	...	3	2	3	...
General Diseases:—					
Anæmia	...	5	2	5	...
Diabetes	...	1	...	1	1
Debility	3	49	12	52	4
Others	...	2	1	2	...
Local Diseases:—					
Diseases of the Nervous System:—					
Sub-section 1.					
Neuritis	...	4	1	4	...
Meningitis	...	1	...	1	...
Myelitis	...	1	...	1	...
Others	...	6	1	6	...
Sub-section 2.					
Apoplexy	...	1	1	1	...
Paralysis	...	5	...	5	...
Chorea	...	1	...	1	...
Epilepsy	...	12	...	12	2
Neuralgia	...	4	...	4	...
Hysteria	...	3	1	3	...
Others	1	6	...	7	1
Mental Diseases:—					
Sub-section 3.					
Mania	...	4	1	4	...
Melancholia	...	1	1	1	...
Delusional Insanity	...	1	...	1	...
Diseases of the Eye:—					
Conjunctivitis	...	22	...	22	1
Keratitis	1	...	...	1	...
Iritis	...	1	...	1	...
Others	...	3	...	3	1
Diseases of the Ear:—					
Inflammation	...	7	...	7	1
Other Diseases	...	1	...	1	...
Diseases of the Nose:—					
Coryza	...	1	...	1	...
Others	...	1	...	1	...
Diseases of the Circulatory System:—					
Valvular Mitral	...	4	2	4	...
Others	...	4	...	4	...
Diseases of the Respiratory System:—					
Bronchitis	3	98	3	101	4
Broncho-pneumonia	...	34	10	34	...
Pleurisy	...	17	...	17	...
Phthisis	...	1	...	1	...
Others	...	2	...	2	...
Diseases of the Digestive System:—					
Stomatitis	...	2	...	2	...
Caries of teeth	...	2	...	2	...
Glossitis	...	3	...	3	...
Sore Throat	...	1	...	1	...
Inflammation of Tonsils	...	4	...	4	...
Gastritis	...	10	...	10	...
<i>Carried forward</i>	87	2,631	396	2,718	155

TABLE VI.—*continued.*
 RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1920.—*continued.*

Diseases.	Remaining in Hospital at end of 1919.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at end of 1920.
		Admissions.	Deaths.		
<i>Brought forward</i> ...	87	2,631	336	2,718	155
<i>Diseases of the Digestive System—continued.</i>					
Hamatemesis ...	...	1	...	1	...
Dilatation of Stomach ...	...	1	...	1	...
Dyspepsia ...	...	9	...	9	...
Enteritis ...	...	3	3	3	...
Appendicitis ...	...	2	1	2	...
Colitis ...	...	6	1	6	...
Hernia ...	...	17	3	17	1
Diarrhoea ...	...	65	8	65	1
Constipation ...	...	3	...	3	...
Colic ...	...	16	...	16	...
Hæmorrhoids ...	...	4	...	4	...
Abscess ...	...	2	2	2	...
Cirrhosis ...	...	1	1	1	...
Jaundice ...	...	1	...	1	...
Ascites ...	...	12	4	12	...
Others ...	...	6	4	6	...
<i>Diseases of the Lymphatic System—</i>					
Splenitis ...	...	1	...	1	...
Inflammation of Lymphatic gland ...	2	30	...	32	...
Suppuration of Lymphatic gland ...	...	23	...	23	1
Lymphangitis ...	...	2	...	2	...
Elephantiasis ...	...	1	...	1	...
Others ...	...	1	...	1	...
<i>Diseases of the Urinary System—</i>					
Acute Nephritis ...	...	2	...	2	...
Bright's Disease ...	...	9	3	9	1
Cystitis ...	...	7	...	7	...
Suppression ...	...	1	1	1	...
Hæmaturia ...	...	1	...	1	...
Chyluria ...	...	1	...	1	...
Others ...	...	5	...	5	...
<i>Disease of the Generative System—</i>					
<i>Male Organs—</i>					
Stricture ...	1	6	...	7	...
Soft Chancre ...	...	82	...	82	7
Condyloma ...	...	2	...	2	...
Inflammation of Scrotum ...	...	1	...	1	...
Hydrocele ...	...	10	...	10	...
Orchitis ...	...	11	...	11	1
Epididymitis ...	...	3	...	3	...
Others ...	3	37	1	40	1
<i>Female Organs—</i>					
Vaginitis ...	...	2	...	2	...
Menorrhagia ...	...	1	...	1	...
Abortion ...	...	2	...	2	...
Delayed Labour ...	1	4	4	5	...
Premature Birth ...	...	1	1	1	...
Abscess of Breast ...	...	3	...	3	...
Others ...	...	9	1	9	1
<i>Diseases of Organs of Locomotion—</i>					
Osteitis ...	...	4	...	4	...
Arthritis ...	...	9	...	9	2
Bursitis ...	1	...	...	1	...
Myalgia ...	5	64	...	69	2
Others ...	4	39	...	43	13
<i>Diseases of Connective Tissue—</i>					
Cellulitis ...	1	47	...	48	2
Abscess ...	5	100	2	105	9
Elephantiasis ...	...	2	...	2	...
Others ...	...	7	...	7	...
<i>Diseases of the Skin—</i>					
Eczema ...	...	5	...	5	2
Boil ...	...	13	...	13	...
P-oriasis ...	...	2	...	2	...
Scabies ...	...	24	...	24	3
Ulcers ...	10	166	1	176	10
Others ...	...	2	...	2	...
<i>Injuries—General</i>					
Local ...	27	524	19	551	64
Tumours ...	1	8	...	9	...
Poisons ...	...	4	1	4	...
Snake Bite ...	...	8	...	8	1
<i>Parasites—Animal—</i>					
<i>Cestoda—</i>					
Tænia Solium ...	...	1	...	1	...
<i>Nematoda—</i>					
Ascaris ...	...	1	...	1	...
Dracunculus ...	...	24	...	24	...
Filariasis ...	...	3	...	3	...
Ankylostomiasis ...	...	1	1	1	...
<i>Insecta—</i>					
Chiggers ...	1	4	...	5	...
Others ...	...	1	...	1	...
TOTAL ...	149	4,130	408	4,279	281

TABLE VII.
RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1920.

Diseases.	European Officials.	Native Officials (including Asiatics.)	General European Population, Officials and Non-Officials.	General Population—European, Asiatics and Natives.		
				Males.	Females.	Deaths.
Infective Diseases—						
Beri-Beri	...	...	...	23	...	7
Cerebro-Spinal Fever	...	...	...	68	1	31
Chicken-Pox	...	...	...	34	2	...
Diphtheria	...	...	...	1	...	...
Dysentery	5	4	6	383	47	29
Endocarditis— <i>infective</i>	...	...	...	3	9	...
Enteric	1	2	...	13	1	...
Erysipelas	...	...	4	9	3	...
Gonorrhœa	1	6	7	1,351	132	1
Influenza	23	12	31	500	133	7
Typhus Fever	...	...	...	1	1	2
Leprosy (<i>a</i>) Nodular	...	...	...	11	...	...
(<i>t</i>) Anæsthetic	...	...	...	7	...	...
Malaria (<i>a</i>) Tertian	29	169	30	859	245	2
(<i>b</i>) Quartan	...	...	...	9	...	...
(<i>c</i>) Aestivo-autumnal	189	394	233	2,632	586	15
(<i>d</i>) Chronic malaria	2	6	5	134	25	...
(<i>e</i>) Black-water	5	12	10	46	3	5
Measles	...	...	1	39	1	...
Malta Fever	...	...	...	1	1	...
Plague	...	1	...	303	117	368
Pneumonia	...	1	...	169	23	46
Relapsing Fever	1	...	1	235	9	2
Mumps	...	...	...	14	8	...
Rheumatic Fever	1	...	1	11	1	...
Septicæmia	...	...	...	4	...	2
Trypanosomiasis (Sleeping Sickness)	...	...	...	126	27	12
Small-Pox	...	...	...	34	7	7
Syphilis (<i>-</i>) Primary	...	...	3	584	155	...
(<i>h</i>) Secondary	2	3	6	994	374	3
(<i>c</i>) Tertiary	...	...	...	1,030	284	8
(<i>e</i>) Inherited	...	...	8	291	148	...
Tuberculosis	4	...	4	15	7	3
Whooping Cough	...	...	9	59	41	...
Yaws	...	...	...	449	53	1
Tetanus	...	...	...	1	...	...
P. U. O.	34	98	46	3,153	505	38
Others	2	...	1	113	56	2
Intoxications.—						
Alcoholism	...	...	1	5	...	2
Others	...	...	...	1	...	...
General Diseases—						
Anæmia	1	3	4	84	13	11
Anæmia—Pernicious	...	...	...	...	1	...
Diabetes	...	...	1	4	...	...
Rickets	...	...	...	1	...	...
Scurvy	...	...	...	3	...	...
Debility	15	10	38	235	65	6
Rheumatism	...	...	...	176	42	1
Others	2	...	2	3	...	...
Local Diseases.—						
Diseases of the Nervous System.—						
Sub-section 1.						
Neuritis	3	3	2	182	3	1
Meningitis	...	...	...	10	...	3
Myelitis	...	...	...	1	...	...
Others	4	...	1	8	3	1
Sub-section 2.						
Apoplexy	...	...	...	6	...	1
Paralysis	...	...	...	14	1	...
Chorea	...	1	...	1	...	...
Epilepsy	...	2	1	37	2	...
Neuralgia	3	12	5	340	140	...
Hysteria	...	1	...	2	10	1
Headache	4	21	6	611	148	...
Others	1	1	7	12	2	1
Sub-section 3.						
Mania	...	...	...	6	...	3
Melancholia	...	...	...	...	2	1
Delusional Insanity	...	...	1	5	...	...
Others	...	2	...	4	1	...
Conjunctivitis	1	...	8	1,943	922	...
Keratitis	...	5	...	20	1	...
Ulceration of Cornea	...	...	2	30	4	...
Iritis	...	1	...	49	18	...
Optic Neuritis	...	...	...	1	1	...
Cataract	...	...	...	11	2	...
Others	...	...	...	67	23	...
<i>Carried forward</i>	283	770	485	17,581	4,409	614

TABLE VII.—*continued.*RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1920—*continued.*

Diseases.	European Officials.	Native Officials (including Asiatics.)	General European Population, Officials and Non-Officials.	General Population—European, Asiatics and Natives.		
				Males.	Females.	Deaths.
<i>Brought forward</i> ...	283	770	485	17,581	4,409	614
Diseases of the Ear.—						
Inflammation ...	...	1	...	401	161	...
Other Diseases ...	3	2	4	314	117	...
Diseases of the Nose.—						
Coryza ...	7	61	12	317	61	...
Rhinitis ...	1	...	1	56	14	...
Others ...	...	...	...	13	3	...
Diseases of the Circulatory System.—						
Pericarditis ...	...	...	...	4	...	2
Endocarditis ...	...	...	...	7	...	...
Valvular Mitral ...	...	2	1	89	3	5
Aneurism ...	...	...	...	1	1	...
Others ...	3	7	3	91	15	2
Diseases of the Respiratory System.—						
Laryngitis ...	1	1	1	72	7	1
Bronchitis ...	13	43	17	5,037	1,415	10
Broncho-pneumonia ...	...	...	...	78	13	14
Emphysema ...	...	...	...	...	1	...
Pleurisy ...	...	1	...	99	12	3
Empyema ...	...	...	...	4	...	...
Asthma ...	...	9	3	71	14	1
Others ...	8	...	10	15	1	...
Diseases of the Digestive System.—						
Stomatitis ...	2	2	4	244	64	...
Caries of Teeth ...	2	15	8	413	241	...
Glossitis ...	3	...	...	12	1	...
Sore Throat ...	5	3	9	355	95	...
Inflammation of Tonsils ...	10	8	24	148	40	...
Gastritis ...	5	4	4	28	8	1
Ulceration of Stomach ...	...	...	...	1	...	...
Hæmatemesis ...	...	1	...	2	1	...
Dilatation of Stomach ...	...	...	...	3	...	...
Dyspepsia ...	4	28	20	989	357	...
Enteritis ...	...	...	1	4	...	3
Appendicitis ...	1	1	2	5	1	1
Colitis ...	2	3	4	43	8	1
Hernia ...	...	...	...	60	2	5
Diarrhoea ...	12	15	24	1,007	219	9
Constipation ...	2	20	4	1,748	589	...
Colic ...	1	9	4	474	159	1
Hæmorrhoids ...	1	2	3	25	8	...
Pancreatitis ...	...	...	...	3	...	...
Hepatitis—Acute ...	...	1	1	8	1	...
Abscess ...	...	1	...	2	...	1
Cirrhosis ...	...	...	...	4	...	1
Jaundice ...	1	...	3	25	3	1
Peritonitis ...	...	...	...	...	3	...
Ascites ...	...	...	...	19	2	7
Abscess of Liver ...	1	...	...	1	...	1
Others ...	4	4	11	58	18	4
Diseases of the Lymphatic System.—						
Splenitis ...	1	...	...	31	3	...
Inflammation of Lymphatic Gland ...	2	1	2	244	62	...
Suppuration of Lymphatic Gland ...	1	1	5	90	18	...
Lymphangitis ...	...	...	1	4	...	...
Elephantiasis ...	...	...	...	6	...	...
Others ...	...	...	1	...	2	...
Diseases of the Urinary System.—						
Acute Nephritis ...	...	...	1	4	...	...
Bright's Disease ...	...	...	...	7	2	2
Renal Colic ...	1	1	1	3	...	...
Cystitis ...	2	...	3	15	...	...
Vesical Calculus ...	...	...	...	...	1	...
Suppression ...	...	...	...	1	...	1
Hæmaturia ...	...	2	...	6	...	...
Others ...	2	...	2	17	2	...
Diseases of the Generative System.—						
Male Organs—						
Urethritis ...	...	...	...	7	...	...
Gleet ...	...	1	...	9	...	...
<i>Carried forward</i> ...	384	1,020	679	30,325	8,157	691

TABLE VII.—*continued.*
 RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1920—*continued.*

Diseases.	European Officials.	Native Officials (Including Asiatics.)	General European Population, Officials and Non-Officials.	General Population—European, Asiatics and Natives.		
				Males.	Females.	Deaths.
<i>Brought forward</i> ...	384	1,020	679	30,325	8,157	691
<i>Diseases of the Generative System—continued.</i>						
Stricture ...	...	...	...	15	...	...
Soft chanere ...	...	...	4	593	37	...
Condyloma ...	...	...	...	23	2	...
Hydrocele ...	...	...	...	30	...	...
Orchitis ...	1	1	2	142	...	...
Epididymitis ...	1	...	1	3	...	...
Abscess of Testicle ...	...	...	...	3	...	...
Others ...	1	...	2	57	...	1
<i>Female Organs—</i>						
Ovarian Cyst ...	...	...	...	...	2	...
Endometritis ...	...	...	2	...	3	...
Displacement of Uterus ...	1	...	...	...	1	...
Vaginitis ...	...	...	...	...	6	...
Amenorrhœa ...	...	...	...	...	10	...
Dysmenorrhœa ...	...	...	1	...	37	...
Menorrhagia ...	...	...	...	...	37	...
Leucorrhœa ...	...	...	...	...	49	...
Abortion ...	...	...	1	...	33	1
Delayed Labour ...	...	...	...	...	18	4
Postpartem Hæmorrhage ...	...	...	...	...	4	2
Retained Placenta ...	...	...	...	...	5	...
Premature Birth ...	...	...	1	...	12	2
Puerperal Septicæmia ...	...	...	...	...	2	1
Mastitis ...	...	...	...	...	9	...
Abscess of Breast ...	...	...	...	...	12	...
Others ...	1	...	13	...	60	1
<i>Diseases of the Organs of Locomotion.—</i>						
Osteitis ...	2	1	2	48	2	...
Arthritis ...	...	3	...	40	5	1
Bursitis ...	...	...	...	2	...	...
Myalgia ...	8	24	18	2,890	702	1
Others ...	2	...	6	202	24	...
<i>Diseases of Connective Tissue.—</i>						
Cellulitis ...	2	6	3	651	123	...
Abscess ...	6	12	9	503	125	2
Elephantiasis ...	...	...	...	8	1	...
Others ...	1	...	1	11	5	...
<i>Diseases of the Skin.—</i>						
Urticaria ...	...	1	1	22	7	...
Eczema ...	1	2	3	151	30	...
Boil ...	9	6	12	401	67	...
Carbuncle ...	1	...	2	13	1	...
Herpes ...	1	...	1	28	5	...
Psoriasis ...	...	1	...	31	11	...
Oriental Sore ...	...	...	...	151	58	...
Tinea ...	1	...	1	87	59	...
Scabies ...	1	6	1	2,288	411	...
Acne ...	1	...	1	5	1	...
Prickly Heat ...	...	...	...	3	1	...
Ulcers ...	1	9	4	4,530	1,166	1
Others ...	4	1	10	139	30	...
<i>Injuries—General</i>						
Local ...	36	40	60	6,098	1,052	22
Tumours ...	...	2	...	52	9	1
Malformations ...	...	...	...	1	...	...
Poisons ...	...	1	...	6	...	2
Snake-Bite ...	...	...	1	21	...	...
<i>Cestoda.—</i>						
Tenia Solium ...	1	...	1	32	4	...
Tenia Saginata ...	1	...	2	6	...	...
<i>Nematoda.—</i>						
Ascaris ...	...	...	...	9	3	...
Dracunculosis ...	...	...	...	69	2	...
Filariasis ...	...	...	...	16	...	...
Ankylostomiasis ...	...	...	...	4	...	1
Oxyuris ...	...	...	...	11	...	...
Others ...	...	...	...	...	1	...
<i>Insecta.—</i>						
Myiasis ...	...	...	...	11	1	...
Chiggers ...	3	6	8	156	34	...
Others ...	1	...	1	22	7	...
TOTAL ...	473	1,142	856	49,952	12,153	742
<i>Deaths</i> ...	2	2	5	...	...	...
Surgical Operations ...	6	12	14	807	144	...

Section III.

SANITATION.

General review of work done.

ADMINISTRATIVE.

I returned from leave in February, but took over the duties of Medical Officer of Health at Kampala as well as those of my own.

No additions have been made to the European staff for sanitation, which consists of myself and one Sanitation Officer and one Superintendent of Conservancy (for Kampala.)

I have been unable to make any tours of inspection through the Protectorate owing to being unable to leave Kampala.

My official designation was changed to that of Principal Sanitation Officer on April 1st.

Legislation, etc.

(1) Under the Infectious Diseases Ordinance, Kampala, Port Bell and Jinja were "infected places" all through the year. The Notices declaring the following places were cancelled in the first half of the year:—Pallisa, Bukedi, Entebbe, Gulu, Masindi and the Kigezi District. Bugwe, Samia and Ekwera Port were declared infected on May 1st. Iganga was declared infected in September followed by the whole of Busoga, Teso, Lango and Bukedi.

(2) Under the Township Ordinance, Busimbi and Mbale (Mawokota) have been proclaimed townships and part of Namirembe has been declared a township in order to obtain control over a number of Indian shops which are on native-owned land.

(3) Sleeping Sickness Ordinance.—Minor amendments to the Rules have been made.

The Factories Board.

The Factories Board, appointed under the Factories Ordinance, 1919, consists of the Director of Public Works (Chairman), the Director of Agriculture, and two unofficial members (one nominated by the Ginners' Association, the other by the Chamber of Commerce) with the Principal Sanitation Officer as Executive Officer.

The Board meets monthly, on the last Wednesday in the month, and as occasion requires. In all 15 meetings were held in 1920.

During the year under review plans were examined and passed for 63 ginneries and godowns including two plans for buildings for hydraulic presses, &c., particular attention being paid to the making of buildings rat-proof.

In addition to the above, the Board dealt with many applications for amendment of sanctioned plans on the grounds that the materials specified were unobtainable locally, or that current prices were prohibitive.

INSPECTION OF FACTORIES. The Board is much handicapped by the delay in the appointment of a Factories Inspector. When possible, the Director of Public Works deposes one of his Engineers to inspect, but this arrangement is very unsatisfactory inasmuch that considerable delay is bound to occur, with consequent loss and annoyance to the owners concerned. It is hoped an Inspector will shortly be appointed, thereby ensuring the carrying out of the Rules with respect to the erection and completion of buildings according to Plan.

In the early part of the year a rule was published prohibiting ginning at any other place than at a ginnery unless a licence for a hand gin had been obtained, but this proved too stringent and was subsequently cancelled. (The procedure with regard to ginning licences is now controlled by the new Cotton Rules—see below).

The question of the demolition of temporary godowns on ginnery plots was carefully considered and eventually it was decided to allow temporary godowns to remain until 31st December, 1921.

Experience proved that several of the rules required amending and the necessary amendments were incorporated in new rules published in the *Gazette* of 30th November, 1920, dealing with installation of machinery for dust removal, and the disposal of waste and refuse from factories.

Simultaneously with the publication of the new Factories Rules, new Cotton Rules were published, under which licences to gin, commencing from 1st January, 1921, will be issued by the Director of Agriculture and not, as hitherto, by the Factories Board.

ACCIDENTS. Only three fatal accidents occurring in factories were reported during the year. The facts were considered but in none of the cases was action by the Board deemed necessary.

Several important questions appertaining to the cotton industry were referred to the Board in an advisory capacity and recommendations thereon made to His Excellency the Governor.

The unofficial members take a keen interest in the work of the Board and make a point of regularly attending the meetings.

Owing to the increase in the clerical work and the scope of the Board, Mr. H. T. Bott was appointed Secretary to the Board with effect from 1st April, 1920.

Central Town Planning Board.

The Central Town Planning Board, formed in 1918, consists of the Principal Medical Officer (Chairman), Land Officer, Director of Public Works and Principal Sanitation Officer (Executive Officer). 13 meetings were held during the year, at two of which His Excellency the Governor attended.

In consequence of the resignation of the last remaining non-official member in the early part of the year, the difficulty of the non-official members attending the meetings of the Board in Entebbe at short notice was recognised, and as the Central Town Planning Board is purely an advisory body for His Excellency's guidance, it was deemed unnecessary to recommend that any further non-official members be appointed to the Board and His Excellency the Governor concurred, it being understood that in all cases affecting Kampala and Jinja, the Township Authority, on which unofficial members sit, be consulted.

Much and earnest consideration was given to the new Town Planning Schemes of Kampala and Jinja which involves the principle of racial segregation and the vexed question of a protecting "zone" between the European and Asiatic communities and between residential and commercial areas.

Questions affecting the laying out of the following stations were considered and recommendations made thereon to His Excellency the Governor:—Kampala, Jinja, Mbale, Soroti, Lira, Butiaba, Kaliro, Namasagali, Masindi, Gulu, Masaka and Fort Portal.

The advisability of granting Temporary Occupation Licences for small shops for a longer period than one year in substitution for the present licence which is a yearly one was referred to the Board for consideration. The Board decided that the present licence was satisfactory subject to the adoption of type plans which the Director of Public Works very kindly circulated to all District Commissioners.

The question as to whether legislation was necessary to control bazaars and native trading centres was referred to the Board, and two of the larger ones, Namirembe and Mbale (Mawokota) bazaars, were proclaimed townships.

PREVENTIVE MEASURES.

Insect-Borne Diseases.

(A) Malaria.

Anti-Malarial Measures:—

(a) Major.—

The open drains in the swamps at Arua, Masindi and Soroti have been maintained.

The Kampala Swamp—The Public Works Department have been unable to detail any European officers for the requisite levelling and supervision necessary for the laying of the subsoil contour drains, consequently only 2,756 feet of pipe and rubble contour drains have been completed this year.

The main and secondary channels have been kept clear and a large planted area maintained and some brick clay borrow pits have been filled in.

(b) Minor.

Anti-Malarial gangs have been employed as formerly. Out of hundreds of collections of larvæ brought to me in Kampala from domestic premises in tins and barrels, only one contained anopheles larvæ, whereas the latter can always be found in pools or ditches in the adjacent swamp.

In my opinion until the open water in the swamp is reduced by drainage to such dimensions as will make it practicable to employ larvicides we cannot hope for any reduction of malaria in the town.

Bush clearing has become more and more difficult to maintain. At Kampala the increased cost as well as the shortage of labour has at times brought this work to a standstill during the rains. Latterly sanction was given for the employment of convicts for this service.

(B) Spirillum Fever.

This disease accounts for a great deal of sickness in the Western Province especially in Kigezi.

Ticks have been found in all outhouses of rest camps along the roads leading to the Western Province in Uganda and these have been burnt. Several native lock-ups near Kampala have been burnt for the same reason.

The Senior Medical Officer, Bunyoro, (Major R. J. A. Macmillan, D.S.O.) states that at Butiaba, which always had a bad reputation for tick fever, visitors only succumb and that the residents have apparently acquired immunity. He states that he has been successful in eradicating ticks in native houses by digging out the floors for a depth of one foot and applying scalding water.

Epidemic Diseases.**Plague.**

There has been increased mortality this year from this disease chiefly owing to the epidemics in Kampala and in Busoga. For report on Kampala epidemic *vide* Appendix V.

In Busoga, plague prevailed in Jinja Township and the outskirts, but in the last quarter of the year both rat and human plague was very widespread in the neighbourhood of Iganga, 24 miles from Jinja.

The remainder of the Eastern Province which has been an endemic area for plague was practically free for the first four months, after which the disease became established chiefly in the Budama, Bugwe and Samia districts, which border in Bukedi on the Kenya Colony boundary, and persisted till the end of the year. There was also a small outbreak in Mbale Township.

Native returns from Teso and Lango shew a total of 180 deaths but in my opinion it is extremely doubtful whether the diagnosis of the majority of these is correct.

Dr. Peacock was in charge of these two districts from April to November and assures me that he saw no definite case of plague and the greatest number of plague deaths in Teso is recorded in October at the time when there was a severe and widespread epidemic of C. S. M. in that district.

Dr. Vassallo was very successful in the treatment of plague cases at Mbale with tinct. iodine intravenously; out of 27 cases so treated 21 recovered, a mortality of only just over 22·2%

Smallpox.

The low figure in the death returns for smallpox for 1920 is doubtless to a great extent due to the fact that a large proportion of the population have had the disease in the past six years.

In the first half of the year there were no cases in the Buganda Kingdom, but there were some fifty cases towards the end of the year, some of which were traced to travellers from Mwanza in Tanganyika Territory where there was an epidemic of smallpox at the time, five of these with one death were treated at the Government Isolation Camp at Kampala, the remainder were dealt with at the Native Isolation Hospitals in the district. The latter are maintained permanently by the Native Administration.

Vaccination.

Thanks to the manufacture of the lymph at the Entebbe Laboratory, vaccination has been conducted on a far more effective scale than in former years.

Of the 172,761 vaccinations performed, the results of 154,684 have been recorded, a far higher percentage than usual.

The results (*vide* Table) are highly satisfactory and all Medical Officers report most favourably of them.

In my experience, however, a few batches gave a very fierce re-action which produced in the majority very bad arms, some with deep ulceration and swollen axillary glands and a few cases of general vaccinia. I also saw two cases of a Pemphigoid eruption, one in an infant, and the other in a man who had been vaccinated a month previously. The infant was in a very poor and filthy condition and the man was of poor physique. These two were treated at Kampala and recovered.

I understand from Dr. H. L. Duke, Bacteriologist, that these batches of lymph were issued from the Laboratory at a time when there was great demand for lymph, which shortage of the supply of calves, &c., made it difficult to meet, so that it is probable that these particular batches were issued before they had been subjected to sufficient storage for sterilisation purposes.

In order to achieve as far as possible the universal vaccination of the Baganda, registers have been employed where the names of the people have been classified by villages and households and vaccinations have been performed by native vaccinators at each village.

The work has been slow, especially in the vicinity of Kampala where there is largely a shifting population and it was difficult to collect the people at the time required, both for vaccination and for examination for results and only a small proportion of the population were vaccinated.

The consequent delay in the work also had a deleterious effect on the lymph till directions were given that no lymph should be kept longer than a week.

In outlying districts where conditions were more normal the work went on more rapidly and a larger percentage of people were vaccinated with more satisfactory results.

The operators gave satisfaction on the whole and I have found the registers well kept and the records faithful, and the directions for technique observed as far as I have been able to judge in the far too few opportunities I have had in supervising the work.

Ten native vaccinators are employed in this service who divide the work of vaccination and clerical work between them. I do not advocate the employment of a greater number until constant European supervision can be arranged.

VACCINATION BY STATIONS, 1920.

TABLE I.

STATION.	ENTEBBE LYMPH.				
	Total.	Successful.	Modified.	Failed.	Unknown.
Arua	781	66	—	—	665
Bombo	2,078	69	1,153	366	490
Entebbe	1,343	253	15	23	1,052
Gulu	2,017	924	197	155	741
Hoima	432	150	50	50	182
Jinja	13,141	8,576	825	3,740	—
Kampala	27,453	19,217	—	3,566	4,770
Lira	6,190	5,420	690	380	—
Masaka	14,076	4,926	2,429	3,311	3,410
Masindi	1,113	567	69	280	177
Mbale	94,478	84,473	—	6,083	3,922
Mbarara	3,019	589	143	357	1,960
Namasagali	214	5	24	53	132
Scroti	5,922	2,786	1,345	1,249	542
Kabale	224	133	—	57	34
TOTALS	172,761	128,074	6,940	19,570	18,077

Dysentery.

There has been a decrease of mortality this year from this disease compared with last year when there was a high figure due to famine.

There was an outbreak in Kampala gaol which was found to be due to the convicts drinking, against orders, the water from the underground tank. Drinking water for the gaol is obtained from a spring. The dysentery ceased on disinfectants being thrown into the tank to render it unpotable. This outbreak was of a mild type—33 cases with no deaths.

Enteric Fever.

vide Special Report, Appendix II.

Influenza.

There is a large figure in the Native Death Returns shewn under this heading for Buganda Kingdom.

The disease was widespread in Siogo and Buruli Districts. On two occasions I sent Native Inspectors to investigate but they reported that it was of a mild type and with no deaths.

There was also a widespread outbreak in Ankole, and in Teso the disease was prevalent together with C. S. M. over a large area. This led to confusion of the diagnoses.

Cerebro-Spinal Meningitis.

There was no epidemic in the Buganda Kingdom but eleven sporadic cases were seen at Kampala, all fatal and all among itinerant Bunyoro peddlers.

C. S. M. was prevalent in Kigezi District in the beginning of the year and another outbreak was reported on the Ruanda border of that District in September. In Teso and Lango there was a serious outbreak in August, September and October.

Dr. Peacock states that in this epidemic adults as a rule had the disease in a very mild form simulating influenza, and that typical symptoms and signs were only seen among children among whom there were many sudden deaths. He attributes this to the influence of the epidemic of C. S. M. which spread over the same area in 1917-18.

Preventive measures consisted in isolation of cases and the segregation of villages, whilst the whole district was closed to traffic for a time by means of guards on the ferries, etc.

General Sanitation.

Drainage.

Very little addition has been made to the masonry drainage in the principal towns. In Kampala a few hundred feet were laid down, the work being undertaken by contract.

Sewage Disposal.

A new trenching ground has been opened $2\frac{1}{2}$ miles from the town of Kampala for this purpose.

Refuse Disposal.

Sanction has been obtained for the inclusion of a sanitary dustbin on the list of furniture supplied to Government Officials.

A certain number of dustbins have been acquired by private householders in Kampala but the available supply has not so far been sufficient to warrant the Township Authority enforcing compulsory acquisition of these by all.

Housing.

The shortage of houses owing to the largely increased staff of Government officials is now being acutely felt at all stations.

Quarters have had to be found for some of the newcomers at hotels in Kampala, and temporary "bandas" for the purpose have had to be built in Jinja Township, thereby contravening the principle of the Township Rules.

Labour Camps.

A large area has been reserved for this purpose and cleared outside Kampala and a start has been made in the construction of a "location" on sanitary lines with pit latrines, cook-houses, etc. Over 100 huts had been built by December 31st.

Hospital Accommodation.

There have been no Isolation Hospital Buildings erected and the need for these during the plague at Kampala has been most urgent. Primitive temporary grass "bandas" have been used for the purpose in which proper care or treatment of the sick is out of the question.

Recommendations for Future Work.

Of those put forward in the 1919 Report very little has been accomplished. They were as follows:—

1. The establishment of a Sanitary branch of the Medical Department, to include the control of Sanitary Inspectors. Not done.
2. The appointment of three qualified European Sanitary Inspectors. Two have been sanctioned for 1921 but have not yet arrived in the country.
3. The establishment of a Training School for Native Sanitary Inspectors and Vaccinators. Sanctioned but not begun.
4. The employment of Prison labour in sanitary work, other than night soil removal in townships. Done to a certain extent.
5. Extension of the system of contour drainage in the Kampala Swamp, etc. A small amount done.
6. Erection of Infectious Diseases Hospitals. Nothing done.
7. The regular use of all Prison station labour, etc., at frequent intervals for systematic rat drives in all townships. This has been done in the three principal towns.

In addition to the above, a piped Water Supply is urgently needed for Kampala and Jinja, more especially to flush out street drains, particularly those in the Indian Bazaar.

C. J. BAKER,
Principal Sanitation Officer,
Uganda Protectorate.

TABLE IV.

**Summary of Routine Sanitary Work done during the
Year in the Town.**

1. NAME OF TOWN.—ENTEBBE.

		Approximate area.	Number of proclaimed Open Spaces.
1918	....	12 square miles	13
1919	....	12 " "	13
1920	....	12 " "	13

2. POPULATION.

	NUMBER OF ASIATICS.		NUMBER OF NATIVES.		NUMBER OF EUROPEANS.		TOTAL.
	Males.	Females.	Males.	Females.	Males.	Females.	
1918	240	78	3,360	1,678	127	48	
1919	237	97	2,653	1,968	106	60	
1920	210	94	2,017	1,857	96	50	

3. HOUSING.

		Number occupied by Europeans.	Number occupied by Natives and Asiatics.
Number of Houses :—			
1918	....	89	448
1919	....	89	446
1920	....	79	450

Number of Huts :—			
1918	....	....	1,179
1919	....	....	1,269
1920	....	....	1,267

4. MOSQUITO PROTECTION OF HOUSES.

	1918	1919	1920
Number of European houses wholly mosquito-protected	89	89	78
Number of European houses with mosquito room	21	21	21
Number rendered during the year wholly mosquito-protected	2	—	—
Number rendered during the year partially mosquito-protected	—	3	7

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

	1918	1919	1920
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	—	—	1
Number of houses erected with sanction as to site, construction, and relation to other buildings	1	—	3
Number of huts erected with sanction as to site, construction, and relation to other buildings	19	—	—
Number of houses built without sanction	—	—	—
Number of huts built without sanction	—	—	—

ACTION TAKEN.

	NUMBER OF PROSECUTIONS.		NUMBER DEMOLISHED.	
	Huts.	Houses.	Huts.	Houses.
1918	—	—	—	5
1919	—	—	—	—
1920	—	—	—	—

6. MARKETS.

—		Total number.	Number paved and drained.	Number unpaved.
1918	....	3	1	2
1919	....	3	1	2
1920	....	3	1	2

7. SLAUGHTER-HOUSES.

—		Total number.	Number paved and drained.	Number unpaved.
1918	....	1	1	—
1919	....	1	1	—
1920	....	1	1	—

8. LATRINES.

—	FOR MALES.		FOR FEMALES.		
	Number.	Number of seats.	Number.	Number of seats.	
Number of Public Latrines :—					
1918	14	42	—	
1919	13	39	—	
1920	5	15	—	
Number of new Public Latrines erected during the year :—					
1918	—	—	—	
1919	—	—	—	
1920	2	12	—	
Number of Public Latrines repaired during the year :—					
1918	2	—	—	
1919	—	—	—	
1920	—	—	—	
Number of Public Latrines demolished during the year :—					
1918	—	—	—	
1919	1	3	—	
1920	2	6	—	
			1918	1919	1920
Number of Private Latrines			325	324	330
Average number of pails of nightsoil removed daily			432	430	450
Average number of soiled pails removed and clean pails substituted			66	50	51
Number of nightsoil men employed to clean latrines and remove excreta			24	24	24
Number of cesspools			830	1,383	1,370
Number of cesspools cleansed			Nil	Nil	Nil
Number of new cesspools constructed during the year			250	987	980
Number of old cesspools abolished			260	434	500
Number of cesspools oiled regularly by Department			Nil	Nil	Nil

9. REMOVAL OF REFUSE.

—	1918	1919	1920
Number of dustbins	30	10	15
Number of carts at work daily to remove refuse from streets	9	10	9
Amount of refuse removed daily	27	30	27
Number of carts at work daily to remove refuse from yards and premises	9	10	16
Amount of refuse removed daily from yards and premises			
Number of men employed for removing refuse	Included in above		

10. MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

	Daily average number of pails of excreta.			Daily average number of cartloads of refuse.			Daily average number of cartloads of Slaughter House and Market Offal.		
	1918	1919	1920	1918	1919	1920	1918	1919	1920
Buried or trenched	432	430	400	27	30	27	1	1	1
Burnt	—	—	—	—	—	—	—	—	—
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with	—	—	—	—	—	—	—	—	—

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

1918	1919	1920
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

12. WATER SUPPLY.

Nature of Water Supply.	1918	1919	1920
PIPE-BORNE WATER :—			
Source (river, lake or spring):—	—	—	—
Number of linear yards ...	—	—	—
Number of stand-pipes along roads ...	—	—	—
Number of stand-pipes in compounds and houses ...	—	—	—
WELLS :—			
Public :—			
Number ...	25	16	20
Number with pumps protected against surface water and mosquito-protected ...	—	—	—
Private :—			
Number ...	1	1	1
Number protected against surface water and mosquito-protected ...	—	—	—
TANKS :—			
Public :—			
Number underground ...	—	—	—
Number mosquito-protected and served by pumps ...	—	—	—
Number above ground ...	—	—	—
Number mosquito-protected ...	—	—	—
Number of 400 gallons capacity or less ...	—	—	—
Number above 400 gallons ...	—	—	—
Private :—			
Number underground ...	2	3	3
Number mosquito-protected ...	2	3	3
Number above ground ...	192	194	160
Number mosquito-protected ...	1	1	160
Number of 400 gallons capacity or less ...	2	2	2
Number above 400 gallons ...	190	192	158
Nature of tank :—			
Wood ...	—	—	—
Iron ...	144	159	58
Concrete ...	50	33	102
Barrels :—			
Number ...	27	25	20
Number mosquito-protected ...	—	10	12

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Linear yards of masonry drains :—		
1918 ...	—	—
1919 ...	2,161	612
1920 ...	2,161	612
Linear yards reconstructed during the year :—		
1918 ...	—	—
1919 ...	—	—
1920 ...	—	—
Linear yards repaired during the year :—		
1918 ...	10	—
1919 ...	—	—
1920 ...	—	—

13. DRAINAGE.—*continued.*

Nature of Drainage.	Public.	Private.
Linear yards of new drains constructed during the year :—		
1918	30	30
1919	—	—
1920	—	—
Earth drains or ditches :—		
Number of linear yards of ditches cleaned :—		
1918	No record	No record
1919	"	"
1920	"	"
Number of linear yards of ditches dug and graded :—		
1918	No record	No record
1919	"	"
1920	"	"
Average frequency of clearing ditches of grass :—		
1918	1 monthly	1 monthly
1919	"	"
1920	"	"

14. CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE.

	1918	1919	1920
Number of square yards of weeds, grass and vegetation cut and removed	Approximately 3 sq. miles.		
Average frequency of clearance of rank vegetation on same area	Twice monthly.		

15. EXCAVATIONS AND LOW-LYING LAND.

	1918	1919	1920
Number of pools and excavations	6	4	5
Number of excavations filled up	4	2	4
Amount of low-lying and marsh land raised and drained	—	—	—
Number of pools, marshes, streams, &c., fish-stocked	—	—	—
Number of cubic yards of material used for filling up pools and excavations	No record	No record	—
Number of persons fined for making new excavations	—	—	—
Average number of men daily employed in filling up pools, &c.	9	10	7

16. OILING.

	1918	1919	1920
Number of drains oiled	—	—	5
Number of pools and excavations oiled	—	—	7
Number of tanks and barrels oiled	2	2	2
Average number of men daily employed for oiling drains, pools, and watertanks or barrels	—	—	7

17. INSPECTIONS AND PROSECUTIONS.

	1918	1919	1920
Number of Inspectors employed	1	1	1
Number of houses inspected	445	443	400
Number of houses where larvæ were found	15	52	15
Number of notices served to remove conditions causing the breeding of larvæ	6	34	5
Number of persons fined for having mosquito larvæ on premises	—	—	—
Number of notices served to remove insanitary conditions on premises	33	23	3
Number of persons fined for not removing insanitary conditions after notice	—	—	—
Number of soda and aerated water factories inspected	1	1	1

J. G. RUBIE,
Acting District Commissioner.

TABLE IV.

Summary of Routine Sanitary Work done during the Year in the Town.

1. NAME OF TOWN.—JINJA.

—		Approximate area.	Number of proclaimed Open Spaces.
1918	....	2,560 acres, approx 4 sq. miles	5 Tennis Courts—Europeans, Goans and Indians.
1919	....	" " "	5 " "
1920	....	" " "	6 " "

2. POPULATION.

—		NUMBER OF NATIVES.		NUMBER OF EUROPEANS.		TOTAL.
		Males.	Females.	Males.	Females.	
1918	....	1,950	1,509	31	12	3,467
1919	....	1,025	945	29	9	2,008
1920	....	1,315	1,040	36	16	2,407

3. HOUSING.

—		Number occupied by Europeans.	Number occupied by Natives and Asiatics.
Number of Houses :—			
1918	....	48	306
1919	....	50	310
1920	....	59	318

Number of Huts :—			
1918	....	....	1,027 approx.
1919	....	....	549
1920	....	....	700

4. MOSQUITO PROTECTION OF HOUSES.

	1918	1919	1920
Number of European houses wholly mosquito-protected	30	31	33
Number of European houses with mosquito room	—	—	—
Number rendered during the year wholly mosquito-protected	—	—	—
Number rendered during the year partially mosquito-protected	—	—	—

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

	1918	1919	1920
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	—	—	—
Number of houses erected with sanction as to site, construction, and relation to other buildings	—	3	17
Number of huts erected with sanction as to site, construction, and relation to other buildings	20	40	60
Number of houses built without sanction	—	—	—
Number of huts built without sanction	3	—	—

ACTION TAKEN.

—	NUMBER OF PROSECUTIONS.		NUMBER DEMOLISHED.	
	Huts.	Houses.	Huts.	Houses.
1918	—	—	189	—
1919	—	—	438	—
1920	—	—	7	4

6. MARKETS.

	Total number.	Number paved and drained.	Number unpaved.
1918	1	—	1
1919	1	—	1
1920	1	1	—

7. SLAUGHTER-HOUSES.

	Total number.	Number paved and drained.	Number unpaved.
1918	1	1	—
1919	1	1	—
1920	1	1	—

8. LATRINES.

	FOR MALES.		FOR FEMALES.	
	Number.	Number of seats.	Number.	Number of seats.
Number of Public Latrines :—				
1918	—	25	—	—
1919	—	43	—	—
1920	—	46	—	—
Number of new Public Latrines erected during the year :—				
1918	—	12	—	—
1919	—	18	—	—
1920	—	3	—	—
Number of Public Latrines repaired during the year :—				
1918	—	—	—	—
1919	—	—	—	—
1920	—	3	—	—
Number of Public Latrines demolished during the year :—				
1918	—	5	—	—
1919	—	—	—	—
1920	—	—	—	—
		1918	1919	1920
Number of Private Latrines		227	235	312
Average number of pails of nightsoil removed daily		450	483	560
Average number of soiled pails removed and clean pails substituted		—	—	—
Number of nightsoil men employed to clean latrines and remove excreta		22	22	25
Number of cesspools		—	—	—
Number of cesspools cleansed		—	—	—
Number of new cesspools constructed during the year		—	—	—
Number of old cesspools abolished		—	2	—
Number of cesspools oiled regularly by Department		—	—	—

9. REMOVAL OF REFUSE,

	1918	1919	1920
Number of dustbins	1	1	11
Number of carts at work daily to remove refuse from streets	—	—	—
Amount of refuse removed daily	—	—	—
Number of carts at work daily to remove refuse from yards and premises	4	4	6
Amount of refuse removed daily from yards and premises	22	30	50
Number of men employed for removing refuse,	27	27	29

10. MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

	Daily average number of pails of excreta.			Daily average number of cartloads of refuse.			Daily average number of cartloads of Slaughter House and Market Offal.		
	1918	1919	1920	1918	1919	1920	1918	1919	1920
Buried or trenched	420	450	545	22	24	30	1	1	1
Burnt	—	—	—	—	—	—	—	—	—
Thrown into sea	—	—	—	—	—	—	—	—	—
Otherwise dealt with	—	—	—	—	—	—	—	—	—

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

1918	1919	1920
2	2	3

12. WATER SUPPLY.

Nature of Water Supply.	1918	1919	1920
PIPE-BORNE WATER :—			
Source (river, lake or spring):—			
Number of linear yards	—	—	—
Number of stand-pipes along roads	—	—	—
Number of stand-pipes in compounds and houses	—	—	—
WELLS :—			
Public :—			
Number	—	—	—
Number with pumps protected against surface water and mosquito-protected	—	—	—
Private :—			
Number	—	—	—
Number protected against surface water and mosquito-protected	—	—	—
TANKS :—			
Public :—			
Number underground	—	—	—
Number mosquito-protected and served by pumps	—	—	—
Number above ground	—	—	—
Number mosquito-protected	—	—	—
Number of 400 gallons capacity or less	—	—	—
Number above 400 gallons	—	—	—
Private :—			
Number underground	—	—	—
Number mosquito-protected	—	—	—
Number above ground	40	44	46
Number mosquito-protected	40	44	46
Number of 400 gallons capacity or less	38	42	44
Number above 400 gallons	2	2	2
Nature of tank :—			
Wood	—	—	—
Iron	33	33	35
Concrete	7	11	11
Barrels :—			
Number	—	—	—
Number mosquito-protected	—	—	—

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Linear yards of masonry drains :—		
1918	—	—
1919	—	—
1920	300	500
Linear yards reconstructed during the year :—		
1918	—	—
1919	—	400
1920	—	100
Linear yards repaired during the year :—		
1918	—	—
1919	—	—
1920	24	—

13. DRAINAGE.—*continued.*

Nature of Drainage.	Public.	Private.
Linear yards of new drains constructed during the year :—		
1918	—	—
1919	—	—
1920	—	—
Earth drains or ditches :—		
Number of linear yards of ditches cleaned :—		
1918	1,600 yards including the new Township.	
1919		
1920		
Number of linear yards of ditches dug and graded :—		
1918		
1919		
1920		
Average frequency of clearing ditches of grass :—		
1918	Every month.	—
1919		
1920		

14. CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE.

	1918	1919	1920
Number of square yards of weeds, grass and vegetation cut and removed	—	160,000	160,000
Average frequency of clearance of rank vegetation on same area	—	60,000	60,000

15. EXCAVATIONS AND LOW-LYING LAND.

	1918	1919	1920
Number of pools and excavations	—	—	—
Number of excavations filled up	—	—	—
Amount of low-lying and marsh land raised and drained	—	—	—
Number of pools, marshes, streams, &c., fish-stocked	—	—	—
Number of cubic yards of material used for filling up pools and excavations	—	—	—
Number of persons fined for making new excavations	—	—	—
Average number of men daily employed in filling up pools, &c.	—	—	—

16. OILING.

	1918	1919	1920
Number of drains oiled	10	18	20
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	—
Average number of men daily employed for oiling drains, pools, and watertanks or barrels	7	7	7

17. INSPECTIONS AND PROSECUTIONS.

	1918	1919	1920
Number of Inspectors employed	1	1	1
Number of houses inspected	260	284	299
Number of houses where larvæ were found	4	16	20
Number of notices served to remove conditions causing the breeding of larvæ	—	—	—
Number of persons fined for having mosquito larvæ on premises	15	25	45
Number of notices served to remove insanitary conditions on premises	75	90	85
Number of persons fined for not removing insanitary conditions after notice	—	—	—
Number of soda and aerated water factories inspected	—	—	—

B. ASHTON WARNER,
President Township Authority, Jinja.

TABLE IV.

Summary of Routine Sanitary Work done during the Year.

1. NAME OF TOWN.—KAMPALA.

	Approximate area.	Number of proclaimed Open Spaces.
1918	322,000 acres	8
1919	322,000 "	8
1920	322,000 "	8

2. POPULATION.

	NUMBER OF NATIVES.		NUMBER OF EUROPEANS.		NUMBER OF ASIATICS.		TOTAL.
	Males.	Females.	Males.	Females.	Males.	Females.	
1918	1,503	372	115	47	560	238	2,835
1919	1,435	471	117	32	756	391	3,202
1920	1,452	342	140	67	666	328	2,995

3. HOUSING.

	Number occupied by Europeans.	Number occupied by Natives.	Number occupied by Asiatics.
Number of Houses :—			
1918	121	435	367
1919	125	456	388
1920	130	476	399

Number of Huts :—

1918	1,197
1919	1,341
1920	1,257

4. MOSQUITO PROTECTION OF HOUSES.

	1918	1919	1920
Number of European houses wholly mosquito-protected	87	88	89
Number of European houses with mosquito room	12	14	19
Number rendered during the year wholly mosquito-protected	2	1	1
Number rendered during the year partially mosquito-protected	1	2	5

5. ERECTION OF NEW BUILDINGS DURING THE YEAR.

	1918	1919	1920
Number of public buildings erected with sanction as to site, construction, and relation to other buildings	4	3	7
Number of houses erected with sanction as to site, construction, and relation to other buildings	17	29	16
Number of huts erected with sanction as to site, construction, and relation to other buildings	487	165	91
Number of houses built without sanction	—	—	—
Number of huts built without sanction	52	35	10

ACTION TAKEN.

	NUMBER OF PROSECUTIONS.		NUMBER DEMOLISHED.	
	Huts.	Houses.	Huts.	Houses.
1918	—	2	270	7
1919	—	—	56	4
1920	—	—	185	—

6. MARKETS.

—			Total number.	Number paved and drained.	Number unpaved.
1918	....	....	3	—	3
1919	....	....	3	—	3
1920	....	....	3	—	2

Nakasero Market is partly paved.

7. SLAUGHTER-HOUSES.

—			Total number.	Number paved and drained.	Number unpaved.
1918	....	....	1	1	—
1919	....	....	1	1	—
1920	....	....	1	1	—

8. LATRINES.

—				FOR MALES.		FOR FEMALES.	
				Number.	Number of seats.	Number.	Number of seats.
Number of Public Latrines :—							
1918	....	....	13	56	2	14	
1919	....	....	13	56	2	14	
1920	....	....	15	68	2	14	
Number of new Public Latrines erected during the year :—							
1918	....	....	—	—	—	—
1919	....	....	—	—	—	—
1920	....	....	2	12	—	—	
Number of Public Latrines repaired during the year :—							
1918	....	....	1	6	—	—	
1919	....	....	1	6	1	6	
1920	....	....	1	12	—	—	
Number of Public Latrines demolished during the year :—							
1918	....	....	—	—	—	—
1919	....	....	—	—	—	—
1920	....	....	—	—	—	—
				1918	1919	1920	
Number of Private Latrines				675	725	766	
Average number of pails of nightsoil removed daily				749	850	848	
Average number of soiled pails removed and clean pails substituted				32	34	42	
Number of nightsoil men employed to clean latrines and remove excreta				42	43	50	
Number of cesspools				—	—	—	
Number of cesspools cleansed				—	—	—	
Number of new cesspools constructed during the year				—	—	—	
Number of old cesspools abolished				—	—	—	
Number of cesspools oiled regularly by Department				—	—	—	

9. REMOVAL OF REFUSE.

—			1918	1919	1920
Number of dustbins	...	...	No record	No record	No record
Number of carts at work daily to remove refuse from streets	...	...	10	15	16
Amount of refuse removed daily	...	(cart loads)	41	65	74
Number of carts at work daily to remove refuse from yards and premises	...	...	10	15	16
Amount of refuse removed daily from yards and premises	...	(cart loads)	21	30	35
Number of men employed for removing refuse	...	...	65	55	55

10. MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

	Daily average number of pails of excreta.			Daily average number of cartloads of refuse.			Daily average number of cartloads of Slaughter House and Market Offal.		
	1918	1919	1920	1918	1919	1920	1918	1919	1920
Trenched ...	825	935	890	—	—	—	—	—	—
Burnt	—	—	—	39	35	—	2	2	2
Thrown into sea ...	—	—	—	—	30	70	—	—	—
*Otherwise dealt with ...	—	—	—	—	—	—	—	—	—

*Mode of disposal :—Filling up old excavations in Swamp area.

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

1918	1919	1920
2	2	2

12. WATER SUPPLY.

Nature of Water Supply.	1918	1919	1920
PIPE-BORNE WATER :—			
Source (river, lake or spring):—			
Number of linear yards ...	—	—	—
Number of stand-pipes along roads ...	—	—	—
Number of stand-pipes in compounds and houses ...	—	—	—
WELLS :—			
Public :—			
Number ...	6	6	6
Number protected against surface water and mosquito-protected ...	5	6	6
Private :—			
Number ...	4	2	1
Number protected against surface water ...	1	1	1
TANKS :—			
Public :—			
Number underground ...	—	—	—
Number mosquito-protected and served by pumps ...	—	—	—
Number above ground ...	—	—	—
Number mosquito-protected ...	—	—	—
Number of 400 gallons capacity or less ...	—	—	—
Number above 400 gallons ...	—	—	—
Private :—			
Number underground ...	10	10	10
Number mosquito-protected ...	10	10	10
Number above ground ...	234	239	246
Number mosquito-protected ...	228	233	240
Number of 400 gallons capacity or less ...	131	136	141
Number above 400 gallons ...	113	113	115
Nature of tank :—			
Wood ...	—	—	—
Iron ...	206	211	218
Concrete ...	38	38	38
Barrels :—			
Number ...	17	14	12
Number mosquito-protected ...	12	4	2

13. DRAINAGE.

Nature of Drainage.	Public.	Private.
Masonry drains :—		
Linear yards of masonry drains :—		
1918 ...	4,773	3,524
1919 ...	5,609	No record
1920 ...	6,025	"
Linear yards reconstructed during the year :—		
1918 ...	400	No record
1919 ...	710	"
1920 ...	—	"
Linear yards repaired during the year :—		
1918 ...	320	31
1919 ...	No record	75
1920 ...	600	No record

13. DRAINAGE.—*continued.*

Nature of Drainage.	Public.	Private.
Linear yards of new drains constructed during the year :—		
1918	1,215	546
1919	836	450
1920	416	No record
Earth drains or ditches :—		
Number of linear yards of ditches cleaned :—		
1918	4,225	} No record
1919	6,524	
1920	6,974	
Number of linear yards of ditches dug and graded :—		
1918	525	} No record
1919	3,951	
1920	450	
Average frequency of clearing ditches of grass :—		
1918	8	} No record
1919	6	
1920	6	

14. CLEARANCE OF UNDERGROWTH, LONG GRASS AND JUNGLE.

	1918	1919	1920
Number of square yards of weeds, grass and vegetation cut and removed	715,326	863,542	645,333
Average frequency of clearance of rank vegetation on same area	7	7	7

15. EXCAVATIONS AND LOW-LYING LAND.

	1918	1919	1920
Number of pools and excavations	No record	No record	No record
Number of excavations filled up	"	"	"
Amount of low-lying and marsh land raised and drained (<i>sq. ft.</i>)	56,111	—	—
Number of pools, marshes, streams, &c., fish-stocked	—	—	—
Number of cubic yards of material used for filling up pools and excavations	No record	No record	No record
Number of persons fined for making new excavations	"	"	"
Average number of men daily employed in filling up pools, &c.	—	—	—

16. OILING.

	1918	1919	1920
Number of drains oiled	—	—	—
Number of pools and excavations oiled	—	—	—
Number of tanks and barrels oiled	—	—	—
Average number of men daily employed for oiling drains, pools, and watertanks or barrels	—	—	—

17. INSPECTIONS AND PROSECUTIONS.

	1918	1919	1920
Number of inspectors employed	2	8*	6*
Number of houses inspected	762	1,164	1,750
Number of houses where larvæ were found	1,608	738	308
Number of notices served to remove conditions causing the breeding of larvæ	24	32	27
Number of persons fined for having mosquito larvæ on premises	2	3	—
Number of notices served to remove insanitary conditions on premises	74	65	122
Number of persons fined for not removing insanitary conditions after notice	2	17	11
Number of soda and aerated water factories inspected	2	2	2
Number of persons fined for adulterating milk	14	6	7

* 6 Native Inspectors have been engaged since June, 1919. 2 Native Inspectors have been transferred to out stations.

Appendices.

1. A Report on Blackwater Fever in Uganda during 1920.
By C. A. WIGGINS, M.R.C.S., L.R.C.P., F.E.S., *Principal Medical Officer.*
2. A Report on Enteric Fever in Uganda during 1920.
By C. A. WIGGINS, M.R.C.S., L.R.C.P., F.E.S., *Principal Medical Officer.*
3. The Report of the Dental Surgeon for 1920.
By G. S. BATEMAN, L.D.S.R.C.S. (Eng.), *Dental Surgeon.*
4. A Report by the Medical Department Entomologist.
By W. F. FISKE, *Entomologist.*
5. A Report on the Epidemic of Plague in Kampala during 1920.
By C. J. BAKER, M.R.C.S., L.R.C.P., *Principal Sanitation Officer.*
6. A Further Report on the Treatment of Sleeping Sickness (by Salvarsanised Serum.)
By C. H. MARSHALL, M.R.C.S., L.R.C.P., M.B. (Lond.), *Senior Medical Officer.*
and S. M. VASSALLO, M.D. (Malta), *District Medical Officer, Mbale.*
7. A Report on the Lingual Application of Iodine as a Prophylactic in Cerebro Spinal Meningitis and Influenza.
By J. A. TAYLOR, M.B., Ch.B. (Edin.), L.M. (Dub). *Senior Medical Officer.*

APPENDIX I.

Report on Blackwater Fever in Uganda for 1920.

1. The number of cases this year was 56 with 7 deaths. Of these 49 cases with 5 deaths were treated at the Government Hospitals and 7 cases with 2 deaths at C.M.S. Hospitals.

2. The following table shows the number of cases, deaths and case death rates during the past 17 years:—

Year.	Cases.	Deaths.	Case Death rate.
			%
1904	10	2	20
1905	14	3	21.4
1906	41	4	9.8
1907	10	2	20
1908	13	2	15.4
1909	21	6	28.6
1910	26	6	23.1
1911	18	3	16.6
1912	45	9	20
1913	58	12	20.7
1914	82	21	25.6
1915	65	18	27.7
1916	46	10	21.7
1917	49	8	16.5
1918	40	7	17.5
1919	83	18	21.7
1920	56	7	12.5

No case of blackwater fever is reported as having occurred in an African native this year as compared with one last year.

The numbers of cases per hundred of the estimated European and Asiatic population of Uganda for the years 1919 and 1920 were as follows:—

	1919.			1920.		
	Population.	Cases.	Case Rate. %	Population.	Cases.	Case Rate. %
Europeans ...	847	24	2·83	948	12	1·26
Asiatics	3,516	58	1·65	4,528	41	·90
Natives of Seychelles ...	(no estimate)	—	—	(no estimate)	3	—

From the two preceding tables it will therefore be noted that there has been a considerable reduction in the death rates as compared with recent years. The number of cases although still very high shows a decrease of 27 as compared with last year and cannot be considered altogether unsatisfactory when the increase in the European and Asiatic population is taken into account.

No estimate is obtainable of the number of natives of Seychelles now living in Uganda but they cannot be very numerous and since three suffered from an attack of blackwater fever during this year it appears that they must be very susceptible to the disease.

3. The following table shows the case and death incidence among Officials and Non-Officials and the race and sex of the patients:—

(a) *Government Officials.*

	EUROPEANS.		ASIATICS.		NATIVES OF SEYCHELLES.	
	Cases.		Cases.		Cases.	
	M.	F.	M.	F.	M.	F.
	5	0	13	0	1	0

(b) *Non-Officials.*

	7	0	24	4	2	0
TOTALS.	12	0	37	4	3	0

The estimated Official and Non-Official European population for 1919 and 1920 with the case rate and number of deaths was as follows:—

	1919.				1920.			
	Population.	Cases.	Case Rate. %	No. of Deaths.	Population.	Cases.	Case Rate. %	No. of Deaths.
European Officials ...	307	5	1·6	1	350	5	1·42	0
.. Non-Officials	587	19	3·23	3	592	7	1·18	1

The figures rendered this year can only be taken as approximate but are probably within two or three of the correct number.

4. *Locality and Seasonal Variation.*—The following table shows the stations where the cases and deaths occurred and the monthly variation:—

BLACKWATER FEVER CASES.

Station.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	1920 Total.		1919 Total.	
													Cases.	Deaths.	Cases.	Deaths.
Butiaba	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	
Entebbe	1	...	...	...	...	...	2	1	...	...	...	...	4	1	1	...
Gulu	...	1	...	...	...	...	...	...	...	...	...	...	1	1	...	...
Jinja	1	...	...	...	1	2	7	5	1	2	...	1	20	2	23	5
Kampala	...	...	...	...	2	3	2	2	2	1	...	...	12	...	18	3
do C.M.S.	...	...	2	...	1	1	1	...	2	...	...	...	7	2	13	5
Kitgum	...	...	1	...	...	...	...	...	...	1	...	...	2	...	1	...
Iganga C.M.S.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Lira	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...
Masaka	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...
Masindi	1	...	...	...	...	...	...	...	...	...	...	...	1	...	3	...
Mbale	...	...	...	...	...	...	...	1	1	...	...	...	2	1	6	...
Namasagali	...	...	...	...	1	1	1	...	...	...	1	...	4	...	8	2
Mityana C.M.S.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
Mbarara	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Soroti	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	2
TOTAL 1920	3	1	4	...	5	7	13	9	6	4	1	3	56	7	...	...
TOTAL 1919	6	1	6	9	14	13	9	8	3	5	8	1	...	...	83	18

The cases are reported as having occurred in the different localities as follow:—

During the rainy season	...	20 cases
At the end of the rainy season	...	19 ..
During the dry weather	...	9 ..
Not recorded	...	8 ..

5. **PREVIOUS ATTACKS.**—Of the 56 cases, 21 patients are reported to have had previous attacks of blackwater fever.

Of the Europeans—

One had three previous attacks.
Three had one previous attack (one death).

Of the Non-Europeans—

One had four previous attacks.
One had three previous attacks.
Three had two previous attacks.
Twelve had one previous attack (one death).

Exciting Causes.—The reports from Government Hospitals record one case of hæmoglobinuria commencing on the second day of the patient's first attack of malaria. The patient, however, had an enlarged spleen. The remaining 48 cases are all reported as having had previous, unusually very numerous attacks of inadequately treated malaria.

6. **Other exciting causes reported :—**

Over exertion	...	...	...	4
Chill and exposure	...	...	...	13
Over exertion and exposure	...	...	...	5
Over exertion and quinine	...	...	...	6
Over exertion and fever	...	...	...	1
Exposure and quinine	...	...	...	1
Unknown	...	...	...	19

7. **BLOOD EXAMINATIONS.**—Blood examinations were made as a matter of routine in all cases treated at the Government Hospitals but malarial parasites were found in eight only.

Before attack in three cases.

During the attack in five cases.

8. The number of cases of malaria treated at Government Hospitals and Dispensaries in stations where cases of blackwater fever occurred is shown in the following Table :—

Stations.	1920.		1919.	
	Blackwater Fever.	Malaria.	Blackwater Fever.	Malaria.
Butiaba ...	1	140	1	440
Entebbe ...	4	693	1	575
Gulu ...	1	46	—	—
Jinja ...	20	388	24	366
Kampala ...	19	1,526	32	1,195
Kitgum ...	2	No return	1	33
Masaka ...	1	14	1	48
Masindi ...	1	116	3	374
Mbale ...	2	290	6	450
Mbarara ...	—	—	1	84
Lira ...	1	132	—	—
Namasagali ...	4	55	8	129
Soroti ...	—	—	5	291
TOTALS ...	56	3,400	83	3,985

N. B.—The C.M.S. blackwater fever cases are included in the above list but not their malaria cases.

9. The age of the patients is reported as follows :—

	Europeans.		Asiatics and Natives of Seychelles.		Totals.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 10 ...	—	—	3	1	3	1
10—20 ...	—	—	3	—	3	—
20—30 ...	2	—	22	2	24	2
30—40 ...	8	1	12	3	20	4
40—50 ...	2	—	2	—	4	—
50—60 ...	—	—	1	—	1	—
62 ...	—	—	1	—	1	—
TOTALS ...	12	1	44	6	56	7

10. Habits with regard to quinine are recorded in the reports of the 49 cases treated at the Government Hospitals:—

	Cases.	Deaths.	Duration of Hæmoglobinuria.	Complications.
Irregular	42	4	—	—
10 grains daily	1	—	3 days	Slight jaundice.
5 " "	1	1	6 "	Intestinal paralysis.
5 " "	1	—	2 "	Nil
10 " twice weekly	1	—	22 hours	"
10 " once "	1	—	18 "	Slight jaundice.
Nil for 7 months	1	—	2½ days	" "
Nil	1	—	1½ "	Nil

11. Length of residence in Tropical Africa is recorded as follows:—

Duration.	No. of Cases.	Deaths.	Duration.	No. of Cases.	Deaths.
5 months	1	—	9—10 years	2	—
1—2 years	7	1	10—11 "	3	1
2—3 "	4	1	11—12 "	1	—
3—4 "	4	1	12—13 "	3	—
4—5 "	8	2	17 "	1	—
5—6 "	7	1	20 "	1	—
6—7 "	4	—	25 "	1	—
7—8 "	3	—	Several "	1	—
8—9 "	3	—	Not recorded	2	—

12. The occurrence of jaundice and other complications:—

Jaundice	....	in 80 cases.	Cardiac symptoms	....	in 2 cases.
Suppression of urine	....	" 7 "	Dysentery	....	" 1 "
Mental symptoms	....	" 1 "	Severe colic	....	" 1 "
Excessive vomiting	....	" 1 "	Round worm from nose	....	" 1 "
Relapse	..	" 3 "	Intestinal paralysis	....	" 2 "

One of the C.M.S. cases was six months pregnant but recovered without abortion.

13. The duration of hæmoglobinuria was recorded in the 49 Government Hospital cases:—

Under 1 day	....	in 8 cases	4—5 days	....	in 4 cases. (1 fatal)
1—2 days	....	" 11 " (1 fatal)	5—6 "	....	" 3 "
2—3 "	....	" 7 " (1 ")	6—7 "	....	" 2 " (1 fatal)
3—4 "	....	" 10 "	8 "	....	" 1 case (fatal)

RELAPSES.—

1 day and relapse for 2 days. 1½ days and relapse for 8 hours. 4 days (not recorded).

14. *Fatal Cases.*—The cause of deaths and other points of interest in connection with the seven fatal cases:—

- Case 1. Child of five-and-half years of age, round worm passed by nose.
- " 2. Nine miles journey in rickshaw after hæmoglobinuria commenced, very anæmic, chronic malaria.
- " 3. No pyrexia from the beginning of the hæmoglobinuria until death. Six days hæmoglobinuria, second attack.
- " 4. Sudden collapse from heart failure.
- " 5. Very debilitated condition, severe vomiting, eight days hæmoglobinuria. Suppression of urine.

C.M.S. Hospital Cases.—

- Case 6. "Fearfully anæmic and run down," second attack, more than ten years in Uganda. Suppression of urine.
- " 7. Suppression of urine. Father died of blackwater fever.

15. *Quinine taken before onset.*—The amount of quinine taken within 34 hours of the onset of the hæmoglobinuria is reported in the Government Hospital cases as follows:—

30 grains quinine in	3 cases.	Quinine taken but quantity unknown in	3 cases
20 " " " "	5 "	No quinine taken for some days or	
15 " " " "	4 "	weeks before attack	" 5 "
10 " " " "	13 "	No quinine taken for seven months	" 1 "
5 " " " "	7 "	Quinine never previously taken	" 1 "
2—4 " " " "	3 "	No record	" 4 "

16. *Predisposing Causes*—Of the 55 patients 21 are reported to have had one or more previous attacks of blackwater fever. All the patients were suffering from or had previously suffered from, usually very frequent, attacks of inadequately treated malaria. Other predisposing causes recorded are general debility in 17 cases and dysentery in one case.

17. *Treatment during the Hæmoglobinuria*.—No quinine was given in 40 cases which include the seven fatal cases. Quinine was given by intramuscular injection in eight cases and by mouth in two cases all of which recovered. Pituitrin injections were given in 22 cases two of which ended fatally. Harsey's or a similar mixture was given in a large number of cases as a matter of routine, and saline, strychnine and digitalis injections as required.

SUMMARY.

From the above and from a careful perusal of the individual reports the following are some of the conclusions arrived at:—

1. *Decreased Case and Death Rates*.—I hope that these to some extent may be due to permanent factors such as the general anti-malarial measures in progress, the better acquaintance with the disease and with the necessity for greater individual precautions against malaria and of early and adequate treatment.

2. *Exciting and Predisposing Causes and Quinine Habits*.—In my opinion there appears to be overwhelming evidence for the following conclusions from the reports received.

(a) That without malaria there would have been no case of blackwater fever.

(b) That the previous attacks of malaria had usually been numerous and in all cases inadequately treated.

(c) That in all cases, except possibly one, the previous administration of quinine can be said with confidence to have nothing to do with the bringing on of the hæmoglobinuria. On the other hand cases of blackwater fever occurred when no quinine had been taken for several days, weeks or months and, in one case, not at all previous to the hæmoglobinuria. In the one doubtful case referred to above the patient had been suffering from fever for a week without taking any quinine, then took 30 grains in one day in three doses and developed hæmoglobinuria shortly after the third dose.

3. One of the patients who died had taken regularly five grains of quinine daily as a prophylactic for one year previously. It is also recorded that he had had very numerous attacks of malaria which were inadequately self-treated by increased doses of quinine. Four other patients also took quinine regularly as a prophylactic; three of these had the same history of numerous mild and self-treated attacks of fever. This in my experience is not an unusual history in cases of blackwater fever and illustrates one of the objections to indiscriminate quinine prophylaxis in a country where this disease is prevalent. I have no doubt that the prophylactic prevents small malarial infections in many cases, but not large or numerous infections. Mild attacks of fever difficult to diagnose as malaria begin to occur which are only damped down by increased doses of quinine for a few days, and eventually after some additional exciting cause such as a chill or over exertion blackwater fever supervenes. Possibly if the prophylactic quinine had not been taken the first attack of malaria would have been more severe, medical aid called in and the case adequately treated. Such cases are of course more apt to occur in persons isolated from early medical treatment, and in this Protectorate with the ever present danger of blackwater fever looming ahead I cannot feel justified in recommending in every case the constant use of quinine as a prophylactic unless under medical supervision. I am convinced that the usual custom is for the average layman to take far too much quinine as a prophylactic and not nearly enough during and after an attack of malaria: a system which invites attacks of blackwater fever.

4. The fact that 21 of the total cases had previously suffered from one or more attacks of blackwater fever confirms the conclusion that one attack of this disease predisposes rather than otherwise to further attacks.

C. A. WIGGINS,

Principal Medical Officer.

APPENDIX II.

Report on Enteric Fever in Uganda for 1920.

1. The total number of cases reported in Uganda this year was 17 with two deaths. Of these 14 cases with no deaths were treated at Government Hospitals and three cases with two deaths at the C.M.S. Hospital, Kampala.

2. The number of cases treated at Government Hospitals compares with the three previous years as follows:—

Years.	Cases.	Deaths.
1917	11	4
1918	8	1
1919	26	6
1920	14	—

3. The following Table shows where the cases were treated and the race of the patient:—

Station.	Europeans.	Asiatics.	Africans.	Totals.	Deaths.
Entebbe ...	1	—	—	1	—
Jinja ...	—	1	—	1	—
Kampala ...	—	4	5	9	—
" C.M.S. ...	—	1	2	3	2
Mbale ...	—	2	—	2	—
Mbarara ...	—	1	—	1	—
TOTALS ...	1	9	7	17	2

4. Of the above 16 were males and one a female (Asiatic). The European patient and two Asiatics were in Government service. These three cases are reported para typhoid.

5. Of the nine cases treated at Kampala four were native prisoners in the gaol and one a native policeman. The origin of these cases was not discovered.

6. The two fatal cases treated at the C.M.S. Hospital, Kampala, are reported upon as follows:—

(1) An Asiatic, died a few hours after admission to hospital. Previously treated 16 days in own home. "Quite typical case clinically."

(2) An African, "a wandering beggar," died 14th day after admission and "an atypical case."

7. One case reported as typho-malaria occurred in a White Father living at an isolated mission station at Ankole. As there appears to be some doubt as to the diagnosis this case is not included in the returns as an enteric fever case.

C. A. WIGGINS,
Principal Medical Officer.

APPENDIX III.

SIR,

I have the honour to submit to you my Annual Dental Report for 1920. During three months of the year I was on leave.

The following Tables show the Dental Treatment of European Officials.

(1) Appointments	...	...	...	472
Officials treated	...	...	...	198
(2) The following conditions were treated:—				
Caries simplex	...	...	...	302
Extractions	...	...	...	41
Pulpitis	...	...	...	39
Abscess	...	...	...	13
Periostitis	...	...	...	14
Erosion	...	...	...	19
Odontalgia	...	...	...	8
Stomatitis	...	...	...	4
Pyorrhœa Alveolaris	...	...	...	14
(3) Conservative work:—				
Synthetic porcelain and cement	...	...	...	61
Ag. Amalgam	...	...	...	169
Cu. Amalgam	...	...	...	7
P. Gutta Percha	...	...	...	9
T. Gutta Percha with dressings	...	...	...	85
Scaling and cleaning	...	...	...	96
Ag. No. 3 applications	...	...	...	26
(4) Prosthetic work:—				
Dentures	...	...	...	24
Repairs to Dentures	...	...	...	33
Crowns	...	...	...	14

(5) Beyond Entebbe and Kampala the following stations were visited:—

					<i>No. of Visits.</i>
Jinja	...	...	...	...	2
Masindi	...	...	...	...	1
Butiaba	...	...	...	...	1
Arua	...	...	...	...	1
Gulu District	...	...	...	...	1
Masaka	...	...	...	...	1
Mbarara	...	...	...	...	1
Kigezi District	...	...	...	...	1

I have the honour to be,

Sir,

Your obedient servant,

THE HON'BLE THE PRINCIPAL MEDICAL OFFICER,
UGANDA.

G. STANLEY BATEMAN,
Government Dental Surgeon.

APPENDIX IV.

Report of Entomologist.

The whole time of the Entomologist has been devoted to the "Victoria Nyanza Infected Area" throughout the year. The programme as briefly outlined in the last report consisted of four items, which may be considered in their original order.

"First:—Thorough general inspection of the proscribed zone to ascertain the actual conditions at present, and the extent to which the Sleeping Sickness Rules are irregularly relaxed."

The survey of the proscribed lake area of Uganda has hardly been thorough but has been extended into all parts of the lake in Uganda. During parts of January and February a tour was made into the lake area of Tanganyika Territory. Reports have been received of conditions in Kenya Colony.

No case of sleeping sickness known to have been contracted on the lake shore has been detected in any one of the three territories. Two cases were found among the crew of the Sleeping Sickness Inspector's canoe in Busoga, but their histories could not be learned. They may easily have been contracted in the Mpologoma area, from which cases occasionally come down to the Busoga shore at Jinja.

Absence of infection on the lake shores generally is in contrast to its persistence in other fly infested areas. This is not due to the population being less freely exposed to the tsetse; on the contrary the infestation is more dense along the lake shore than is at all general along the rivers where human infection persists, and at some points, certainly, the population living in contact with fly on the lake shore is much more dense than is usual along the rivers. The circumstances cannot be explained without further research into the epidemiology of the disease. In fact its disappearance from the lake shore is no less remarkable than its appearance and spread there 20 years ago. The rise of the epidemic is usually explained on the theory that infection was newly introduced from the Congo Basin. The wane of the epidemic to the point of practically, if not actually, complete disappearance of infection cannot be explained so easily.

The extent to which the Sleeping Sickness Regulations are irregularly relaxed is greater than expected. Probably not 10% of the actual exemption from application of the rules are regularly *Gazetted*. The legal limit of the closed area is one mile from the lake shore. The actual limits, as defined by more or less well marked boundaries, are anywhere from ten yards to three miles. Anything more than one mile is of course, illegal; anything less is also illegal unless duly *Gazetted*, but the boundaries have been *Gazetted* at some half dozen points only. In many cases Medical or Administration Officers have granted concessions with due consideration to the intent and spirit of the ordinance and rules but without complying with their cumbersome technicalities; in many others subordinate officials or native inspectors have made concessions with no authority whatever, and often with complete disregard to the spirit and intent of the rules they are supposed to enforce. Certain of the inspectors have themselves been profiting by violation of the fishing regulations and it must be admitted that these have been among the most efficient in preventing poaching by others.

"Second:—To regularize by amendment of rules existing relaxations wherever they are of long standing and no harm can be shown to have resulted."

As already stated no harm can be shown to have resulted anywhere in the lake area,—whether in Tanganyika Territory, Kenya Colony or Uganda,—from complete absence of sleeping sickness regulations (as in Kenya); from general relaxation of the already moderate regulations (as in Tanganyika) or from the conditions above described in Uganda. Therefore, wherever these conditions in Uganda were of at all long standing they should have been regularized by amendment of the rules.

In February it was attempted to prepare *Gazette* notices to this end, as required by the rules, but the first lot submitted, after having passed from one to another official in the Medical, Administrative and Legal Departments, were finally returned to the Entomologist some three months later with the ruling of the Attorney General that in their then existing form they stood in conflict with certain of the rules. The situation was exactly as in the beginning—three months before—and inasmuch as at least one hundred additional notices required preparation it was rather obvious that the legal machinery required under the rules for their relaxation was too cumbersome to be practical, and that they would necessarily be revised in such radical manner as to obviate this difficulty. This revision has not yet been made. Half-a-dozen or more drafts have been made, but all have proved in some respect undesirable. All that is really necessary is that the common procedure whereby Administrative Officers grant exemptions on the advice of Medical Officers shall be recognized, and some provision made for recording these exemptions for adequate control of fishing and water traffic and enforcement of the rules generally, and for reorganization of the Sleeping Sickness Inspection Service.

“THIRD.—To grant extensive privileges in all parts of the infected area in accordance with rules as thus amended.”

The rules have not been amended, therefore the granting of extensive privileges ought not to have been undertaken. But extension of privileges have nevertheless been irregularly granted in two directions:—First in the reopening of a few fishing grounds and landing places, and second in the reopening of certain of the islands to reoccupation by their former inhabitants.

Extension of fishing privileges was necessary for two reasons:—First because in anticipation of revision of rules the natives were permitted to clear landing places on the understanding that fishing privileges would be granted. They expended much labour in clearing the landings, and it was certainly not their fault that the rules had not been amended to permit fishing; therefore the Sleeping Sickness Inspectors have been instructed not to interfere with fishing from cleared landings when conducted exclusively in open lake out of contact with fly. The second reason was that until opportunity could be had for study and observation of the fishing industry as conducted under native control it was impossible to revise the rules intelligently, and fishing under native control could only be irregularly permitted.

Extension of privileges in all the islands had to be irregularly granted because of the definite promise given in November, 1919, that ten islands in the Saza (county) of Sese might be reoccupied in part, and under certain restrictions. The restrictive conditions were accepted and the natives built about one hundred canoes and provided themselves with large quantities of dried food. By August they were ready to begin the work of colonization actively and it was impossible to delay it without causing great hardship. It was delayed at the request of the Principal Medical Officer until Dr. Carpenter should return in September to assist in revision of the rules, but this had not been accomplished by the 1st of October. The canoes were rapidly deteriorating, the food was being destroyed by insects, and the prospective colonists were becoming disheartened and beginning to retreat from the adventure. Further delay would have been fatal, and permits were therefore granted but unfortunately too late to permit the colonists to take full advantages of the autumn rains. Nevertheless about 300 men have part cleared the jungle from their future homes, and have brought their women to plant and cultivate the new cleared land.

This recolonization and reclamation of a Saza has been replete with difficulties. These have been to a large extent due to the onerous conditions imposed, and in another large part to the desire of every owner to reoccupy his own land and of most peasants to return to their own villages. In his last annual report the Entomologist stated that “taking the population from islands to mainland was an almost absurdly simple undertaking in comparison to taking it back again.” The difficulties could only be foreseen when this was written, none had been encountered. All that were foreseen have since been encountered and in no case found to be over estimated. It is doubtful if in all Africa within historic times, so many natives have voluntarily worked more diligently than the handful of men who are carving homes for themselves in the wilderness that was once the highly prosperous and valuable Saza of Sese.

“FOURTH.—To enforce the amended rules strictly.”

This last item in the programme will be the most difficult to carry out. There has been serious shortage of staff in the District Offices throughout the period of the war and very many transfers of Officers from one station to another. The enforcement of the Sleeping Sickness Rules has been left almost entirely in the hands of native “inspectors” paid out of the Medical Vote, but under the control of the District Commissioner. These men have had little, and in some cases no supervision from either Administration or Medical Department for considerable periods and some of them have done little or nothing except to draw their pay and such other perquisites as might be extracted from their position. The force must be promptly reorganized and apparently it will be necessary to consolidate it under a single head.

The inspectors are at present supposed to be responsible for the observance of the rules on the part of all persons. In other words the Government undertakes to deal with the situation through the mediumship of the inspectors instead of through the mediumship of the regularly constituted chiefs. This is working out badly. The chiefs are actually responsible and should be made to meet their responsibilities. The duties of the inspector should be literal: to inspect the area and report to Headquarters whether or not the chiefs are doing their duties, and, if not, the report should be transmitted from Headquarters to the District Officers that they may deal with their chiefs.

It is for the inspectors, also, to supervise fishing and petty traffic by water for the practical reason that they must have canoes and that these activities can only be supervised from the lakeward side, and not from the landward side at all effectually.

The administration of the lake area is, in effect, specialized work, altogether different in important respects from administration of mainland districts removed from the lake—and all mainland districts have virtually been removed from the lake during the past twelve years. Fishing is the industry of paramount importance. There are hundreds of square miles under water which are more valuable economically than corresponding areas of land in the poorer parts of the Protectorate. Agriculture along the shore and on the islands occupies a subsidiary position, and administration of the lake area, including the islands therein, must be undertaken with this fact always in view. It is also necessary to take into fullest account the fact that fishing is proved to be a very dangerous occupation. The industry was almost destroyed by the epidemic with literal decimation of fishermen. Moreover the great fish markets on the lake shore where infected fishermen came into closest contact with herds of healthy people in presence of fly appear to have been the main centres of a spread of infection amongst the population generally.

Taking these two facts into full consideration—first that the whole life of the lacustrine population centres about fishing and, second, that unless the fishing industry is revived and redeveloped under more sanitary conditions than formerly prevailed it is likely to be destroyed again, and it will be seen that the administration of the lake area must be made to conform strictly to rules of sanitation. When the District Officer comes down through an agricultural country to those parts of his domain bordering the lake he must adopt an entirely new, and at present to the younger officials, an entirely unfamiliar view point.

This is not easy, nor to be expected. Five districts in two provinces border the lake. In all of these except in the Entebbe district which includes two insular counties and a long reach of mainland shore as well, the portion of the lake area included is at present of insignificant relative importance to the remainder and the same is more true of the Entebbe district since the inclusion of Busuju and Gomba than hitherto.

It has therefore seemed the logical course that those parts of the lake, inclusive of its islands, which fall within the limits of the Protectorate should be considered as a quasi independent district, attached to the Entebbe district, with the Officer in charge responsible for administration of the island counties and of the Sleeping Sickness Ordinance and Rules on both islands and mainland.

In pursuance of this idea it was long since proposed that all the islands should be included in either Sese or Buvuma Sazas.

A question which must be answered promptly is the future of the Saza of Buvuma. At present the Saza is completely depopulated and for twelve years the handful of survivors of the great sleeping sickness epidemic have maintained the Saza Government extra territorially on the mainland. There was never a question of perpetuating this arrangement. It was adopted because the people were definitely promised that eventually they would be allowed to return to their lands. Very few land-owners have taken advantage of the opportunity offered them to exchange their holdings for lands in the interior of Buganda. In consequence the Crown has only insignificant interests as compared with its interests in Sese, where perhaps one-third of the lands have in one manner or another reverted to it.

Experience in the reclamation and repopulation of Sese has proved beyond all doubt that the young men who have passed their formative years in exile on the mainland cannot be expected to assist. As a rule they are rather afraid of the lake and repelled by it, than in love with and strongly attracted to it, like the older men. Some of them have become indolent and hopelessly useless for the hard work in hand, others have found lucrative employment which they are loath to leave, many have left the Protectorate altogether and some are seriously affected with diseases contracted on the mainland. In short there are few except the land holders and the old men who are willing to undergo the hardships which recolonization of a wilderness entails. Unless the Government assists materially in providing transport facilities, in restocking the island ranges with cattle, and in other ways, it will be many years before the Saza ceases to be a source of expense and trouble.

These truths apply much more forcibly to Buvuma. There are not nearly so many prospective colonists. Under the same sanitary conditions that have been imposed in Sese there would be much more work for this smaller number of people to perform. The Government must assist to a considerably greater extent, with far poorer prospects of return, than in the case of Sese, or the Saza will remain for a much longer period a source of trouble and expense.

It is certainly true of Sese, and probably true of Buvuma, that the expense and difficulties of reclamation and repopulation have doubled with each two years that have passed since depopulation. Only five years ago, in Sese, reclamation of old villages merely required the cutting away of relatively small trees and bush in order that the old banana plantations might revive and become quickly fruitful, whereas to-day the old villages must be cleared of much heavier growth and when cleared the people must bring new plants from the mainland and wait years before their plantations are in full bearing. During these five years expense and difficulties have more than doubled biennially on this score alone to which must be added the death or superannuation of older men, alienation of many of the younger, and numerous other factors.

What shall be done in Buvuma? Shall the idea of repopulation be definitely abandoned? In view of the circumstances under which the population was removed; of the retention by Buvuma of their titles to the land and of the perpetuation of the Saza organization in witness of the clear intention of the Government to return the population to the land, it would probably be impossible to abandon the original plan without compensating the chiefs and land holders liberally. It might be that payment of liberal compensation would be cheaper in the beginning, than to undertake repopulation under the same conditions which have been imposed in Sese.

Shall repopulation be not abandoned, but merely postponed? Certainly not. There is not a word to be said in favour of such a course. It is doubtful if the lake area will ever be more free of sleeping sickness than at present. It is absolutely certain that the expense and trouble of repopulating the Saza will increase steadily as time passes. The expense will be heavy now, it will be much heavier next year, and there is no turning point in sight.

It is a conservative estimate that the repopulation of Buvuma will entail a dead loss of not less than £2,500 per year for from three to five years to come, if the same precautionary measures are to be taken as in Sese. If the land were purchased at Fl. 1/- per acre, it would cost about £12,000 but it is doubtful if the Buvuma would sell at any such price, or if they would consent to exchange these lands for double the area of land upon the mainland, because of the fishing rights, which are considerably more valuable than the land.

The final paragraph of the last annual report stated that "the activities of the Entomologist are mainly directed to the planning and execution of preliminary experiments in reclamation work which are necessary before practical details can be elaborated or any exact estimate of the cost to the Government presented." These experiments still continue. They have included, amongst others, the following:—

I.

EXTIRPATION OF TSETSE THROUGH CLEARING OF FORESHORE.

About eight miles of foreshore have been cleared of bush since the last report was written. All clearings were for utilitarian purposes. Part were done by Government and part by native gangs employed by chiefs under Government supervision. In addition about $1\frac{1}{2}$ miles of canals have been cut entirely by natives to give access to old landing places at the back of permanently anchored sudd fields.

With respect to longshore clearings of bush three subjects were under investigation.

- (1) Cost of original clearing.
- (2) Effectiveness in extirpating fly.
- (3) Cost of maintenance.

The cost of clearing proved less than anticipated except for the item of food for labourers, which was more than anticipated, owing to the fact that operations had to be conducted in depopulated areas far from the source of food supply.

Leaving out the item of food (or rather of the transportation of food from the source of supply into unpopulated area), the cost of clearing and burning all woody growth to the ground ranged from just under Fls. 25/- to just over Fls. 40/- per acre: to which must be added nearly 60% for cost of food and transport. This included the digging up of small bushes but not of stumps of larger trees.

The ponderous masses of vines, growing over and through the trees add very largely to the cost of clearing. In the absence of these it could be done much more cheaply. In the first clearing at Bugoma (where clearing cost Fls. 40/- the acre) it required a gang of 45 men to cut the vines away ahead of 25 axemen.

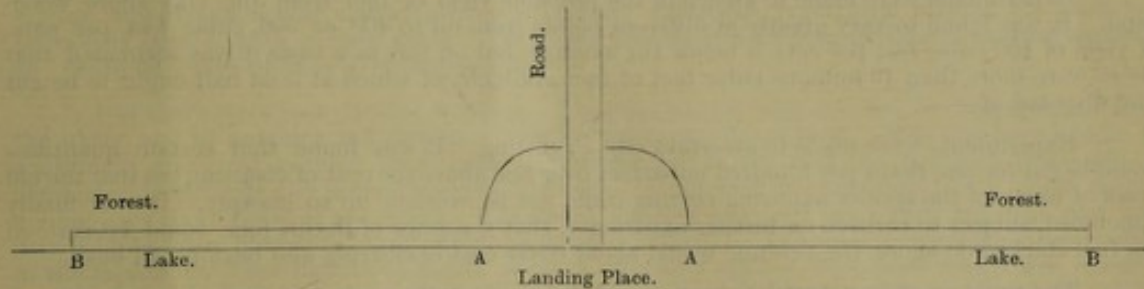
The effect of clearing upon tsetse is, in part to destroy the shelter required by the adult flies and in part to destroy that required by their young. The adult insects require "massive shelter" such as is provided by trees, or large shrubs (of 20 feet or more) in masses, or smaller shrubs and vines growing over a cliff. Their pupæ require low growing shelter not more than two or three feet from the ground. Such shelter rarely provides suitable protection except when growing over sand or over deposits of dry, finely divided, vegetable debris. It follows that a clearing is effective if all the trees and larger bushes are cut, leaving only low growing bush, everywhere within range of flies spreading outward from better sheltered localities, and that it is equally effective if all the low growing bush and low hanging branches of trees are cut throughout the breeding places leaving only the large trees. Such clearings are, in either case, extirpative. Excellent examples of both were encountered during the year in Tanganyika Territory and in Sese.

In Tanganyika extensive clearings made by the Germans on Kome Island, Bumbide Island, and on the mainland shore south of Bukoba were seen in January and February. Nothing has been done towards maintaining them since the war, but they are still effective because though densely bushed, the bush has not yet grown to provide the massive shelter required by the adult flies.

In Sese the rapid increase of the Situtunga Antelope on Bugalla Island since depopulation has profoundly affected the vegetation. In some localities, notably on Lutoboka Peninsular, formerly densely infested by fly, the animals have destroyed virtually all the low growing bush, and fly has completely disappeared.

Clearings of another sort may also be made which are not extirpative, but which owe their effectiveness entirely to the reluctance of the flies to cross a belt of grass, or to leave shelter far behind. Thus a cleared belt of 50 or 100 yards on either side of a road passing through a fly infested forest affords a measure of protection to passengers along the road, but it does not necessarily have any effect in reducing the number of flies in the general locality.

It is regarded as the best course to make clearings with the double object of keeping the flies as far as possible from occupied land, and also of reducing their numbers as much as possible. To this end a long and narrow belt along shore—as for protection of a landing place and road leading up from it—is regarded as far more effective than a semicircular clearing of equal area. Thus as in the diagram, a road and landing place might be protected by either a semicircular clearing 500 yards in length along the shore from A to A, with a maximum depth of 250 yards from landing place along the road, or by a clearing of 2,000 yards in length from B to B with a depth of 30 yards everywhere. The clearing B to B is preferable to the clearing A to A for three reasons:—



First, because (in this region) most of the breeding grounds of fly are within 30 yards of the lake, and it is four times more efficacious in destroying these. Second, because the flies coming into the road will follow either the shore or the edge of the forest. If they follow the shore they have four times further to go to reach the landing: if they follow the edge of the forest they have nearly three times further to go to reach the road. Third, the area requiring to be cleared is less by one third, and the cost in proportion.

Two experiments with clearings of the B to B type were made during the year. In the first the clearing was 1,200 yards long and 50 yards deep. It included a very prolific, and very densely infested breeding ground, about midway its length. The shore at this point was all but completely cleared of fly and there was very great reduction in density of fly in uncleared bush for another long reach of shore beyond the limits of the clearing. It appeared unnecessarily wide and the second experiment was made to ascertain, first if a 30 yards belt would suffice, and, second, if the effect of such clearing is literally extirpative, or if it is in part due to repellent effect on fly.

The island of Kibibi, needed in connection with quarantine of domestic animals, was selected as a site for the second experiment. It is a small island of slightly under a mile longest diameter, with $1\frac{1}{4}$ miles of sheltered shore and one mile of naturally cleared shore. A patch of thick bush occupies the northern half, with frontage of 800 yards on the water. A narrow bush fringe extended along shore for 700 yards on the east and 600 on the west of this bushy patch. All this was cut away to the grass land. It exceeded 30 yards in width at only two points and for a very short distance. The thick bush was cleared back to 30 yards from the water's edge.

Work began in September with 20 men and was finished in December. The effect on fly was extraordinary.

Previously there had been plenty of flies, but they were so well fed on the crocodiles and varanus that haunted the bush-fringed shore that they passed unnoticed if not sought for. They were not in the least troublesome. One might spend hours in the bush without being bitten or even annoyed. This continued after the clearing was begun. By the middle of October the clearing had extended to reduce the area of feeding ground by about one-third, and the flies became troublesome. A month later their feeding grounds had been reduced by two-thirds: the flies were concentrated in the part remaining cleared, and they were very annoying. Where the clearing was finished they had concentrated in the patch of bush that was left, and were unbearably troublesome. One needed both hands armed with fly switches to keep from being continually bitten.

It was obvious that no flies were leaving the island. It was therefore estimated that four to eight months would be required for the existing swarm to die out.* The final outcome cannot be reported upon until next year.

II.

UTILIZATION OF FUEL FROM CLEARINGS.

There is no coal or oil locally produced in either Uganda or Kenya Colony and fuel except wood is expensive in consequence. The supply of wood in close vicinity of the three principal towns of Uganda: Entebbe, Kampala and Jinja, is none too extensive, and during recent years has

* In January there was a very great decrease in the number of flies on the island, in March a still greater decrease was noted. There seemed no doubt that extermination would be virtually complete in six or eight months from finishing of clearing in December.

been steadily decreasing. In consequence the Government has expended some money for plantations of quick growing trees to forestall serious future shortage.

All three towns are situated on or near the lake shore. The shore is for the most part fringed with bush or forest. Fuel cutting along shore has been prohibited or discouraged because of tsetse fly.

The fly persists only because of the shelter. If shelter could be destroyed fly would disappear.

It is therefore highly desirable from a sanitary view point that the fuel along shore should be cut and equally so from an economic viewpoint. Two obstacles have to be overcome before this can be done. Transport must be provided and means must be found for maintaining the clearings where made; also it is necessary that the clearings shall be clean to the ground which adds materially to cost of cutting fuel.

Experiments were made to ascertain the probable yield of fuel from the lake shore woodland. It was found to vary greatly at different points from nil to 400 or 500 cubic feet per acre. A yield of 100 cubic feet per acre is below the average, but on this as a basis it was estimated that there were more than 40 millions cubic feet of fuel available, of which at least half ought to be cut and disposed of.

Experiments were made to ascertain cost of cutting. It was found that certain quantities could be cut for one florin per hundred cubic feet over and above the cost of clearing, but that the old trees of many of the species requiring cutting could not be worked up so cheaply. It was finally concluded, subject to revision on further experience, that if a price of florins four could be realised for fuel stacked on shore, the revenue would about cover cost of clearing and burning all bush.

The problem of transport has been considered as carefully as circumstances have permitted. It was desired to sell the fuel at the piers (Entebbe, Kampala or Jinja) at from florins six to florins seven per hundred cubic feet, thus allowing florins two to florins three for transport charges.

The Uganda Railway quoted a rate of 6.28 cents per ton (roughly equivalent to 100 cubic feet) per mile, an entirely satisfactory rate except for the conditions that full loads for tug and tow of lighters should be guaranteed; that piers should be constructed at both ends of the route and that labour should be provided for loading and unloading. These conditions were collectively prohibitive.

The use of the Uganda Government steamer "Mackinnon" with lighters was considered. The idea was discarded because the ship is old and in need of frequent repairs, and no Department in the Uganda Government is prepared or willing to undertake keeping it in repair.

For the same reason (that no existing Department would undertake responsibility of repairs) and also because of difficulties experienced in securing petrol and paraffin, the use of motor boats for towing small lighters or scows appeared impracticable.

Canoes are more economical methods of transport by water than are the "hamali carts" now used on land, and can be kept in repair by natives, but they are more expensive than dhows, which can also be kept in repair by native "fundis." Therefore the native dhow was selected as on the whole the most economical mode of transport. A single experiment in hiring a dhow was made, and quickly abandoned: the charges appeared exorbitant from every view point. It is therefore proposed to purchase from one to three of these vessels for further experiment.

It is virtually certain that a tug with lighters would be preferable provided only that shops and men were available for repairs when required, but the business is not sufficiently important to justify such a plan.

Charcoal can be transported much more cheaply than wood. It was therefore attempted to manufacture it. A gang was employed two months. Five pits were burnt. Closed pits produced large quantities of coals at a large expense for preparing the wood. Open pits produced small quantities of better quality coals but the amount of wood wasted was very great.

In the end the experiment was accounted a failure because of the impossibility of securing a market for more than very limited quantities at a price which paid for burning and transport. The Public Works Department offered only 35 cents per sack, which was almost exactly the cost of burning, food for labour and transport of product, and not enough could be sold at higher prices to make the venture other than a losing one.

III.

MAINTENANCE OF CLEARINGS BY CLEAN CULTURE.

In the past the clearings made at Entebbe, Jinja, and other ports on the lake front have been maintained by continued cutting over of the woody vegetation as it grows. The method has proved very expensive.

In Tanganyika Territory very extensive clearings have been made along the lake shore by the natives for cultivation and cultivation has been extended close to the shore. The result is complete absence of fly along shore which must have been infested under natural conditions. No kind of crop grown by the native appears to provide adequate shelter for fly provided that it is cleanly cultivated. Therefore one experiment was made by Government, and others under Government supervision in the maintenance of clearings in Uganda by clean culture.

The principal experiment was made at Bugoma, where 1,200 yards of shore had been cleared by Government for protection of a ferry head and village. One-half this length was new cleared bush or forest and had never been cultivated. The remainder was formerly cultivated to within about 15 to 30 yards from the lake shore. The clearing was 50 yards in depth. The Government undertook to plant and cultivate the new cleared part, and a local chief to maintain the part formerly cultivated.

The Chief's venture proved a paying one. His half of the clearing was planted to sweet potatoes, beans, maize and a few other crops. He erected a barricade along shore against hippopotami, and his villagers, who lived near at hand and who had vital interest in the work, effectively protected the plantations against monkeys and antelope. There was very little trouble from insects or other minor pests.

The Government's venture proved disastrous. About 40 kinds of crops were planted in small plots, and three (sweet potatoes, maize and tapioca) in large plots. Every plot failed except the tapioca, and excepting also a small garden of mainly European vegetables, planted on what had previously been a patch of open grass. The major trouble was fungous in the soil, causing seedlings to "damp off" and rootlets to wither and die.

But there were many minor troubles. The plantations were invaded by hippopotami from the water, and by antelope and monkeys from the uncleared forest back. Men and boys had to be continually employed keeping these pests at a distance. In the end the monkeys succeeded in completely destroying the second plantings of maize, it was said in consequence of a single night's delinquency on the part of the guard. The sweet potatoes promised fair return until the plot was invaded by a heard of noctuid larvæ, which completely ruined it. The antelope threatened destruction of the tapioca until the near-by villagers began a campaign against these pests which was effective in reducing their numbers throughout the general vicinity. Thereafter this crop grew splendidly and promises to give a good return.

Most of the trouble encountered was traceable to premature planting of the land before it was free of fungous mycelia, or to its distance from the village and the indifferent care given to the crops by men who had no personal interests at stake. These troubles were not encountered on that part of the clearing maintained by the chief, and his success indicates that maintenance of long shore clearings by cultivation may be practicable if the natives can be induced to take up such land. There exists, however, a strong native prejudice against extension of cultivation to the water's edge. The native wishes to leave a strip of bush between his crops and the water, which serves as a wind break and ensures a certain privacy but which also affords good shelter for fly. Not one of the villagers who have cultivated the foreshore at Bugoma or elsewhere could be induced to build their huts in the open clearing. All insisted on more secluded sites. The native's mode of life is nicely arranged to protect tsetse fly and to give it opportunity to exterminate him. He must arrange his affairs somewhat differently before he can be safely permitted to reoccupy village sites on or near the shore.

IV.

MAINTENANCE OF CLEARINGS BY CLOSE GRAZING.

The long shore clearings at Entebbe are the best kept of any on the lake front, and mainly because they are more freely and closely grazed by cattle. Both the browsing and trampling of cattle are destructive to woody growth and favourable to the production of a short grass sward of a character especially repellent to tsetse. In fact, the clearing at Entebbe was actually being extended by the browsing and trampling of cattle, sheep and goats during the drier months of the past year.

It has long been obvious that if sufficient numbers of domestic animals could be turned into a new cleared area, they would serve almost as well as a human "clearing gang" but it has been doubtful if it is practicable to graze the foreshore thus closely on account of contagious or infectious animal diseases. There are rinderpest and pleuro-pneumonia; *trypanosomiasis* as transmitted by *Tabanus* or *Stomoxys*; ticks and the various sorts of tick fever, and numbers of lesser diseases of cattle, sheep and goats which are likely to increase and spread where large numbers of animals are grazed in restricted areas. It is very doubtful if maintenance of clearings by close grazing is practicable on the mainland where so many diseases are prevalent or likely to appear on short notice.

On the islands it is a very different matter. There are, at present, no ticks whatever, and no fly except *Glossina* that appears likely to transmit *trypanosome* diseases. Rinderpest and pleuro-pneumonia ought to be excluded without difficulty. It has appeared probable that if these diseases and vectors of disease can all be excluded it would be a profitable venture to clear the foreshore for the purpose of providing pasturage, and to maintain the clearings at a nominal expense.

A long series of experiments has been planned and in part carried out, leading up to the conclusions above stated. Included in this series are the following:—

In order to ascertain if cattle could be completely freed of ticks through hand picking, a lot of eight young bulls was received on loan from the Pathological Laboratory in November, 1919. At first much difficulty was experienced in inducing the men in charge to seek and remove the small ticks with which the animals were thickly covered. It required nearly two months to get this first lot completely clean.

Some forty-five head were subsequently handled in the same manner, followed by a lot of thirty-five purchased from Kome Island in Tanganyika. The men soon became experts at their work, and it is now possible to detick young animals by hand in less than one-third the time originally required, and at a cost exclusive of transport charges of from 50 to 75 cents each.

In order to ascertain if any ticks existed on the islands small herds of deticked cattle were moved about from place to place on the largest island in the Sese group during the period May to December. The most careful scrutiny has failed to disclose a single tick on any of these animals.

In order to ascertain if young cattle are likely to suffer from *trypanosome* infection transmitted from antelope through *Glossina*, two experiments have been made. The first was with the herd of eight that was first subjected to process of deticking. This was grazed from 10th January to 15th June in a range densely infested with tsetse, and thick with antelope (situtunga). Blood slides were taken on the 11th February and sent to the Chief Veterinary Officer, whose Deputy reported presence of *trypanosomes* in several. In March several of the animals showed symptoms of disease, and one was returned to the Pathological Laboratory for diagnosis and observation. This one died. The Government Bacteriologist found *trypanosomes* but did not consider *trypanosomiasis* to be the cause of death. Two of the seven animals remaining never showed outward signs of disease. A third that appeared the healthiest through March, became very sick in April, and was regarded as doomed in May, but by July it had begun to recover and is now in splendid condition. A fourth was ailing from the beginning of the deticking experiment but lived through exposure to fly, and is now entirely recovered. The three remaining were noticeably affected by what was pretty certainly "fly sickness," but from June onward they have all improved steadily in condition.

It appears possible that the absence of ticks and of the not altogether superficial irritation caused by them, is a factor of considerable consequence in helping the animals to withstand effects of *trypanosome* infection.

At the request of the Veterinary Adviser the experiment was repeated with some 38 young bulls loaned from the Pathological Laboratory. Twenty-eight were exposed to fly in presence of antelope from periods of one to three months and then removed to a range where grazing was better. Three animals died; one before it left the mainland, the second during process of deticking and before exposure to tsetse, and the third some time after being deticked, but before exposure to infective fly.*

This experiment to date has been the counterpart of the first. A number of the animals are in poor condition apparently due to the "fly sickness" and two look hopelessly ill, but no worse than the most seriously affected of the first herd. It appears certain that "fly sickness" due to *Glossina palpalis* is no more but rather less to be feared on the islands than tick borne diseases on the mainland.

Stomoxys, *Tabanus* and other biting flies are present on the islands in small numbers but in some variety, and it was fully expected that when cattle were brought these pests would increase. There has been ample opportunity for such increase at three points. At one of the three *Lyperosia* which previously passed entirely unnoticed has increased to cause the animals some annoyance. At the other points neither this nor any other fly shows signs of increase to date. The animals never crowd together for protection, but graze well scattered, and there is no present cause to fear the spread of any of the more virulent forms of *trypanosomiasis* even if introduced.

The animals are yet too few in number, and have been on the island too short a period to undertake the close grazing experiment that has been planned. It is intended to stock one range of about 300 acres to approximately the limit, and to clear a mile or two of shore to supplement the natural grazing. But it is already evident that the number of cattle required for such an experiment has been underestimated. One head to each three acres is not enough and one head to each two acres may prove insufficient. This is by no means an unsatisfactory development—for the experiments with cattle have, so far, proved profitable ventures—and the larger the expenditure required for purchase of animals the greater the profit appears likely to be.

Several experiments have also been made with goats, but with indifferent success, mainly owing to the difficulty of finding men to herd them. The native breed is by no means hardy. The animals are sheltered at night, not merely from wild beasts, but from storms, and they are not permitted to feed when the herbage is wet. It is not regarded as man's work to herd them and no herdsman has yet been found who will give the care and attention to which the animals are accustomed. The animals have proved wonderfully efficient aids in maintaining new clearings, but the two herds purchased for experiments have not increased. The experiments are being continued under different, and it is hoped, more favourable conditions.

V.

REVIVAL OF FISHING INDUSTRY UNDER SANITARY CONDITIONS.

The fishing grounds in the closed area are more extensive and valuable than the agricultural and grazing lands combined. The industry was the most important of those destroyed by the Sleeping Sickness epidemic and the subsequent depopulation of the area. It was also, on two accounts, the most dangerous industry: first, because the fishermen themselves were more freely exposed to fly and more liable to contract infection than any other element of the populations and, second, because they were regular frequenters of fly infested market places where they became the source of infection to the population at large—of the interior no less than of the lake shore.

* The obviously sick animals received (7 head) were not exposed to fly, in presence of antelope, but were kept on an antelope free island until they should either die or recover.

On these accounts the industry is the most necessary to control, and it is also the most difficult to control because of the high prices prevailing in the native market and of the large profits which can be made by poachers in the forbidden grounds. Fish was formerly an important item in the Buganda dietary and in absence of a substitute, a necessary item. No satisfactory substitute for it appears to have been found. After 12 years of legal prohibition the people still exhibit keen desire and obvious need for it. In 1919 there were many hundreds of professional poachers, working in defiance of the rules and in some cases under such protection as their chiefs could give. It was impossible to enforce the rules because there was no obvious need for their enforcement. So far as could be learned none of the poachers took harm from contact with fly and both native and European authorities were inclined to judge breaches of regulations leniently; relaxation of rules was therefore a necessary preliminary to their enforcement.

Before the rules could be intelligently amended or revised it was necessary to learn something of the methods of fishing and of the extent, distribution and productiveness of fishing grounds. Accordingly a series of practical experiments was begun in March and is still being continued. This was supplemented by observations in the already authorized and in the newly (and irregularly) reopened grounds. The following is a *resumé*.

Methods of fishing fall in two categories which may be called "offshore" and "inshore" respectively. Offshore methods involve the use of staunch canoes or of sailing or motor boats and of trawls, drift nets, drift lines and traps of a certain type. Inshore methods are conducted from the shore or with the aid of rafts or small dug-out canoes, and with seines, weirs, rod and line, spears and traps of several types.

Offshore methods are dangerous from fly infested landing places but are absolutely safe if conducted quite independently of inshore methods from artificially or naturally cleared landing places. Inshore methods are dangerous along fly infested shore, and it is not practicable to clear the foreshore for protection of inshore fishing; therefore inshore methods must be restricted to shore naturally free of fly or to shore artificially cleared with some other object in view. It is practicable to clear landing places for offshore fishing wherever the grounds are at all productive. Therefore offshore methods (if conducted independently of inshore methods) may safely be encouraged everywhere where landing places can be found, or labour found to clear them.

Of the offshore fishing appliances named, trawls have never been used in Uganda, and experiments in their use are suggested and planned. Drift nets were not used previous to European occupation. They are now extensively used by Europeans, Eurasians and Asiatics, and less extensively by natives. The art of setting, handling, drying, and mending nets has not been generally learned. Many natives who have undertaken net fishing have failed completely, but a few have learned the art and knowledge of it is gradually extending. The drift line is the best known and most popular native method of offshore fishing, but large quantities of small fish are required for bait, and the native knows no means of providing himself with these except resort to inshore methods. Traps set in deep water are not very profitable nor popular.

From a purely sanitary view point the drift net is the method which can most safely be encouraged unless some method for catching bait offshore can be devised.

As has been stated the natives are only slowly learning the art of net fishing. Many have failed and have reported that nets cannot be used in many parts of the fishing area. In several grounds irregularly reopened for offshore fishing exclusively the use of nets was quickly abandoned: the fishermen declared they could not use drift lines unless allowed to catch bait inshore and operations practically ceased. Therefore in June two experiments were begun. Nets of standard pattern were procured and set nightly wherever camp was made in the course of the Entomologist's extensive touring, with the object of discovering by practical experience the areas into which this method of fishing can profitably be extended. Twine (which had to be ordered from England) was procured and fashioned into small mesh nets which it was hoped might serve for catching bait for drift lines.

In the course of the first experiment one or two nets have been set on 123 nights in about 40 different localities, and 1,062 fishes have been caught of the following sorts:

I.	{	"Emale"	...	...	23	} These are predatory fish growing to large size. Only the immature fish are caught.
		"Semutundu"	...	..	110	
		"Kisinja"	...	..	78	
					211	
II.	{	"Ngege"	..	...	675	} These feed on small fry or vegetable matter. The mature and some smaller are caught.
		"Mbegede"	..	...	172	
					847	
III.	{	"Mamba"	...	...	3	} Caught more or less by accident.
		"Nsoga"	...	...	1	

These nets were of the standard five-inch mesh commonly used in this lake. They catch the fish included in group II. in relatively large numbers. Neither of these species are properly predatory, and neither has been known to take the hook. The "ngege" is the most valuable food fish in the lake, and the most popular in the European market. It never grows to large size. The five-inch mesh may catch any above half-grown, but doubtfully holds the mature individuals so securely as it holds the half grown. The "mbagede" is a poor quality, strangely shaped fish, prized only by natives. It grows to a larger size than the "ngege," but owing to different shape of head the five-inch mesh catches larger individuals.

The species included in group I. are those most commonly caught on drift lines. All are predatory on smaller fish, and the "emale" and "semutundu" are especially notable in this connection. They are large of head, with enormous wide spreading mouths, and grow to 15, 20 or 25 lbs. weight. These larger individuals prey upon the full grown "ngege" which they even take from the nets. The "semutundu" is a fine fish, with flesh similar to cod, and equal in quality. The "emale" is an extremely voracious fish, with head broader than the body. It is much more commonly taken on drift lines than "semutundu," but on account of its broad head, much less commonly taken in the nets. It and the "kisinja" are prized in the native market, but do not appeal to the European taste. Only the small and very immature individuals are commonly caught in the nets, worth 20 to 40 cents in the native market as compared to 50 cents to Fls. 1/50 for the larger sizes, such as are caught by means of the drift lines. The catching out of the large predatory fish—as by use of drift line—is plainly desirable for they are not only valuable when caught, but are also injurious to the smaller and also valuable sorts if not caught. The catching out of the smaller fish of all sorts, while leaving the larger individuals of the predatory sorts, is certainly undesirable, for the large individuals are not only lost but they are left to continue a career of destruction. Hence it is believed to be inadvisable to encourage net fishing at the expense of line fishing.

After long delay a consignment of linen netting twine was received from England in December, and sold at cost, in small lots, on condition that it should be used exclusively for the manufacture of small mesh nets for capture of small fish for bait on drift lines. The fishermen were keen to buy it and many small nets were made and put into use. Some are certainly succeeding. In one case it is reported that a half pound net is not only providing bait for 200 hooks, but a surplus for sale. Other fishermen have not succeeded, and report that they are "too old" or that their "fingers are too stiff" to manipulate and repair the net.

The catch in these small mesh nets set offshore has so far consisted almost exclusively of "nsoga," a scavenger in its food habits. No fry of large fish have as yet been seen in the catch. The use of such nets appears desirable from every view point. A much larger order for netting twine has been placed, and experiments will be made with mesh of varying sizes.

It was attempted to estimate the profits of drift line and drift net fishing, actually and relatively.

During march one canoe with a crew of four men was employed to fish with drift lines. The catch was used as food for labourers employed on the clearing work. It could not be weighed every day, but the average for days when it could be seen was 63 lbs. The men worked 26 days, catching (estimated) 1,650 lbs., worth in the native market Fls. 165/-. The loss and depreciation of hooks and lines was estimated at Fls. 11/- and of canoe at Fls. 7/50, or total of Fls. 18/50, leaving margin of Fls. 146/50. If this were divided amongst four men it would give Fls. 36/60 gross profit per man, from which would need to be deducted the cost of marketing the produce and of market dues.

The experiment was continued through the year in five other localities. Not nearly so exact figures could be kept. The profit in the first locality was indicated to be above the average. Perhaps Fls. 20/- to Fls. 25/- gross profit per month, per man, would be a fair average for the six localities.

The catch with nets has varied from: nil on six to eight nights to the maximum catches on three occasions of 81 in two nets, 43 in one net, and 41 in one net. The average of all nights was just under seven fish per net. This is not a fair average. On numerous occasions nets have been set in darkness in strange grounds, and usually with poor results. At one camp the men set two nets for three nights. The first night the nets were set in darkness and caught one fish. On the second night 41, and on the third 81 were caught: the increased catch being due to increased familiarity with the grounds. In what are accounted good and profitable grounds the catch by eight canoes was actually counted for the same night as follows:

Canoe No.	No. of nets.	Catch of fish.	Average per net.	Canoe No.	No. of nets.	Catch of fish.	Average per net.
I.	9	34	3.7	VII.	22	302	13.7
II.	5	37	7.4	IV.	10	140	14.0
VI.	4	45	11.2	V.	14	230	16.4
VIII.	9	107	11.9	III.	6	102	17.5

In this case the canoes operated from the same landing and had equal opportunity in the same grounds. The small catch with canoes I. and II. was explained by their crews as to their own inexperience. They were old drift line fishermen and this was their first venture with nets. The great diversity in catch per net, per night, is also in large part due to the irregular distribution of fish.

The tentative conclusions reached through this hasty survey of the fishing area is that good grounds are less extensive than expected, but that some grounds are more productive than

expected. Some native reports that nets could not be used in certain grounds were proved*false, others were substantiated. The fishermen employed in the experiments would never willingly set the nets in deep water, and if ordered to do so the small catch justified their objections, but nevertheless pelicans and some other birds find good fishing in deep water, and something may perhaps be learned from them. The records to date indicate that one or two areas are virtually fishless, despite superficial appearance, and the birds seem also to avoid them. In others, where conditions otherwise appear extremely unfavourable (but where it has not yet been practicable to set nets) birds flock in large numbers.

It is intended to continue the survey as opportunity offers and to make some attempt to ascertain conditions at depths greater than are commonly worked.

Especially it is hoped during the coming year to learn something of the conditions which prevail in the breeding grounds of the "lake flies." These insects rise from the depths in such countless myriads as to appear like dense smoke hanging over the water. They mainly come from certain as yet ill defined areas. It would seem that their larvæ should provide food for fish—but it may prove that absence of fish is responsible for the quantities of flies.*

The life of the nets used in Victoria Nyanza is very short. Those used in the experiment lasted for from 22 to 40 nights, with an average of 30 nights. Some among the professional Indian and Eurasian fishermen put out from 18 to 25 nets from each boat, and replace one net daily. The Muganda who has learned to use nets does better as a rule. He puts out fewer nets and takes more care in mending and drying them. The standard net is made in Ireland, and costs a trifle over Fls. 15/- when ready to set.

The market prices of fish vary. The "ngege," which runs fairly constant in size is a fair standard for comparison. The lowest price at which they are reported to have been sold in Uganda is eight per florin, or 12½ cents each—but this only at one market during a temporary glut. The highest prices are at Kampala, 40 cents each; and Jinja, 25 to 35 cents each. At both markets the industry is in the hands of foreigners.† At Entebbe where the natives control the industry the price has been kept at 15 to 20 cents per fish. The average price for all markets is between these figures, or about six per florin. At this rate 90 fishes must be caught to pay for the net, exclusive of landing and market dues.

In good grounds 20 fishes per net, per night, is a fair average. Considerable areas have been found where the experimental catches indicate that this average will be exceeded. At the minimum price of eight per florin such fishing would give very large profits provided that market and landing dues could be eliminated. Net profits of 5,000 to 10,000 florins per year, per boat, as operated by the foreign experts would not unreasonably be expected. One man may have as many as ten boats, and could retire on his income after a year or two.

The pests of the fishing grounds are conspicuous and varied, including mammals, birds, reptiles and fishes.

Foremost among the "natural enemies" of fish and pests of fishing grounds must be placed the fisherman who employs nets of too small mesh indiscriminately and with no consideration for the future.

Otters are very common locally and destroy many small fish and fish fry. They are also accused of taking fish from nets. Half eaten fish are sometimes found in the nets. The fishermen believe the otters to be the robbers in such cases, but it is doubtful if they will eat their prey under water.

Hippopotami are very common in some grounds, and makes life unpleasant for the fishermen who must go in frail canoes amongst the herds. Canoes may be overturned and men killed or maimed. The beasts may also work havoc with nets and lines.

Cormorants and "darters" are extremely numerous and destructive. It is (very roughly) estimated that they destroy fish valued at Fls. 1,000,000 per year. They feed mainly on the small fish which abound inshore, and which are not only prized in the native market, but which are used as bait and which are also valuable as the food for the large predatory fish. They are said to have multiplied greatly since the fishing grounds were closed. Previously the fishermen are said to have raided their nesting places more or less systematically and to have kept their numbers reduced.

The fish eagle is a common bird generally distributed and quite unnecessarily protected by law for purely æsthetic reasons. It is very destructive to food fish and often wastes as much or more than it eats. It is estimated that the fish destroyed by one pair of eagles would maintain a native family in comfort.

There are two pelican roosts and breeding places in the closed area, and the birds are common over the radius of five to seven miles from each. They are very rarely seen elsewhere.

There is a diversity of other fishing birds ranging from tiny brilliantly coloured kingfishers to the gigantic "whale headed stork" or "shoe bill" which is reputed to feed on the lung fish.

* It has been reported that the flies arise in characteristic swarms in Kavirondo Gulf and also that this Gulf is especially good fishing throughout. If so it may yet prove that the lake fly breeding grounds are also good fishing grounds at greater depth than commonly worked.

† Among professional fishermen using nets in Victoria Nyanza are to be found Europeans, Arabs, Goans, Indians, Cinghese, Somalis, Swahilis and others representing a commingling of these races.

* Crocodiles are generally distributed and locally very numerous. In this region they appear to be mainly fish feeders and rarely feeders on fishermen. It is impossible to estimate the injury they inflict. They not only destroy fish of their own catching, but are reputed to be inveterate robbers of nets and lines, and are known occasionally to destroy or seriously to injure nets. They are also the principal host of the tsetse fly, but it is an open question if they may not be beneficial in attracting fly to themselves and away from men.

The large predatory fish have already been mentioned, as valuable when caught and injurious if left uncaught. The large "emale" and "semutundu" are known to be robbers of nets and lines. Occasionally they swallow or attempt to swallow fish and net together and become victims of their own rapacity.

It is wise to hesitate before undertaking to improve on natural conditions. It is too soon as yet to be certain that the campaign against crocodiles, which was undertaken by the German administration of Tanganyika Territory as a part of the sleeping sickness precautionary measures, is on the whole wise. It is certainly true that tsetse fly is much more numerous than it would be if crocodiles were to be destroyed, and the reptiles superficially appear to be unmitigated pests in all economic relationships; but it is also indubitably true that when crocodiles are sufficiently common, man is virtually immune to double attack by the same tsetse fly with an interval between attacks sufficient to permit the completion of the biological cycle of the *trypanosome*. It may therefore be that he would be immune to sleeping sickness in form of wide spread epidemic in presence of crocodile where he would be liable to it otherwise. Until more is known of the precise conditions under which human *trypanosomiasis* is spread from man to man by tsetse, the economic status of the crocodile in this region cannot be definitely stated.

No such doubts arise with respect to cormorants and darters. The natives are probably correct in stating that these pests have increased during closure of fishing grounds, and it is strongly recommended that systematic effort shall again be made to reduce their numbers. It can be accomplished at small expense and will be undertaken if specific orders to the contrary are not received.

Not enough is known of the food habits of fish, especially in the case of the "ngege," which must be accounted on the whole the most valuable species. Some study of stomach contents of all fish is proposed for 1921. Still less is known of the breeding habits of the more valuable food fish and a systematic study is really necessary as a basis for intelligent fishing regulations, but there is little prospect of doing anything in 1921. This is especially necessary in the case of the "ngege" the whole life history of which is a mystery.

Lacking knowledge of feeding and breeding habits the best course is deemed to be such as will interfere as little as possible with the old "natural balance" in the fishing grounds. The campaign against cormorants would be reversion to old conditions, and therefore advisable. The campaign against crocodiles would be an innovation and inadvisable until we are a bit more certain of our ground.

Adherence to the principle above stated involves restrictions on use of the drift net. Howsoever advantageous it may appear to encourage extension of net fishing for sanitary reasons, it must not be overlooked that this mode of fishing is an innovation—that it is very destructive to valuable species of fish not so commonly caught by native methods under the old "natural balance," and that it may easily prove to have serious effect on the continued productivity of the grounds; it is, in fact, believed that the indiscriminate net fisher, who puts or may put out hundreds of nets per night, is as already stated, the worst pest of the fishing area, and most in need of control.

There is fact as well as theory in support of the last contention. Nets have been extensively used in the Entebbe grounds for some years, and while precise figures are lacking there is no doubt that these grounds have fallen off very seriously in productivity during the past three years. The same is reported as true of the grounds in Kavirondo Gulf—which are originally better, with respect to combined size and productiveness, than any in Uganda. Additional information on this point is being sought. In the meantime it is proposed that a heavy tax shall be placed on net fishing until such time as it can be effectively regulated in other ways.

This tax will automatically serve to protect the Baganda fishermen against foreign competition. The native can afford to pay it because he is satisfied with a small profit, whereas the Eurasian or Asiatic who requires a large profit cannot afford to pay both the tax and the wages of the native. This is also regarded as desirable for reasons already given: that the price of fish caught in grounds where foreigners are in control is higher than in grounds where natives are in control. And, certainly, nothing could be worse for the industry than for the grounds to be invaded by foreigners; to exploit them for a few years, to despoil them, and then to return with their spoils to a foreign country.

A phase of the fishing industry of the very first importance is the landing and marketing of the product. On Crown Lands in the townships of Entebbe, Jinja, etc., no landing tolls are charged, but fish are supposed to pass through the township markets where dues are charged on sales or stall rent collected. Fishermen may also take out a "petty trader's" or "hawker's licence" instead of paying market dues. In only one township (Kibanga) there is no market, nor any dues charged for landing.

The Kibanga grounds are not very extensive, and though regularly authorized have not been worked at all intensively. A monopoly was granted to a European some years ago on the

theory then held that natives could not be trusted to obey the regulations if working for themselves, but his venture was not profitable, and he soon discontinued operations. No licences were issued to natives or others until 1920, when the policy was changed, and licences were issued to all applicants. Fishermen, both native and Indian, flocked to the landing and when last visited there were three large boats, twelve canoes, several Indians and 65 natives working there, and setting an uncounted but very large number of nets. This is the only entirely free landing place in Uganda, and the scene of activity would be most encouraging were it not virtually a certainty that it is ephemeral. The setting of so many nets in these limited grounds must exhaust them speedily; but the operations are permitted to continue as a practical experiment to demonstrate this point, and to ascertain how long time must elapse before the effect is noticeable.

On native-owned land the fishermen may be called upon to pay either or both of two tolls for the privilege of landing their produce. If the quantities landed are sufficient, the central Native Government establishes a fish market through which all fish landed are supposed to pass. Dues of 10% in cash are collected on all sales, and of 20% (perhaps not invariably) on transactions where fish are exchanged for other produce. At unimportant landing places where no "Lukiko market" exists, the land-owners may establish and control a similar market on their own behalf. At any privately owned landing—whether or not it represents the terminus of a public highway—the land-owner is privileged under native custom to collect any tithes or toll he pleases for all fish landed.

Needless to state this last-named privilege may be a very valuable one. Under the proposed regulations to encourage only off shore fishing from cleared landings, the number of landing places which can be authorized will be small in comparison to the number formerly used, and the profits of the fortunate few among the land-owners who control authorized landings stand to be very large. Their tolls vary anywhere from 10% to 50% of all fish landed, and are commonly as high as 33 $\frac{1}{3}$ %. The income to the fortunate owner of any good landing place may run into four figures, expressed in rupees, and might, even, exceed four figures expressed in pounds sterling.

This custom has the undoubtedly good effect of automatically restricting the number of fishermen, and thus conserving the grounds. It also has the effect of excluding the foreigner and his destructive methods. It is regarded favourably on these accounts, but it is open to grave doubt if the Courts will sustain it as "reasonable" in view of the changed conditions due to restrictions on landing places.

It is hoped, if the Courts declare the land-owner's toll to be unreasonable, to replace it at once by a reasonably high licence, especially on net fishing. The excessive profits which are going to the foreigner (with his superior boats, equipment and business acumen) at free landings such as Kibanga, and which are going to a favoured few chiefs and land-owners at landings under native control, may thus be acquired by the Government, and used, let it be hoped, for promotion of the fishing industry along conservative and sanitary lines.

The question of fish markets and their control is of especial moment. Previous to the great epidemic there were very large markets on the lake front where the population for many miles inland congregated by hundreds and—it is said—thousands on the frequent market days. Here the fishermen brought their produce, and mingled in closest contact with the buyers from the interior.

These markets were, by coincidence, most frequently located on or near sandy beaches, because these were preferred as landing places for canoes. At such points the soil is apt to be poor, and unfitted for cultivation, with the result that tsetse fly is unlikely to be disturbed or driven away from the near vicinity. And it is also along sandy beaches that the tsetse fly find conditions most favourable for increase to large numbers. Given the presence of human infection in these crowded, fly infested markets, conditions were ideal for the spread of sleeping sickness. In consequence, when the disease began to spread, the fishermen became doubly likely to contract it, in their fishing grounds and in the market places, and having become infected they became prolific sources of infection for each other and for the population generally. The market places were undoubtedly the most dangerous infective centres in the whole area.

Experience during the year has proved that these markets will spring into being immediately fishing on an extensive scale is permitted, and it is regarded as the most essential of all precautionary measures that they shall be well controlled. The present Rules make no provision for this, but provision must be made when they are revised.

Provision must also be made for the establishment and control of fish markets on Crown Lands, remote from any township and sometimes far removed from any point likely to be reached by District Officers in their ordinary touring. It is open to question if the Native Government has the right to establish markets on Crown Land, or to require that fishermen operating from such land shall take their produce through native markets to pay the dues to the Native Government. These requirements are nevertheless being made of numerous fishermen operating in Crown Lands in South Buddu.

One final point may be touched upon—the value of a fish ration in the Buganda dietary. During the past seven years the Entomologist has spent three full years (36 months) in touring the lake, and has had in his employ anywhere from 40 to 200 boys, paddlers, porters, etc. Some of these men have had a regular ration of fish, meat or both, while others have been restricted to what is more or less fallaciously believed to be the "normal" Buganda dietary of vegetable food

with occasional additions. It is impossible to give precise data to sustain the indubitable fact that the porter or canoe-man—with a regular ration of fish or meat—soon becomes a far more efficient organism than if deprived of it. Both strength and endurance are increased—and what is very much more to the point—are more willingly displayed.

It is beyond question that the Buganda needs such food as the fisheries can provide, and the plain duty of the Government is to help them acquire it with safety to themselves, through enforcement of conservative sanitary regulations.

This report on experiments and observations made during the past year in connection with the fishing industry has been far more lengthy than contemplated—and at that it has left out of account numerous questions for which answers have had to be sought. The main question is how to frame regulations of such character that they can be enforced without imposing such hardship as to encourage poaching at the expense of legitimate fishing; that they will provide for adequate protection of the industry against destruction a second time through epidemic of a disease more or less peculiar to it, and that will not result in depreciation in economic value of the fishing grounds and thereby of adjacent lands. This question is complicated by so many others that it has not yet been satisfactorily answered, but it is believed that enough of these subsidiary questions will have been answered to permit intelligent revision of the Rules early in 1921.

Paragraphs four to eight inclusive of the Entomologist's last report were given over to a recountal of certain difficulties encountered through lack of the assistance and transportation facilities which had been declared pre-requisite in previous reports and memoranda. "Temporary" expedients had been adopted to meet the lack of administrative and medical assistance and of mechanical transport on the lake.

The Entomologist had been temporarily *Gazetted* "Supernumerary Assistant District Commissioner." He still acts in this capacity and sometimes out of it. The administration of Sese has been largely in his hands, and has required a considerable amount of his time.

Dr. C. H. Marshall acted for a time as "S.M.O., S.S." and gave great assistance during the first quarter of the year but soon went on leave. Since then no Medical Officer has been definitely connected with the work. More of medical service is very greatly desired, but at the same time there is danger of too much. It is very necessary that every effort shall be made to detect the first signs of recurring epidemic in the lake area, and to this end medical examination of large numbers of people is necessary, but it is also necessary to avoid any action which tends to destroy fear of the disease and confidence in the wisdom of the regulations for prevention of it. Negative examinations of large numbers of people has had this most undesirable effect in Uganda.

Therefore it is hoped that medical examination in the lake area may be restricted to the class of persons most liable to contract infection, *viz.*, to the fishermen—and to villages which for some special reason are believed to harbour infection.

The question of transport on the Lake is ever a vexed one. The temporary expedient of employing the S.S. *Sir William Mackinnon* has been the resort on two occasions in 1920 and the ship must be used for at least two or three months in 1921. The need for more adequate transport facilities is none the less pressing. It was never over, but rather under-estimated. Through the personal effort of His Excellency the Governor a fine motor launch has been provided, but it will not suffice for long tours in which two Europeans take part. The old fashioned "canoe safari" is no longer practicable owing to lack of men sufficiently hardened to the arduous work. The transport of fuel cut in clearing operations; of cattle for stocking the Government ranges; of native owned cattle through the quarantine station; of the labourers required for various public works in the islands, and of various other freights, is not yet provided for.

Nothing was said in the last report of the proposed quarantine of the insular ranges against dangerous and preventable diseases of domestic animals. It was left for the Veterinary Department to decide if this were advisable and, if so, to take over control of it. It was recommended by the Veterinary Adviser in August last, but no assistance was provided for carrying out the recommendations. Accordingly for the remainder of the year the undersigned has acted in charge of a ridiculously inadequate, but it is hoped not ineffective, quarantine station, through which some thousands of sheep, goats, dogs and young cattle have passed. No tick of any species has yet been found to have passed this station to reach the permanent ranges, but it has taken more time to direct and supervise the work than could well be spared. It is confidently expected that the Veterinary Department will provide assistance in the near future.

An undertaking more in line with economic application of Entomological knowledge is in its first beginnings in December, 1920. It is the reclamation of an estate of 320 acres (as provisionally certified) in Sese to serve primarily as a farm for the breeding of healthy calves required by the Pathological Laboratory for production of vaccine. Incidentally it is the experiment in close grazing already referred to and is still further designed as a practical experiment in the reclamation of Crown Lands in the Lake area acquired by "lake shore exchange." The estate is one of a group of four, containing in all about 2,500 acres which it is hoped may all be developed profitably, but work has been begun on the one only. This is a fine estate of rather more than the 320 acres called for, with 50 acres at least of good garden land, an equal area of woodland and not far from 300 acres of grazing. There are fishing rights of considerable value, and in the clearing operations necessary to release the garden land for re-occupation much fuel will be cut. It is hoped to be able to re-colonize the garden land, which was once a village of 200 inhabitants, and to make the fuel pay for transport of all cattle, plants, etc., etc., required. More than

forty head of young cattle loaned by the Pathological Laboratory are already on this estate, and others will be bought out of funds provided for reclamation and experimental work, and held at the disposal of the Pathological Laboratory for the specific purposes required.

The activities reported upon herein may appear to the reader to be strangely diverse and dubiously included in the province of an "Entomologist." All have been incited, however, by the conclusions reached through two and one-half years of purely technical research to the effect that *Glossina palpalis* is not as previously assumed, a "natural" parasite of man nor "naturally" a transmitter of human disease. On the contrary its preferred hosts are reptiles and it avoids rather than seeks the human host. It cannot, in consequence, act as the transmitter of human disease except under the combination of circumstances and conditions which are believed to have been quite accurately described by Dr. Hodges, sixteen years ago.

Moreover this insect does not belong to the category of insect pests which increase and spread with increase and extension of human population. Nearly all the common insect pests of Europe belong to this category. They thrive best in human environment, not only in Europe but in European colonies and are likely to follow European man almost anywhere that he can establish himself under home-like conditions. Such pests are "fought" by certain stereotyped methods which are wholly inapplicable in dealing with the tsetse flies because the tsetse flies belong to an entirely different category. They do not increase and spread with increase and extension of population but only with the decrease and restriction of population. They must themselves decrease in numbers and extent of territory occupied with any increase or extension of populations.

Sanitation of the Lake Area against sleeping sickness can have no other object than to permit its repopulation and the economic development of its natural resources. It would be useless to extirpate tsetse unless repopulation and development followed. In itself this objective is of no economic value whatever. Elimination of tsetse as a pernicious factor in human bio-economy is none the less prerequisite to economic development and repopulation.

But, in as much as the pest is unable to exist in populated areas except as it strays into them from wild lands adjoining, it follows that repopulation and revival of industry are in themselves the means to the end of securing better sanitary conditions, provided only that operations are conducted in such manner as (1) to bring about the maximum destruction of fly with (2) a minimum exposure of the population to fly during the process. It requires full knowledge of the bionomics of the insect in order to direct and supervise the reclamation and repopulation of the closed area in this manner. It is indeed true that the Entomologist of the Medical Department has taken a more active part than he wished or than is well or desirable, but this has been due to the lack of administrative and other assistance in the work. Every phase of it: fuel cutting and marketing, experiments with domestic animals; quarantine against animal diseases; administration of newly established colonies in the danger zone; transport problems; control of fishing operations; conservation of fisheries, etc., etc., are all parts of the campaign against fly.

The reason why all this has been attempted may now be stated for the first time. It is in part found in the truth already stated that the stereotyped methods of "fighting" the insect vermin that infest households, gardens, orchards, meadows, fields and pastures in Europe and European colonies overseas are neither necessary nor applicable in the case of tsetse flies. Whenever the time is ripe it will be found that the vast areas overrun by these insects can be reclaimed by the methods herein outlined. The time is doubtfully arrived in many of the infested areas, because there is not, as yet, sufficient need or use for the lands involved, but it is hoped that the undertaking may succeed in this particular area under consideration.

It certainly cannot be expected to succeed in other of the "infected areas" if not in this one, because none of them are so rich in natural resources nor so desirable for recolonization, but if economic development of Africa continues, the time will soon come when experience in the reclamation of this area will serve as guide and precedent for similar undertakings in others. The whole work herein reported upon in all its diversity of detail, is regarded by the undersigned as an experiment in the reclamation of territory infested by tsetse fly, and is designed like any other experiment to serve as guide and precedent for future operations.

A successful outcome would be assured but for one circumstance:—the present absence of sleeping sickness in the area. A population, as of the lake area, with respect to a disease like sleeping sickness may very aptly be compared to the human organism with respect to a disease like smallpox. The organism can protect itself against the disease, but will not and does not take precautionary measures in the absence of the disease. Therefore it is necessary to incite the organism to protect itself by deliberately inoculating it with the virus under conditions which preclude serious injury. The population of the lake area can certainly protect itself if it will against sleeping sickness but it will certainly not do so in the protracted absence of the disease. The Entomologist cannot go so far as to recommend inoculation of the area with sleeping sickness but it is certain that the recurrence of a few localized centres of epidemic would have the same salutary effect on the population, that the localized eruption following vaccination has on the individual.

It is equally certain that if cases of sleeping sickness are not found in the lake area within a few years the trouble and expense of reclaiming the area under sanitary conditions will prove for the most part useless. The regulations, to whatsoever extent they are relaxed, will be non-enforceable, and will fall into desuetude unless and until recurrence of the disease incites the population to self protective efforts.

W. F. FISKE,
Entomologist, Medical Department.

Note by P. M. O.

I will comment on two points only in Mr. Fiske's interesting report. These are :—

1. *The repopulation of the Buvuma Islands.*

This is a most difficult question. The Provincial Commissioner, Buganda Kingdom, states that if the Buvuma are to go back they must go back at once. It is quite impossible for such a small population to return on the same conditions and with the same restrictions as are being enforced on the Basese. There are not sufficient working men to do the necessary clearing and we have not the means or staff for adequate supervision. It is, I am told, equally impossible to allow them to return without any restrictions whatever unless the same privilege is granted to the Basese and to the lake shore inhabitants. I cannot agree to this at present.

2. *The medical examination of those returning to what have been prohibited areas.*

I am insisting on the right to examine any one for enlarged glands who returns to the island or Lake shore. This will not be done often, possibly only once annually. But there are many, especially in the Entebbe district, who will not agree to such examination (owing to their religious beliefs, a sort of Christian Science) and have accordingly been sent back inland again from the lake shore after they had cleared it. The Kabaka and the whole Native Lukiko have unanimously agreed that this condition is necessary.

This report will disclose the many difficulties and variety of points to be considered in drafting new Sleeping Sickness Rules.

C. A. WIGGINS,
Principal Medical Officer.

APPENDIX V.

PLAGUE.

THE KAMPALA EPIDEMIC OF 1920.

Human plague had broken out in the bazaar on December 24th, 1919, and there were four cases before the end of the month. Rats dead of plague had been found in the bazaar a week previously, and in October, rat plague had broken out at Port Bell following rat plague on one of the lake steamers carrying a cargo of hides which had called at the port.

Up to January 1st the following anti-plague measures had been undertaken. The Town and Port Bell had been declared infected under the Infectious Diseases Ordinance in order to enforce the restrictions imposed, cases and contacts had been isolated and inoculation carried out on a large scale. On January 7th barriers at the entrance to the town with police guards were established through which no one was allowed to pass without a certificate of inoculation. On the 19th January a notice was published prohibiting the export of merchandise without a permit from the Medical Officer of Health.

Arrangements were made with the Railway Authorities in order to prohibit shipment of cargo liable to harbour infected rats on the *S. S. Clement Hill*, and others to ensure the clearing of the goods-sheds by other steamers fortnightly so as to avoid congestion.

An area of ground at the railway station was covered with sand on which articles of clothing, bedding, etc., belonging to intending passengers from the bazaar were exposed to the sun. The storage of hides and grain was prohibited except in approved godowns.

Meanwhile all infected premises in the bazaar had been closed till they had been disinfected, and the schools in the town were closed.

During January, February and March there were 57 cases all of which occurred either in the bazaar itself or among natives who worked in the bazaar in the day time and slept in huts or houses outside. The latter huts and houses were burnt. Rat driving was done only on a small scale until the end of March.

Towards the middle of March I came to the conclusion that the guards and barriers were doing very little good as the natives had found means of avoiding them and as they seriously affected the trade of the town they were the cause of much discontent; and I considered that if the general public would co-operate in cleaning up the town it would be safe to remove the barriers.

I therefore gave a well-attended lecture on plague to Europeans explaining the role played by the rat and rat flea in the dissemination of the disease with the result that a rat drive on a large scale was organised which produced a bag of 727 rats in one morning.

I also lectured to about 100 Indian merchants and invited their help. A committee of Indians was formed who organised a general clean up of the Nakasero Bazaar; all personal effects, bedding, etc., being exposed to the sun while the premises were cleaned out with disinfectants.

I then removed the barriers, but continued the restrictions on the goods and passage traffic on the railway. After this only one human case occurred in the Nakasero Bazaar.

With the exception of one case of doubtful origin on April 8th which occurred at Rubaga no human case occurred in the immediate district from March 18th to April 19th.

On the 16th of April it was reported to me that rats had been seen dying in great numbers at the Namirembe Market where there is a small but crowded Indian Bazaar of mean shops about two miles from the Nakasero Bazaar.

This area was declared in quarantine until all the shops had been cleaned out with disinfectants and all the Indian inhabitants and most of the natives in the vicinity were inoculated.

These precautions were too late to do much good and though none of the Indians contracted plague (most of them had been inoculated in December and January as well as in April) some of their native employees were stricken and the disease spread to an alarming extent in the neighbouring native dwellings—chiefly in Rubaga, Mengo and Namirembe hills.

The native market was removed to a distance and though the shops remained open for a time the trade diminished considerably so that it was an easy matter to persuade the Indian shopkeepers to evacuate the Namirembe Bazaar and camp out at a distance. The bazaar was therefore closed from May 14th to June 8th, while the shops were frequently disinfected as far as their ramshackle nature would allow. The mission schools were closed.

The Lubiri a large area occupied by the Kabaka and his retinue, was also evacuated, but unfortunately some of his followers took the plague with them and a new focus of disease was established at a place six miles away which has not led to very many cases but some of these have been concealed and one or two cases monthly have continued to appear in that neighbourhood.

The bazaar was owned by native chiefs and is in the centre of the native "Kibuga" or township and under native control for police purposes, etc., and though I attended the Lukiko (Native Parliament) and preached rat driving as an anti-plague measure, it was only undertaken in a half hearted manner until dead plague rats were found in the Prime Minister's premises and in the Lukiko House. This stimulated the chiefs to action and war was waged on rats for a short time with surprising results, over 4,900 being taken in eight days on Rubaga, Mengo and Namirembe.

Unfortunately so many complaints were forthcoming from the employers of natives who had been forcibly taken to hunt rats, that the chiefs were disheartened and their energy slackened before a sufficiently large area had been dealt with.

The plague quickly died out where rat driving was vigorously conducted but continued to persist in an area within five miles of the town until the end of the year though there have not been more than two or three human cases of plague per month in any one place.

The disease has therefore become endemic in character over a large area. Part of this comprises the Kibuga or native township which is divided into various sized plots which form town residences of Baganda chiefs which are either unoccupied except by caretakers or, when the chief is in residence, are crowded with followers. In the Kibuga which covers several square miles the houses and huts are generally arranged in groups roughly 50 to 100 yards apart and the plots are divided by high reed fences. The remainder of the infected area is occupied by natives who work daily in the town.

In both these portions the soil has become worked out to a large extent so that cultivation is not regular and jungle is found close to the houses in which rubbish accumulates. Timber and thatching grass has to be brought from a distance so that houses and huts are not renewed with the same frequency as in those parts of Uganda where conditions are normal, and a large proportion of the houses are dilapidated.

These conditions, in combination, favour the harbouring of rats and other vermin and the dissemination of disease and plague in particular.

To keep down the rats effectively over the hole of this area has been impossible but rat reduction has been persisted in within the township, a gang of ten men daily being employed in digging up rat burrows assisted weekly by a batch of prisoners. Poison and traps have also been used but without much success. Altogether 10,517 rats have been accounted for within the township and another 10,322, have been sent to me from outside. Total—20,839.

Since the rat driving was organised, on four occasions rats dead of plague have been found within the township. On three of these occasions a single human case occurred subsequently but in each case vigorous rat hunting was pursued locally and apparently stopped further trouble.

I estimate that 95% of the rats are the common local brown rat which though it has been found infected with plague is not perhaps so susceptible as the imported *Nus rattus* or black rat or as the local small grey house rat which the Baganda say is also an imported species, and I have seen this species dead of plague in scores. It is possible that the latter has been imported from Bukedi or Kavirondo where plague is always endemic.

I have not had the opportunity of ascertaining the limits of distribution of the two last species but it is possible that the limits of the present endemic area round Kampala may correspond with that of one or both species.

INOCULATION.

13,992 inoculations were performed with Haffkine's Prophylactic. These were mostly done either in January or in April and May.

All native and Asiatic travellers from Kampala by lake steamers were inoculated. The supply of vaccine became short so that latterly inoculation was confined to contacts, travellers, police and the convicts in the gaol. Of the cases which recovered, eight only had been previously inoculated. Of the fatal cases, 53 had been inoculated but some of these only a few days previously. Of the 300 human cases in 1920: 175 were bubonic, 32 were pneumonic and 93 septicæmic in type. Of these 26 recovered—all bubonic cases. There were no European cases. There were eight cases among Asiatics with six deaths. 217 of the cases were reported after death, 83 seen were alive, of these 18 died before they could receive treatment and three recovered without any special treatment being very mild bubonic cases among contacts.

Various methods of treatment were attempted as follows:—

Drug and Method.	Cured.	Died.
Tr. Iodine intravenously	19	31
Tr. Iodine orally	2	2
Tr. Iodine injected into bubo	1	—
Tr. Iodine thymol and camphor into bubo ..	2	3
Tr. Iodine + Eusol intravenously + Iodine into bubo	—	2
Eusol intravenously	—	2
Acid Carbolie orally	—	1
Without special treatment	3	—
	27	41

The Tr. Iodine was given as follows:—

Eight minims morning and evening in one drachm of distilled water on the first day, this was reduced to six minims on the second day and repeated on the third day if the temperature had not fallen.

The treatment of the cases for want of proper hospital accommodation had to be undertaken in grass bandas on native bedsteads so that a case mortality of 63% among those which were seen early enough to attempt curative treatment is in my opinion a low figure in the circumstances.

I have received every assistance from the District Medical Officer, Kampala, Dr. Webb and his staff, especially from Assistant Surgeon, Achhru Ram, who was chiefly concerned in the treatment of the cases and deserves special mention in this respect. One of the native attendants in the Post-mortem room contracted plague and died.

I have found the native Plague Inspectors most useful in searching out concealed cases of plague and their work and conduct has been most satisfactory.

C. J. BAKER,

Principal Sanitation Officer,

(Acting Medical Officer of Health, Kampala.)

APPENDIX VI.

Further Report on the Treatment of Sleeping Sickness by Salvarsanised Serum.

In a previous report published in the British Medical Journal of May 22nd, 1920, by one of us (C. H. M.), attention was drawn to the treatment of sleeping sickness by combined intravenous and intrathecal injections of organic Arsenical preparations (Kharsivan). An epitome of 12 cases thus treated was also given.

Since then the number of cases treated and under observation has increased to over 50, and the conclusions we have drawn are that this treatment shows prospects of a possible cure for, at any rate, early cases of this protean disease.

The following is a resumé of the technique of the treatment given in detail in the report previously alluded to:—An intravenous injection of an organic compound of Arsenic is given, and after a period varying from one to four hours a certain quantity of blood—usually 20 c.c.—is withdrawn. This is kept in a vessel, stood in cold water, until the serum separates completely from the formed elements of the blood. The separated serum is then injected into the cerebro-spinal cavity, an equal amount of C.S.F. having been previously drawn off. This completes the treatment, and the patient is free to resume his normal life, subject to his reporting from time to time for re-examinations.

The principle of the treatment was based on the theory that the *trypanosomes* having once reached the cerebro-spinal canal, were, after a certain time, immune to any medication *via* the blood stream; since we have adopted this routine procedure for sleeping sickness cases we have had striking examples of this fact.

The following are examples:—

Case 30.—Karungano. A man with large typical chains of glands in the neck, admitted to hospital on 14th June, 1920. Gland puncture showed numerous *trypanosomes* and *filaree*. On the 15th June, 1920, 6 gms. Neokharsivan injected intravenously; on 17th June, 1920, 12 c.c. of C.S.F. drawn off by lumbar puncture. The C.S.F. on examination showed *trypanosomes*.

Case 33.—Wana. A man with large typical glands was admitted on 19th June, 1920, gland puncture showed *trypanosomes* infection. Neokharsivan 6 gms. administered intravenously on 20th June, 1920, and on 23rd June, 1920, when 12 c.c. of C.S.F. were drawn off, prior to intrathecal medication, it was found to contain living *trypanosomes*.

The next case is, to our mind, more striking and we think proves conclusively our theory.

Case 34.—Asumani. A boy with typical enlarged glands on both sides of the neck from which *trypanosomes* could be easily recovered. Admitted 3rd August, 1920. On 5th August, 1920, he received 6 gms. of Neokharsivan, and as his home was far away, he was kept in hospital.

He was given no intraspinal treatment. Towards the end of October, this boy reported difficulty in walking and general debility; on examination of his C.S.F., living *trypanosomes* were found, while none were discoverable in the blood or in his cervical glands. His glands were again examined at the time of writing this report 24th December, 1920, and still nothing could be found. (It should be noted that in none of the above cases was there any chance of re-infection).

While there is no doubt that in healthy individuals, drugs administered intravenously may find their way into the C.S.F.,* we are of opinion that the choroid plexus mainly, and other structures concerned in the diffusion of the plasma and the C.S.F., become obliterated at a clinically early stage: the result is we have two foci of disease, the blood or lymphatic stream, and the cerebro-spinal cavity, and to get rid of the disease it is necessary to attend to both these foci. That the permeability of the meninges is seriously affected at an early stage of the *trypanosome* infection is evidenced in the living by early Lymphocytosis of the C.S.F., and, in the dead by microscopical examination of the meninges, the latter, being at times the only evidence of the disease; and, when such nervous alterations have occurred, blood medication however active, will fail to influence the course of the disease.

Many authorities are agreed that the administration of a dose of Salvarsan, Neosalvarsan or Atoxyl is sufficient to sterilize the blood in a surprisingly short time: the patient is thus looked upon as temporarily cured but within a variable period of time nervous symptoms appear, and the infection goes on unchecked, the patient eventually dying. Excluding re-infections two theories have been put forward to account for this: (a) that there are resistant forms, and (b) that certain *trypanosomes* are protected from the action of the medicament by their position in the organism, e.g., bone marrow, and central nervous system.† While the possibility of the *trypanosome* in forming new races cannot be doubted, and is by some considered as unlimited; we are more inclined to think that the second theory is the more probable from the arguments we have set forth.

It also appears very probable to us, that if we can obtain a case of *Trypanosomiasis* in its early stages, one single dose of Salvarsan or any other allied drug, may be enough to cure once for all the patient from the infection, and this may account for those cases which have been recorded as cured, and in this category we are inclined to place two of our own cases (case 14 and case 28), who only received an intravenous injection, and who, up to now, are enjoying excellent health. These cases were originally kept as controls, and for that reason they had no Salvarsanized serum given to them.

The detection of early cases is a difficult affair, excepting perhaps in Europeans where a history of having been bitten by a fly in a *Glossina* infested area, may be obtainable. Even then the assertion that the case is an early one is a distinctly risky one, as one cannot be sure of the presence or otherwise of the *trypanosome* in the C.S.F., unless the latter is examined, and once this has been decided upon, as it should be, the serum (Salvarsanized) can be given at the same time.

An injection into the thecal cavity, done with the usual antiseptic precautions, does not show any untoward symptoms or sequela: we have noticed that the injection of Salvarsanized Serum is usually accompanied with a slight rise of temperature to 100° or 101°, pains in the back along the spinal column, most marked in the region of the anus, vomiting and slight diarrhoea. These symptoms disappear in a day or two, after which time the patient is discharged.

The course, therefore, of the *trypanosome* in the human body is first its passage into the blood, subsequently followed by glandular enlargement, usually in the cervical region, secondly its passage into the central nervous system, where it produces lesions of the meninges which shut it off from its parent in the blood. The curability or otherwise of the disease, therefore, depends to a great extent on how far the nervous lesions have advanced, if these are far gone the infection ceases, so to say, to be *Trypanosomiasis* and becomes a chronic nervous disease ending in death. Between the passage of the *trypanosome* in the C.N.S. and the onset of nervous lesions there seems to be, however, an appreciable interval during which we think it is possible to cure the patient, and it is only when symptoms like spasticity and impotence appear that the disease is hopeless.

From an analysis of cases treated (and from these we exclude those which have been done during the last three months), it appears that the patients, after treatment, start putting on weight, feel much better and are generally changed individuals. They are able to do physical work, not excluding porters' work which, we might add, consists in the carrying of loads varying between 40 and 50 lbs. for an average distance of 10 or 15 miles; one patient of ours, treated in April (case 23), aged about 60, cycled in about 30 miles in one morning for re-examination, a feat for him, as he states he had been unable to ride a cycle for at least a year before treatment.

While it may be early to definitely state that the present treatment promotes a definite cure, in the face of the results we have obtained we cannot help but feel optimistic. Several of our cases have gone well beyond a year with one dose of treatment, they have all invariably improved in health, and though subjected to repeated and careful examinations of glands (when these are still prominent, an unusual feature after this treatment), blood and C.S.F., the results have consistently been negative.

Most of our cases have been treated with Neokharsivan (B. & W.), a few cases were also treated by Atoxyl, the object being to find out which is the more efficient drug. We also mean to use other drugs such as Galyl and also Tartar Emetic, and we hope to be able to publish during the next year comparative results of the various drugs used.

* Nierestein, B. M. J., June 5th, 1920.

† Van Sackeghem R., Bull. Soc. Path. Exotique. May, Vol. 8, No. 5, pp. 339-348, and also with Nicolas E, in the same Bulletin, 1916, Vol. 9, No. 10, pp. 813-823.

‡ Ritz Hans. Archiv f. Schiff- u. Trop. Hyg., 1916, September 20, No. 17, pp. 397-420, also Stuehmer A, Zeitschr. f. Immunitätsforsch. 1. Teil Orig., 1916, March 4, Vol. 24, No. 4, pp. 315-335.

Experiments are also being made to see whether the results we have up to now obtained may not be due to the formation of *Trypanolysins* or other antibodies. That the *trypanosomes* give rise to specific lysins was suggested by Louis Martin and Henri Darre who attributed the fever to the massive destruction of the parasites by *Trypanolysis*, and who showed that the blood of patients obtained at the onset of fever, had a very marked *Trypanolytic* power both in vitro and in vivo. We have therefore treated one or two well chosen cases with plain serum, *i.e.*, the serum from one of our treated cases was injected into the blood and C.S.F., of another sleeping sickness patient: up to now it is much too early to form any opinion.

In conclusion: (1) Of 56 cases treated up to now, eight are dead. Of six of these we have records, and of these six only three died of sleeping sickness, the others dying of an intercurrent disease, favoured, possibly by the *trypanosome* infection.

(2) All the remaining cases are doing well. Some (21) have only been treated during the last six months, and so are excluded from this paper, though included in the index of cases.

(3) The drugs tried so far have been Neokharsivan most extensively, and to a less extent Atoxyl, but all that has been said in this paper refers mainly to Neokharsivan.

(4) Plain serum treatment is also being tried in a few carefully selected cases. In advanced cases we are trying direct spinal medication, so far the results are uncertain, one case treated thus died. Another, under observation, in whose spinal cord 003 gm. Neokharsivan was introduced, seems to present a certain amount of improvement.

Finally we wish to express our thanks to Dr. C. A. Wiggins, Principal Medical Officer of this Protectorate, for his assistance and encouragement in carrying out these investigations and for his permission to publish this report.

CLAUDE H. MARSHALL,
Senior Medical Officer.

S. M. VASSALLO,
District Medical Officer.

APPENDIX I.

Case No.	Sex.	Date of treatment.	Drug.	Re-examination.	State of			Case No.	Sex.	Date of treatment.	Drug.	Re-examination.	State of		
					Blood.	Glands.	C.S.F.						Blood.	Glands.	C.S.F.
1	M	26-9-18	N	11-1-19	Died	(S.S.)		20	M	26-4-20	N	not reported			
2	F	30-9-18	N	2-9-19				21	M	27-4-20	N	"			
				29-11-19				22	F	27-4-20	N	3-11-20	Neg.	None	Neg.
				7-1-20				23	M	28-4-20	A	28-6-20	"	"	"
				3-7-20				24	M	28-4-20	A	26-10-20	"	"	"
				29-10-20	Neg.	None	Neg.	25	M	28-4-20	A	3-11-20	"	"	"
3	M	1-10-18	N	Disappeared	presumably	dead.		26	M	3-5-20	A	26-6-20	"	"	"
4	F	10-1-19	N	2-9-19				27	M	4-5-20	A	26-10-20	"	"	"
		9-1-19	N	27-1-20				28	M	8-5-20	N	3-11-20	"	"	"
				23-4-20				29	M	13-5-20	N	3-11-20	"	"	"
				28-6-20	Neg.	None	Neg.	30	M	15-6-20	N	3-11-20	"	"	"
5	F	11-7-19	N	26-10-20	? Died	(S.S.) no records		31	M	15-6-20	S	3-11-20	"	"	"
6	Dog	—	—	—	Shot.			32	F	18-6-20	N	3-11-20	"	"	"
7	M	1-6-19	N	28-10-19				33	M	20-6-20	N	Died.	? Delayed	C. H. Cl ₂	poisoning
	CSF			7-1-20											
				23-4-20											
				28-6-20											
				26-10-20	Neg.	None	Neg.								
8	M	9-19	N	20-4-20											
				26-6-20											
				28-11-20											
9	M	26-9-19	N	3-11-20	? Died	(S.S.) no records		34	M	5-9-20	S	Case under treatment referred to in Report.			
10	M	25-10-19	N	—	Died	(S.S.)		35	M	13-9-20	S				
11	M	27-11-19	N	20-4-20				36	M	14-9-20	N				
				26-6-20				37	M	28-8-20	N				
				23-10-20	Neg.	None	Neg.	38	M	27-8-20	N	No re-examinations to date.			
12	M	27-11-19	N	23-4-20				39	M	27-8-20	N				
				26-6-20				40	M	4-10-20	A				
				23-10-20				41	M	5-10-20	A				
13	F	29-11-19	N	22-4-20				42	M	6-10-20	A	Died pneumonia 25-10-20.			
				26-6-20				43	M	—	—	Died one day after admission.			
				3-11-20								No treatment given.			
14	M	29-11-19	N	24-4-20		1 gland.		44	F	4-10-20	N				
				26-6-20		2 punctures.		45	M	29-9-20	S				
				26-10-20	Neg.	Negative.		46	M	24-9-20	N				
								(European)							
15	M	2-12-19	N	23-4-20				47	M	15-11-20	A				
				26-6-20				48	M	15-11-20	A				
				3-11-20	Neg.	None		49	M	15-11-20	A				
16	M	26-4-20	N	26-6-20				50	M	2-12-20	A				
				26-10-20				51	M	2-12-20	A				
17	M	26-4-20	N	27-6-20				52	M	6-12-20	A				
				26-10-20				53	M	6-12-20	A				
18	F	26-4-20	N	26-6-20				54	M	6-12-20	A				
				28-10-20				55	M	6-12-20	A				
19	F	26-4-20	N	26-6-20				56	M	28-12-20	N				
				3-11-20											

N=NEOKHARSIVAN; A=ATOXYL; S=PLAIN SERUM.

APPENDIX II.

Duration of cases up to December 31st, 1920, without any symptoms or microscopical findings.

Case No. 2	27 months.	Case No. 21	8 months.
" 4 Av. 24	"	" 22	
" 7 Av. 18	"	" 23	
" 8 Av. 15	"	" 24	
" 9 Av. 15	"	" 25	
" 11	13 months.	" 26	7 months.
" 12		" 27	
" 13		" 28	
" 14		" 29	
" 15		8 months.	" 30	6 months.
" 16	" 31		
" 17	" 32		
" 18	" 33		
" 19			
" 20			

APPENDIX III.

CASES WHERE C.S.F. WAS POSITIVE.

Case No. 7	Case No. 39
" 10 (since died of S. S.)	" 42 (since dead).
" 30	" 44
" 33 (since dead.)	" 45

APPENDIX IV.

Case No. 1 S. S.	Case No. 33 ? Delayed CHCl ₃ poisoning (marked mediastrial changes at P.M.)
" 3 Disappeared. Presumably dead.	" 42 Pneumonia.
" 5 ? S.S. (no records.)	" 43 Died on admission.
" 9 S.S.	
" 10 S.S.	

APPENDIX VII.

The Lingual application of Iodine as a Prophylactic in Cerebro-Spinal Meningitis and Influenza.

The treatment of Cerebro-Spinal Meningitis by the application of Iodine to the tongue led me to try it also in this manner as a prophylactic for the same disease and for Influenza during the 1918-19 epidemic in the Mbarara and Kigezi Districts, Uganda.

In both diseases the infection-site appears to be the respiratory passages, possibly most frequently through the pharyngeal tonsils and my assumption was that the Iodine would to some extent cause disinfection of the mouth, throat and tonsils and thus prevent or reduce the intensity of the disease. Moreover, the Iodine increases the flow of saliva which in itself is prohibitive to the growth of the organisms and a four-fold action is thus brought into force:—

- (1) The local disinfectant action on application near the infection-site.
- (2) The action of the increased flow of saliva.
- (3) The excretion of the Iodine in the saliva and respiratory passages again acting as a disinfectant.
- (4) The action of the Iodine on absorption.

Ordinary B.P. Tincture of Iodine was mixed with an equal part of native honey and, in the case of Cerebro-Spinal Meningitis, instructions were given that two or three drops of this mixture should be placed on the tongue of contacts two or three times daily. A large number of Cerebro-Spinal Meningitis cases among natives was being reported monthly throughout the district and all that can be said as to results is that no contacts who used it developed the disease and the number of deaths reported monthly fell in a few months from an average of 100 to an average of 40 per month. Strict isolation of contacts, however, was in force before the use of the Iodine, and in any case it was unusual for contacts to become infected after segregation. It is therefore doubtful whether the Iodine had any effect, but the natives themselves had great confidence in its efficacy.

With regard to Influenza the results, however, appeared to be more definite. No attempts could be made to distribute an experimental medicinal prophylactic among the natives generally and distribution was therefore confined to 10 Europeans, about 100 Asiatic clerks and shopkeepers and a few native chiefs, clerks and servants of Europeans. The Iodine was used in the same manner, but with the recommendation that applications should be made at least every three hours or more frequently if convenient. This was done in November, 1918, when the first suspicious case of Influenza occurred near Mbarara. Towards the end of December the disease became prevalent throughout the district and nearly every person except some of those to whom the Iodine had been distributed suffered from the disease in a more or less severe form. Among the Europeans, who all used the Iodine more or less regularly, no case occurred, although many were in daily contact with persons suffering from the disease. With regard to the Asiatics and Natives to whom the Iodine had been distributed it was impossible to ascertain in most cases with what regularity the prophylactic had been used, but a large number escaped infection altogether and others had the disease in a mild form with no complications. None of the natives using it died, as compared with a high death rate among those who did not, and among the Asiatic population there were also no deaths as compared with a mortality rate of 6.53% throughout the Protectorate.

Many instances occurred which appeared to prove the efficacy of the prophylactic and the value of frequent applications. In one family the father who was in daily contact with Influenza cases in all stages, used the Iodine regularly and escaped altogether, while the remainder of the family who had used it less regularly, had mild attacks. In another case one child appreciated the taste of the mixture so much that he managed to obtain frequent applications and escaped infection, while all the rest of the family had slight attacks.

I have refrained from publishing these notes until now as I considered the results far from convincing. During the past year, however, I have had the opportunity of seeing several records of the use of Iodine taken internally both in the treatment of and as a prophylactic for Influenza. Possibly the Iodine after lingual application instead of acting as a local disinfectant had its chief action through absorption, but personally I am convinced that its use saved several lives. Moreover, during the past year I have had the opportunity of using it with contacts of isolated cases of Influenza and all have escaped the disease. Possibly painting the tonsils and the back of the throat with Iodine would be of greater value but I consider this would be a too elaborate and unpleasant procedure to be adopted as a general prophylactic with regularity, whereas the placing of a few drops on the tongue is a very simple matter and may prove as efficacious if done with sufficient frequency.

ENTEBBE.

J. A. TAYLOR,
Senior Medical Officer.

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