Report of the Sudan Medical Service.

REPORT

OF THE

SUDAN MEDICAL SERVICE

FOR THE YEAR

1947

REPORT

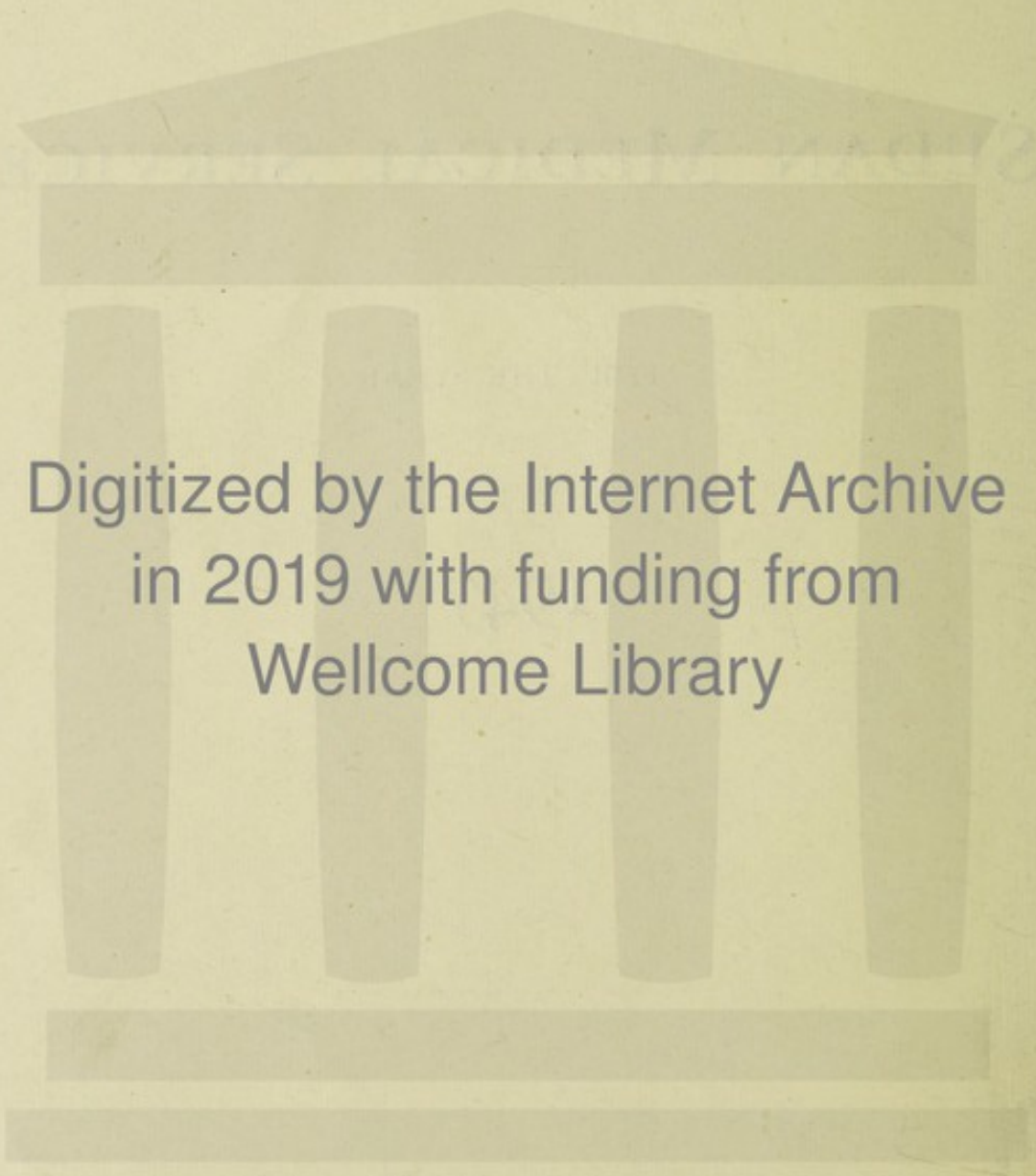
OF THE

SUDAN MEDICAL SERVICE

FOR THE YEAR

1947

McCorquodale & Company (S). Ltd, 4934 S.G. 1112 M. 350 5/49.



SUDAN MEDICAL SERVICE
ANNUAL REPORT 1947.

CONTENTS.

APPENDICES.

CHAPTER I.

INTRODUCTION.

The state of the public health remained satisfactory throughout the year. There was no great epidemic but a total of 973 cases of smallpox occurred in different parts of the Sudan. No case of typhus or of yellow fever was reported during the year and the recorded number of cases of cerebrospinal meningitis was the lowest since 1938. There has been a progressive decline in the number of cases of relapsing fever since the introduction of the use of D.D.T. powder among the people and in 1947 only 588 cases occurred. The violent outbreak of cholera in Egypt necessitated the taking of special measures of protection—particularly at Wadi Halfa—and the disease did not establish itself within the Sudan. Generally the rains were rather light and food crops reasonably good; there was a decrease in the number of cases of malaria reported.

Progress in curative medicine was maintained as reference to Table 1 shows. These figures mark an increase, both in admissions to hospitals and attendances as outpatients. All treatment is free in the outpatient departments and in the third class wards of hospitals.

TABLE I.

Statistics of treatment in Sudan Hospitals and Dispensaries in the last Ten years

YEAR	Admissions	Attendances	Operations
1938	104,366	6,989,990	11,439
1939	105,103	7,119,973	11,253
1940	104,422	6,649,335	11,139
1941	103,023	6,330,711	10,417
1942	114,837	6,750,329	11,353
1943	112,275	6,796,372	12,726
1944	131,077	7,077,919	13,796
1945	131,571	7,897,148	15,455
1946	126,586	8,474,874	15,509
1947	142,294	9,253,351	16,785

The estimated population of the Sudan is eight millions and the recorded out patient attendances were over nine millions.

Progress in preventive medicine was also maintained. The liberal use of D.D.T. powder in dispensaries and its sale—as a household remedy in village shops—was coincident with the sharp decline in the number of recorded cases of relapsing fever. Measures against mosquitoes were extended and improved in many parts of the country; the use of D.D.T. in oil as a larvicide was found to be most effective. Considerable attention was given to maternity and child welfare work both in special centres in the towns and in village dispensaries. The school medical service, which includes also a school dental service in the Three Towns, was well maintained. At agricultural shows and tribal gatherings, "health" posters, and exhibits were displayed and demonstrations on personal, domestic, and village hygiene were given. Research work was carried out on animal poxes, on cross immunity tests on the viruses of vaccinia and contagious pustular dermatitis; on variola and alastrim; on Van Rooyan's test for smallpox; studies were made on the neuropathies following

treatment with stillbamidine; experiments on the transmission of Sudan kala-azar by sandflies; and into several outbreaks of food poisoning; on the chromium trioxide test for cocaine hydrochloride and its suitability in local climatic conditions; on the instability of stillbamidine; on fluourescence fatigue; on the toxic principle of courbonia virgata, its isolation and identification as a tetramethyl ammonium salt; on the seed oils of *Celtis integrafolia*, *Chartacme microcarpe*; *Trema guineensis*; *Boscia octandra*; *Zizyphus spinacrista*; and *Grewia Villosa*.

CHAPTER II.

HEALTH OF OFFICIALS.

The figures for the health of officials as shown in Table 2 below show a low average for the number of days of sickness for all officials employed, British, Sudanese and Egyptians:

TABLE 2.

Sudan 1947.

Health of Officials.

NATIONALITY	Number of officials employed	Total		Average days sickness		Died	Invalided
		Placed on sick list	No. of days sick	For all officials	For those who were sick		
British	869	222	1,695	1.95	7.64	1	5
Sudanese	4,705	1,261	13,422	2.85	10.64	5	18
Egyptian	292	93	776	2.65	8.34	2	5

CHAPTER III.

EPIDEMIC DISEASE.

1. CEREBROSPINAL MENINGITIS

There were sporadic cases of cerebrospinal meningitis in five provinces of the Sudan; a small outbreak, numbering 402 cases, occurred in Equatoria but there were no cases in either Khartoum or Northern Province. In all 443 cases were reported with 159 deaths contrasted with 730 cases and 155 deaths in 1946. As has been found in previous years the case mortality rate was high among the sporadic cases, being probably due to inevitable delay in diagnosis and treatment.

TABLE 3.

Cerebrospinal Meningitis.

Incidence in the last ten years

YEAR	Cases	Deaths
1938	234	124
1939	2,714	647
1940	4,032	796
1941	1,824	459
1942	2,787	1,027
1943	3,526	765
1944	2,346	405
1945	6,166	666
1946	730	155
1947	443	159

The distribution by provinces was:-

PROVINCE	Cases	Deaths
Blue Nile	18	10
Darfur	10	7
Equatoria	402	136
Kassala	2	2
Khartoum	—	—
Kordofan	7	2
Northern	—	—
Upper Nile	4	2
TOTALS	443	159

2. DIPHTHERIA.

There were 364 cases reported with 37 deaths as contrasted with 390 cases and 61 deaths in 1946.

TABLE 4.

Diphtheria

Incidence in the last ten years.

YEAR	Cases	YEAR	Cases
1938	51	1943	309
1939	77	1944	270
1940	114	1945	389
1941	186	1946	390
1942	207	1947	364

The distribution by Provinces was :—

PROVINCE	Cases	Deaths
Blue Nile	57	15
Darfur	7	1
Equatoria	5	—
Kassala	44	4
Khartoum	200	9
Kordofan	22	3
Northern	29	5
Upper Nile	—	—
TOTALS	364	37

There was no significant change in the incidence in the various provinces; Equatoria, Darfur, and Upper Nile Provinces again showing the lowest incidence. The people of these three provinces are the least sophisticated of the Sudan and have but little contact with countries outside the Sudan.

3. RELAPSING FEVER.

There were only 588 cases reported with 67 deaths as contrasted with 1,952 cases with 65 deaths in 1946. Over 500 of these cases occurred in Darfur and Upper Nile Provinces, where difficulty of access to a scattered population delays setting up of measures to control outbreaks of this disease.

Ample stocks of D.D.T. powder allowed delousing to be under-taken on a large scale and, throughout the Northern Sudan, the people came forward in great numbers to be freed of their lice. The disease showed a progressive decline throughout the year in the Blue Nile Province, where it had been of great public health importance in the last few years and where there had been over 14,000 cases in 1944 but only 28 cases in 1947.

TABLE 5.

Relapsing Fever

Incidence in the last ten years.

YEAR	Cases	Deaths	YEAR	Cases	Deaths
1938	1,124	116	1943	10,505	668
1939	1,006	92	1944	22,672	310
1940	1,487	45	1945	17,392	444
1941	3,028	110	1946	1,952	65
1942	5,287	559	1947	588	67

The distribution by Provinces was :—

Province	Cases	Deaths
Blue Nile	28	—
Darfur	294	58
Equatoria	—	3
Kassala	—	—
Khartoum	—	—
Kordofan	38	3
Northern	—	—
Upper Nile	228	3
Totals	588	67

4. SMALLPOX.

There were in all 973 cases reported with 160 deaths. There had been no cases of smallpox in 1945 and 1946. The disease was first reported on the Kordofan-White Nile boundary and then spread along the railway line into the Blue Nile and Kassala Provinces. Although it did not at any time assume grave epidemic proportions yet measures, required to control its spread, were maintained in force during nine months of the year in several parts of the Sudan. At the end of the year the disease still smouldered in Kordofan and Kassala Provinces ; here it was found that West African immigrants, who pass slowly through the Sudan working their way to pay for the pilgrimage, were loathe to report cases and sought at times to evade vaccination.

In all 799,414 vaccinations were performed during the year of which 213,133 were in Equatoria.

Table 6.

Smallpox

Incidence in the last ten years.

Year	Cases	Deaths	Year	Cases	Deaths
1938	527	158	1943	182	36
1939	553	103	1944	242	51
1940	515	104	1945	—	—
1941	46	—	1946	—	—
1942	12	—	1947	807	160

The distribution by Provinces was :—

Province	Cases	Deaths
Blue Nile	139	3
Darfur	—	—
Equatoria	425	87
Kassala	299	51
Khartoum	—	—
Kordofan	90	19
Northern	—	—
Upper Nile	20	—
Totals	973	160

CHAPTER IV.

ENDEMIC DISEASE.

1. ANCYLOSTOMIASIS.

There was no significant change in the incidence of this disease. It was, as heretofore, present in Equatoria and cases were seen in the Northern Province; the remainder were scattered throughout the other Provinces as imported cases. In the Moro district of Equatoria an experiment to test the value of pit latrines in the prevention of ancylostomiasis is now being carried out.

The chief, who had been a sanitary overseer in the Sudan Medical Service has persuaded the inhabitants of some villages to provide themselves with a sufficient number of pit latrines, other villages having been left as controls. The plan has been to treat all persons suffering from ancylostomiasis in the two sets of villages and then, by later examinations at varying intervals, to determine the reinfestation rate.

2. BLACKWATER FEVER.

Cases during the last seven years have been:-

Year	Cases	Deaths	Year	Cases	Deaths
1941	28	9	1945..	14	2
1942	29	11	1946..	14	3
1943	17	3	1947..	4	—
1944	11	4			

There was an abrupt fall in the cases reported in 1947 and there were also fewer cases of malaria. Quinine, both in the treatment and in the prophylaxis of malaria, has given way to mepacrine (atebrin) and, to some extent, to paludrine.

The nationalities of the four cases were: three Sudanese (Arab) and one Egyptian.

TABLE 7.

Blackwater Fever.

Incidence by age and sex in Provinces.

Province	Male		Female		Age Groups in Years.				
	Cases	Deaths	Cases	Deaths	5-15	15-25	25-35	35-45	45-65
Equatoria	1	—	1	—	—	—	2	—	—
Northern	2	—	—	—	—	2	—	—	—
Totals	3	—	1	—	—	2	2	—	—

3. DRACONTIASIS.

There were 2,645 cases reported and of these 656 were admitted to hospital as compared with 2,793 and 512 admitted to hospital in 1946.

The distribution by Provinces was:-

Province	Cases	Deaths
Blue Nile	35	1
Darfur	8	—
Equatoria	1,554	—
Kassala	340	—
Khartoum	1	—
Kordofan	585	—
Northern	30	—
Upper Nile	92	—
Total	2,645	1

In Kassala Province there were 340 cases; it is probable that the disease has been introduced here within the last few years by immigrant labourers from the Western Sudan. Strong measures were taken to control the spread of the disease.

4. DYSENTERIES.

Cases admitted to hospital were 3,894 as compared with 3,838 in 1946. Of these 3,894 cases 572 were diagnosed as the bacillary type. These figures probably do not represent the true incidence of the two diseases (bacillary and amoebic dysenteries) as facilities for bacteriological diagnosis do not exist in the smaller hospitals. There was, however, no indication of any significant change in the incidence of these diseases.

5. ENTERIC FEVER.

Cases reported were 144 with 13 deaths contrasted with 116 and 14 deaths in 1946. The cases were mostly sporadic and no local epidemic occurred; the disease is endemic in the large native town of Omdurman.

The distribution by Provinces was:-

Province	Cases	Deaths
Blue Nile	33	7
Darfur	3	—
Equatoria	1	—
Kassala	16	—
Khartoum	25	2
Kordofan	9	—
Northern	38	2
Upper Nile	19	2
Total	144	13

Table 8.

Enteric Fever.

Incidence in the last ten years.

Year.	Cases	Year.	Cases
1938	213	1943	145
1939	202	1944	199
1940	336	1945	183
1941	129	1946	116
1942	167	1947	144

6. HYDATID DISEASE.

This disease was only seen among the Taposa people living in the Kapoeta District. There were 54 cases admitted to hospital as compared with 40 in 1946.

7. LEISHMANIASIS.

There were 327 cases reported with 60 deaths contrasted with 246 cases and 50 deaths in 1946.

TABLE 9.

Leishmaniasis

Incidence in the last ten years.

YEAR	Cases	YEAR.	Cases
1938	296	1943	225
1939	394	1944	201
1940	460	1945	192
1941	494	1946	246
1942	432	1947	327

Cases occurred chiefly in the Fung District of Blue Nile Province and Gedaref District of Kassala Province. Further studies were made into the role of sandflies as vectors of the disease and clinical trials were given to sodium antimony gluconate in the treatment of Kala-Azar.

TABLE 10.

Visceral Leishmaniasis Distribution by Provinces

PROVINCE	MALE		FEMALE		AGE GROUPS IN YEARS					
	Cases	Deaths	Cases	Deaths	1-5	5-15	15-25	25-35	35-45	45-65
BLUE NILE ..	62	14	7	1	—	13	19	29	7	1
DARFUR	2	—	1	—	—	1	2	—	—	—
EQUATORIA	21	—	5	1	1	19	3	2	1	—
KASSALA	181	36	41	6	27	56	47	63	19	10
KHARTOUM	2	—	1	—	—	1	2	—	—	—
KORDOFAN ..	2	—	—	—	—	—	1	—	1	—
NORTHERN	—	—	—	—	—	—	—	—	—	—
UPPER NILE ..	2	2	—	—	—	—	1	1	—	—
TOTALS ..	272	52	55	8	28	90	75	95	28	11

The racial distribution of these cases was: Sudanese (Arab) 160, Sudanese (Negroid) 140, Abyssinian 8, West African 19.

TABLE 11.

Leishmaniasis : Results of Treatment in the Last Six Years.

YEAR	Apparently cured %	Died %	Still under treatment %	Untreated or lost sight of %
1942	47.0	30.0	12.0	11.0
1943	41.0	25.0	20.5	13.5
1944	43.0	30.0	2.0	25.0
1945	49.0	24.0	15.0	12.0
1946	74.4	7.3	11.1	7.2
1947	68.4	18.4	10.6	2.6

8. LEPROSY.

In the Sudan leprosy is mainly, but not entirely, a disease of the Southern and negroid half of the country. Survey work was continued by the B.E.L.R.A. workers chiefly in the Moro district of Equatoria ; further west leprosy surveys can usually be combined with sleeping sickness inspection.

There was no significant change in the incidence of the disease throughout the Sudan.

TABLE 12.

Leprosy : Distribution in the Sudan.

PROVINCE.	Total known cases	Total in Settlement		Bacteriologically positive New cases found during year
		Govt.	Mission	
Blue Nile	280	47	—	54
Darfur	32	35	—	21
Equatoria	6,910	927	162	179
Kassala	62	26	—	23
Khartoum	43	—	9	12
Kordofan	1,205	90	—	6
Northern	24	—	—	18
Upper Nile	46	—	25	8
TOTALS ..	8,602	1,125	196	321

9. MALARIA.

There were 13,910 cases admitted to hospital with 253 deaths as contrasted with 16,515 cases with 213 deaths in 1946. The rains over the country as a whole were light to normal. D.D.T. in oil was used largely as a mosquito larvicide. In areas of high endemicity or of high seasonal incidence certain public buildings and houses were treated with D.D.T. residual spray. The mapping out of the area of every mosquito man's work into six parts—each part being covered in a day—has

resulted in closer control of mosquito-men's work and consequently of mosquito-breeding. Paludrine was brought into general use, both as a prophylactic and in treatment, as a supplement to Quinine and Mepacrine. Two experiments were set up to test in the Sudan the relative value of Paludrine and of Mepacrine in the prophylaxis of malaria among the Sudanese Arabs of the North.

Admissions to, and deaths in, hospitals by provinces were:-

Province	Admissions	Deaths
Blue Nile	3,133	88
Darfur	592	11
Equatoria	3,733	51
Kassala	1,255	23
Khartoum	1,213	29
Kordofan	2,131	35
Northern	1,404	9
Upper Nile	449	7
Totals	13,910	253

10. RABIES.

In all 127 persons received anti-rabic treatment in hospital as compared with 1,011 in 1946. 8 deaths were reported as compared with 17 deaths in 1946.

Table 13.

Rabies and Anti-Rabic Inoculations: Cases Recorded in the last ten Years

Year	Persons Treated	Deaths after Treatment with Anti-Rabic Vaccine	Total Deaths.
1938	557	1	8
1939	422	8	16
1940	352	7	3
1941	407	7	14
1942	396	1	11
1943	358	—	7
1944	272	—	4
1945	63	—	9
1946	1011	4	17
1947	127	4	8

TABLE 14.

Human Rabies : Details of Cases.

Locality	Age	Sex	Biting Animal	Severity of bite	Site of bite	No. of days after bite when treatment was begun	No. of injections given	No. of days from bite to fatal termination
UPPER NILE.								
Lau Village	40	F	Dog	Deep	R. thigh	240	7	247
KORDOFAN.								
Abu Haraz	40	M	,,	Severe	Foot	120	1	121
Sebey (Dilling)	28	M	,,	Slight	Leg	35	3	38
EQUATORIA.								
Meridi ...	70	M	,,	Mild	Leg	60	—	60
Yei	6	F	,,	Slight	Leg	60	—	61
Rumbek ...	55	M	,,	Moderate	Leg	?	—	50
KHARTOUM.								
Wadi Bushara	40	M	,,	Slight	Leg	?	2	?
BLUE NILE.								
Dar el Salam Village Sennar	38	M	,,	Mild	Finger	—	—	116

11. ACUTE RHEUMATISM.

There were 216 cases admitted to hospital with 3 deaths as compared with 196 cases with 2 deaths in 1946.

TABLE 15.

Acute Rheumatism

Incidence in the last ten years.

YEAR	Cases	Deaths
1938	292	4
1939	303	4
1940	223	3
1941	356	1
1942	136	—
1943	190	3
1944	281	2
1945	280	2
1946	196	2
1947	216	3

The distribution by Provinces was :—

PROVINCE	Cases
Blue Nile	45
Darfur	2
Equatoria	27
Kassala	24
Khartoum	34
Kordofan	15
Northern	61
Upper Nile	8
TOTAL	216

12. SCHISTOSOMIASIS.

There was little change in the incidence of the vesical form of this disease in the Northern Province. Routine examinations showed some slight increase in the Merowe—Dongola district but a decrease in the Wadi Halfa Area. A further—and more extensive—survey of the Gedaref area revealed 504 bilharzia cases among 5,356 people examined.

In the Gezira Area routine examinations, similar to those carried out in past years, did not show an appreciable change in the haemotabium type of the disease but did show some increase in the Mansoni type. A comprehensive survey of all the villages in the Gezira is now being carried out and steps have been taken to extend and intensify measures for treatment of patients and for the extermination of infected snails.

The incidence among the people living along the White Nile Reservoir continued to be low.

TABLE 16.

Gezira : Incidence in the Indigenous Population.

YEAR	HAEMATOBIUM						MANSONI					
	Children			Adults			Children			Adults		
	No.	Inf.	%	No.	Inf	%	No.	Inf	%	No.	Inf	%
1945 ..	12,133	672	5.5	22,681	448	1.9	3,926	249	6.3	9,546	183	1.9
1946 ..	18,728	567	3.02	35,870	430	1.2	8,369	151	1.8	24,155	336	1.4
1947 ..	11,203	351	3.1	17,830	374	2.0	3,367	166	4.9	9,763	300	3.0

TABLE 16.

Merowe and Dongola Districts

Incidence of S. Haematobium Infection.

YEAR	Number Examined	Infections found	Percentage
1945	12,146	400	3.29
1946	12,124	925	7.6
1947	9,539	791	8.3

TABLE 18.

Schistosomiasis.

Halfa District : Incidence of S. Haematobium Infection.

YEAR	Number Examined	Infections found	Preceutage
1945	4,169	829	19.8
1946	5,456	1,110	20.0
1947	10,795	1,785	16.5

13. TRYPANOSOMIASIS.

YEAR	Yubu	Yambio	Yei	Kajo-Kaji	Meridi	Other Localities	Imported
1938 ..	106	—	—	4	—	—	—
1939 ..	103	—	—	6	—	—	—
1940 ..	80	—	—	—	—	—	1
1941 ..	69	—	—	1	47	—	8
1942 ..	48	—	—	2	25	—	—
1943 ..	60	—	8	1	9	—	3
1944 ..	37	—	35	—	4	4	—
1945 ..	16	1	19	—	—	3	—
1946 ..	21	19	16	—	—	—	—
1947 ..	18	6	21	—	2	—	—

Palpations carried out during the year numbered 260,338 and 4,569 gland punctures were performed. There were only six cases found in the Yambio District, where there had been 19 cases the year before and 21 new cases were discovered in the Yei District, where the disease has smouldered since 1943.

The value of D.D.T. residual spray on the screens at the end of road clearings as a means of destroying "fly" was tested out as were also various kinds of traps

14. TUBERCULOSIS

There was a slight fall in the number of cases of all forms of tuberculosis admitted in 1947 as compared with 1946. The number of admissions for tuberculosis per 1,000 admissions for all diseases has shown little change over the last 27 years; in 1920 it was 14.1 per 1000, in 1930 it was 15.6 in 1940 9.9 and in 1947 10.8. In the three towns of Khartoum, Khartoum North, and Omdurman special measures were taken to examine, and to keep under observation, the house contacts of open cases of tuberculosis.

Table 20.

Tuberculosis.

Admission to Hospitals in the Last Ten Years.

Year	Pulmonary	Non-Pulmonary	Totals
1938	623	404	1,027
1939	685	396	1,081
1940	579	457	1,036
1941	631	511	1,142
1942	671	505	1,192
1943	593	529	1,122
1944	796	632	1,428
1945	957	643	1,600
1946	888	613	1,501
1947	877	599	1,476

Table 21.

Admissions To Hospitals in the Last Five Years contrasted for the Northern and Southern Regions.

	1943		1944		1945		1946		1947	
	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.
Northern Sudan	516	483	677	526	845	508	781	538	682	469
Southern Sudan	77	46	119	106	112	135	107	75	152	87
West Africans	—	—	—	—	—	—	—	—	43	43

Table 22.

Pulmonary Tuberculosis

Analysis by Age-Groups of Hospital Admissions

Part of Country.	AGE GROUPS IN YEARS															
	1-5		5-15		15-25		25-35		35-45		45-65		65&over		Total	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Northern Sudan	2	1	16	2	160	25	228	34	160	23	105	16	11	3	682	104
Southern Sudan	–	–	1	–	26	3	60	10	53	4	12	2	–	–	152	19
West Africans	–	–	–	–	4	1	12	3	16	5	6	1	5	2	43	12

TABLE 23.

Pulmonary Tuberculosis

Analysis by Occupation of Admissions To Hospitals in the Last Six Years.

Year	Prisoners	Cultivators	Nomads	Soldiers Sailors and Police	Townsmen			Servants	Indigent and Unemployed	Women not employed	Children	Unclassified	TOTAL
					Day Labourers	Artisans and Shopkeepers	Clerks						
1942	—	239	—	21	61	32	5	17	34	123	5	131	671
1943	21	129	—	25	113	44	12	31	113	81	3	21	593
1944	—	171	—	47	132	25	25	15	165	159	12	45	796
1945	—	191	7	41	159	65	21	25	170	197	25	56	957
1946	—	216	35	40	66	40	23	34	175	172	11	76	888
1947	16	245	8	27	129	51	20	26	95	153	14	93	877

TABLE 24.

Non-Pulmonary Tuberculosis.

Part of Country	AGE GROUPS								
	0-1	1-5	5-15	15-25	25-35	35-45	45-65	65over	Total
Northern Sudan	2	17	46	91	137	89	73	14	469
Southern Sudan	1	6	14	15	29	17	5	—	87
West Africans	—	—	4	9	13	13	4	—	43

TABLE 25.

Non-Pulmonary Tuberculosis : 1947.

Analysis by Site of Lesion of Hospital Admissions.

PART of Country	Gland	Bone	Joint	Other	TOTALS
Northern Sudan ..	192	112	91	74	469
Southern Sudan ..	32	33	14	8	87
West Africans ..	14	14	9	6	43

15. TUMOURS.

Recorded cases numbered 564 and were classified as follows :—

Malignant :	carcinoma	138
,,	sarcoma	30
,,	Undifferentiated	65
	Total	233
Benign	.. ..	331
	Total all Tumours	564

TABLE 26.

Tumours.

Incidence in the Last Six Years.

NORTHERN SUDAN

YEAR	Malignant	Non-Malignant	TOTAL
1942	164	205	369
1943	291	457	748
1944	217	664	881
1945	211	280	491
1946	189	295	484
1947	196	241	437

SOUTHERN SUDAN

Year	Malignant	Non-Malignant	TOTAL
1942	11	62	73
1943	6	34	40
1944	20	96	116
1945	70	107	177
1946	51	210	261
1947	37	90	127

16. UNDULANT FEVER.

70 cases were reported with 2 deaths compared with 58 cases and 3 deaths in 1946.

TABLE 27.

Undulant Fever

Incidence in the Last Ten Years.

Year.	Cases	Year.	Cases
1938	28	1943	55
1939	29	1944	66
1940	43	1945	70
1941	31	1946	58
1942	17	1947	70

17. VENEREAL DISEASE.

There were 129,427 cases reported with 59 deaths compared with 119,047 cases with 28 deaths in 1946. These figures show some increase in the number of those reporting for treatment. Syphilis was prevalent among the tribal communities of Darfur and Southern Kordofan whilst gonorrhoea, as heretofore, was essentially an urban disease.

The Distribution by Provinces was:

Province.	Cases.
Blue Nile	24,563
Darfur	19,913
Equatoria	7,662
Kassala	18,043
Khartoum	10,619
Kordofan	28,352
Northern	5,821
Upper Nile	14,454
Total	129,427

Yaws was present in the Southern Sudan more particularly in the remoter parts of Equatoria and Upper Nile Provinces. There was no evidence of any change of incidence.

CHAPTER V.

PUBLIC HEALTH

1. QUARANTINE.

5442 persons entering the Sudan at Wadi Halfa were examined. The following cases of disease were found amongst them :—

Schistosomiasis	421
Malaria	2
P.U.O.	4
Amoebic Dysentery	1
Asthma	4
Chickenpox	2
Measles	3

Labourers imported by contractors were medically examined, deloused, vaccinated and, if proceeding south of latitude 15° N., inoculated against yellow fever. Cases of schistosomiasis were detained in the Quarantine for treatment. All trains, boats, and road vehicles arriving in Halfa from the South were inspected before entering the town.

The *aedes* index for Halfa was maintained at Nil throughout the year and *gambiae* control measures have eradicated this mosquito from the Halfa area.

The Port Quarantine Service dealt with 681 ships entering Port Sudan and 732 native craft entering Flamingo Bay. Twenty seven arrived at Port Sudan after a voyage of less than 6 days from a port in the yellow fever endemic area and the required measures were taken against these ships. No mosquitoes were found on board and no ship carried any case of communicable disease.

137 dhows were fitted with 263 mosquito proof fresh water containers and thereby reduced considerably the possibility of importing *aedes aegypti* mosquitoes into the area.

The two ship searchers inspected 417 ships for rats and mosquitoes. No unusual rat mortality was found in ships coming from plague infected ports. The system of radio pratique in abeyance during the war was re-instituted in 1947.

The quarantine service at Suakin dealt with 2210 Sudanese and 9810 Westerners going on the pilgrimage. These 12,020 pilgrims left in September and October All pilgrims were deloused with D D T. powder, inoculated against cholera and vaccinated against smallpox.

The pilgrimage was declared clean and the period of detention in the Quarantine for returning pilgrims fixed at 5 days in Suakin. The Sudan Medical Mission accompanied the pilgrimage.

Measures to combat the transport of mosquitoes by air, land, river or seacraft were carried out as in previous years at Wadi Halfa, Port Sudan, Khartoum, Malakal and Juba.

TYPE OF CRAFT.

	Land		Sea or River		Air	
	Total Insp.	No. of Adult Mosq. found	Total Insp.	No. of Adult Mosq. found	Total Insp.	No. of adult Mosq. found
Wadi Halfa ..	408	0	7,130	0	921	0
Port Sudan ..	—	—	417	0	240	0
Khartoum	All trains from South	46	1,184	7	1,546	0
Malakal	—	—	311	0	465	0
Juba	—	—	73	0	1,508	0
Kosti	—	—	—	—	—	—

2. ANTE-NATAL AND MATERNITY SERVICE.

At Kassala Hospital ante-natal clinic 406 new cases were seen and of these 121 were found to need treatment (albuminaria 51, malaria 25, anaemia 18, Toxaemia of pregnancy 8, Amoebic Dysentery 6 and hepatitis 13). Cases admitted to hospital for labour were 28, and of these one died—she had not attended the ante-natal clinic.

At Port Sudan 577 new cases were seen in the four clinics. In Kordofan Province, at the El Obeid clinic 2812 new cases were seen. At Nahud clinic 1625 new cases were seen, compared with 237 in 1946. At the 12 S.M.S. ante-natal clinics in Khartoum Province 4336 new cases were seen contrasted with 3235 in 1946.

35 midwives passed out of the Midwives Training School Omdurman, and returned to their villages in the following provinces.

Blue Nile Province	9
Kassala Province	3
Khartoum Province	11
Kordofan Province	2
Northern Province	10

3. INFANT AND CHILD WELFARE

15263 attendances at clinics and home visits of which 4336 were new cases, were reported from S.M.S. Child Welfare clinics in the Khartoum Area of these 9178 were home visits.

The infantile mortality per 1000 live births in Khartoum and Omdurman was :

	1946	1947
Khartoum	61.30	73
Omdurman	56.83	45

The total maternal mortality in Omdurman was 1.9 per 1000 births and 6 deaths in the Three Towns were due to puerperal sepsis.

In Khartoum Province S.M.S. Welfare centres were maintained at the Omdurman Midwives School, at the Morada, in East and West Deims, Khartoum North, Kobar, Burri, Tuti Island, Halfayat el Meluk, Shambat, Deim Abu Said and Church Missionary Society Centres at C.M.S. Hospital, at Abu Ruf, Beit El Mal, Wad Nubawi and Abu Kaduk.

TABLE 28.

Khartoum Province : 1947.

Infants and Children seen at Child Welfare Centres and by Home Visitors

CENTRE	Seen at Centre			Referred to Hospital
	New Cases	Old Cases	Total	
Omdurman	416	1,186	1,602	180
East Deims } Khartoum	349	528	877	26
West Deims }	305	767	1,072	32
Khartoum North	247	684	931	45
Kobar	69	216	285	14
Burri	139	217	356	36
Tuti Island	100	158	258	9
Halfayat el Meluk	76	190	266	5
Shambat	70	60	130	10
Deim Abu Said	124	184	308	24
TOTALS	1,895	4,190	6,085	381

Home Visits—S.M.S.

AREA	No. of Homes	No. of Visits
Omdurman	1,434	4,783
Khartoum Deims	1,017	2,442
Khartoum North	158	547
Rural District	557	1,406
TOTALS	3,166	9,178

Church Missionary Society Child Welfare Centres

Centres	Children seen at Home	Children seen at Clinic	Total
Abu Ruf	602	979	1,581
Beit el Mal	883	493	1,376
Wad Nubawi	885	462	1,347
Hospital	892	840	1,732
Abu Kaduk	1,473	2,979	4,452
Totals ..	4,735	5,753	10,488

Summary of work done by S.M.S. Child Welfare Service and by the Church Missionary Society

Centre	Home Visits	Visits to Centres	Total
Sudan Medical Service	9,178	6,085	15,263
Church Missionary Society	4,735	5,753	10,488
Totals	13,913	11,838	25,751

4. SCHOOL HEALTH.

Table 29 gives figures for the examination of school children in each province. No significant changes in the health of pupils were found.

TABLE 29

HEALTH OF SUDANESE SCHOOL CHILDREN

The following table shows the results of the medical examination :

PROVINCE AND DISTRICT.	No. Examined	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Ankylostomiasis %
Blue Nile Province.						
WAD MEDANI AREA.						
2 Boys Intermediate	1,004	18.0	1.3	7. 8	—	—
2 Girls Intermediate	217	32.	.5	17. 0	—	—
10 Boys Elementary	1,980	13.	.6	15. 3	—	0.1
7 Girls Elementary	717	10.5	3.06	6. 1	—	—
18 Sub-Grade and Khalwas ...	2,366	21.2	6.0	27. 5	—	0.9
ABU USHER.						
2 Boys Intermediate	280	10.0	.4	5.4	—	—
10 Boys Elementary	1,623	22.6	6.2	17.9	—	—
5 Girls Elementary	721	13.6	1.8	6.6	—	—
7 Sub-Grade	423	18.2	6.9	25.5	—	—
SENNAR.						
2 Boys Elementary	557	17.05	1.8	20.1	—	—
2 Girls Elementary	188	17.0	—	19.68	—	—
12 Sub-Grade	1,079	23.63	4.26	47.08	—	—
SINGA.						
4 Boys Elementary	632	11.92	—	3.95	—	—
2 Girls Elementary	183	9.63	—	5.08	—	—
5 Sub-Grade	280	14.73	17.5	2.29	—	—
ROSEIRES.						
1 Boys Elementary	112	36.6	—	55.3	—	1.7
1 Girls Elementary	43	55.8	—	34.9	—	—
5 Sub-Grade	220	24.6	—	32.7	—	—
KOSTI					—	—
1 Boys Intermediate	98	44.8	5.1	15.3	—	—
6 Boys Elementary	830	13.9	4.6	17.1	—	—
3 Girls Elementary	259	29.3	—	30.1	—	—
6 Sub-Grade	420	24.3	2.6	16.4	—	—
WHITE NILE.						
1 Bakt Er Ruda Training College	165	7.87	8.47	4.51		
1 Junior Secondary	51	7.84	7.84	3.92	—	—
1 Intermediate	156	9.61	6.41	10.25	—	—
9 Boys Elementary	1,514	18.88	2.70	20.66	—	—
4 Girls Elementary	402	12.68	—	19.40	—	—
2 Sub-Grade	122	18.85	—	27.87	—	—
Darfur Province.						
FASHER.						
1 Boys Intermediate	127	22	30	29	—	—
1 Boys Elementary	337	50	33	25	—	—
1 Girls Elementary	118	25	—	3	—	—
8 Sub-Grade...	661	68	21	29	—	—

Province and District.	No. Examined	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Ankylostomiasis %
Nyala.						
1 Boys Elementary	237	15	30	16	—	—
1 Girls Elementary	82	14	6.2	9.7	—	—
3 Sub-grade	364	19	27	14	—	—
Geneina.						
1 Boys Elementary	140	33.5	15	37	—	3.6
Umkadada.						
1 Boys Elementary	131	32	—	14	—	—
1 Girls Elementary	44	15	—	23	—	—
Kuttum.						
1 Boys Elementary	165	67	7	21	—	—
Zalingi.						
1 Boys Elementary	171	29	—	50	—	—
Kassala						
Kassala Area						
1 Boys Intermediate	41	39.0	—	—	—	—
6 Boys Elementary	857	31.5	0.12	38.5	—	—
11 Sub-Grade	403	33.5	—	12.4	—	—
Kassala District Gedaref.						
9 Boys Elementary	1145	26.8	—	22.2	—	—
1 Girls Elementary	107	26	11	—	—	—
4 Sub-Grade	315	31.4	—	12.0	—	—
Kordofan						
Central District.						
3 Boys Intermediate	206	21	12.1	21	—	—
1 Girls Intermediate	31	22.5	9.6	16.1	—	—
Boys Elementary	560	48.2	20.1	32.8	—	—
Sub-Grade	66	42.4	9.0	26.9	—	—
Eastern Kordofan.						
Boys Elementary	442	11.5	18.5	24.4	—	—
Girls Elementary	217	7.3	10.1	6.4	—	—
Sub-Grade	317	20.5	15.4	33.7	—	—
Northern Kordofan						
Boys Elementary	296	18.6	0.6	25.4	—	—
Girls Elementary	92	8.6	—	3.2	—	—
Sub-Grade	213	16.8	2.3	26.7	—	—
Nuba Area						
Jebels District						
Boys Elementary	1,025	4.4	20.7	38.8	—	—

Province and District	No. examined	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Ankylostomiasis %
Tegali District.						
Boys Elementary	457	8.2	44.8	43.1	—	—
Girls Elementary	151	16.5	21.1	58.2	—	—
Western Kordofan.						
Boys Elementary	829	9.7	8.8	19.6	—	—
Girls Elementary	199	3.0	9.0	38.1	—	—
Sub-Grade	594	5.7	3.5	27.1	—	—
Khartoum						
Higher Schools	192	10.9	—	.5	—	—
Boys Secodary	1,364	8.3	—	.1	—	—
Girls Secondary	256	10.1	1.5	—	—	—
Boys Intermediate	1,970	26.5	—	1.5	—	—
Girls Intermediate	894	5.5	—	.3	—	—
Boys Elementary	4,456	24.8	—	1.4	—	—
Girls Elementary	1,175	21.5	—	.7	—	—
Technical Schools	111	45.	—	1.8	—	—
Mahad Ulama	172	33.1	—	2.3	—	—
Sub-Grade Boys	3,891	24.1	—	2.3	—	—
Sub-Grade Girls	132	9.0	—	6.0	—	—
Port Sudan.						
Boys Intermediate	40	17.5	2.5	—	—	—
Boys Elementary	578	25.3	3.0	7.0	—	0.3
Girls Elementary	25	48	—	12	—	—
Sub-Grade	103	30	—	4	—	—
Upper Nile.						
Boys Intermediate	52	5.8	—	5.8	—	—
Boys Elementary	415	26.7	3.3	21.4	—	—
Khalwa	90	22.2	2.2	2.2	—	—
Northern						
Atbara.						
4 Boys Intermediate	234	21	7	22	—	—
12 Boys Elementary	2,139	32	19	9	—	—
5 Girls Elementary	506	24	2	3	—	—
4 Sub-Grade	289	23	1	23	—	—
14 Khalwas	1,871	30	1.4	9.9	—	—
Wadi Halfa.						
1 Boys Intermediate	155	55	27	—	—	—
1 Boys Elementary	216	65	9	—	—	—
1 Girls Elementary	85	82	4	—	—	—
Khalwas	1,873	56	10	2	—	—
Dongola.						
Boys Intermediate	30	16	3.3	—	—	—
Boys Elementary	1,118	35	7	5	—	—
Girls Elementary	146	56	4	9	—	—
Khalwas	601	31.4	6.3	4.8	—	—
Merowe.						
Boys Elementary	944	38	6	7	—	—
Girls Elementary	144	39	—	—	—	—
Sub-Grade and Khalwas ..	1,441	43.8	1.3	9.2	—	—

Province and Districts	No. Examined	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Ankylostomiasis %
Shendi.						
Boys Intermediate	200	39	1	—	—	—
Boys Elementary	487	17	0.4	—	—	—
Girls Elementary	140	21	—	1	—	—
Equatoria						
Central District.						
Juba	99	2	2	51	—	12
Rejaf	125	3	1	56	—	13
Zande District	526	—	11	6	—	10
Lakes District	236	—	—	31	—	54
Torit District	1,029	2.2	1.7	26.6	—	6.2
Yei District:—						
Intermediate	121	7.43	9.09	31.39	—	9.91
Boys Elementary	159	5.35	8.58	42.22	—	10.11
Girls Elementary	96	16.2	21.9	60.5	—	3.1
Wau District.						
Elementary	1,171	6.5	5	39.6	0.12	3.7
Intermediate	110	11.8	12.7	27.0	—	8
Yambio	223	—	6.3	13.5	—	12.2
Meridi	169	1.2	38.2	33.5	—	20.6
Kapoeta	72	20.83	—	40.28	—	—

5. RURAL HEALTH.

Four new village dispensaries were opened during the year and at the 347 dispensaries scattered throughout the Sudan, there were 5,818,906 out-patients attendances.

6. NUTRITION

A dietetic survey was begun in the Zande district of Equatoria Province. This survey is to finish in 1948.

7. LEGISLATION.

Given below is a *resume* of legislation affecting health enacted during the year:—

1. The Quarantine Regulations 1947 (1947 L.R.O. No. 6) gave powers to the Medical Officer of Health Kassala Province (Southern Area) to take measures to prevent the introduction of typhus into the Sudan from Eritrea.

2. The Pharmacy and Poisons (Amendment) Ordinance 1947 (1947 Ordinance No. 17) placed the technical management of a pharmacy under the sole control of a licensed pharmacist where previously it had been required that a licensed pharmacist should control the whole business and management of the pharmacy.

3. The Quarantine (Yellow Fever) Amendment Regulations 1947. (1947 L.R.O. No. 48) require that the officer carrying out the inoculation against Yellow Fever should sign the certificate of inoculation. The regulations also define valid certificates of inoculation against Yellow Fever and certificates of immunity against Yellow Fever.

4. The Quarantine (Smallpox) Amendment Regulations 1947 (1947 L.R.O. No. 49) defined as valid a certificate stating that vaccination against smallpox had been carried out not more than 3 years or less than 14 days prior to presentation of the certificate.

5. The Quarantine Amendment Regulations 1947 (1947 L.R.O. No. 73) provide for a reduction in the space in ships allotted for each pilgrim from 16 square feet to 12 square feet in the between decks and from 6 square feet to 3 square feet on the upper decks.

6. The Quarantine (Cholera) Regulation 1947 (1947 L.R.O. No. 91) gave Medical Officers of Health powers to take special measures to prevent the introduction of Cholera into the Sudan from Egypt.

8. HEALTH OF PROVINCES.

(a) BLUE NILE PROVINCE

Area	54,755 sq.m.	Population ..	1,707,622
Beds	1,179	Per 10,000 Population ..	7
Inpatient admissions ..	18,034	„ „ „ ..	106
Outpatient attendances ..	2,042,405	„ „ „ .	11,961
Vaccinations	141,842	„ „ „ ..	831

TABLE 30

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	5	11	16
Nursing Sister	2	—	2
Medical Assistant	—	112	112
Hospital Attendant	—	582	582
Public Health Inspector	2	—	2
Public Health Officer	—	8	8
Sanitary Overseer	—	22	22
Mosquito man	—	180	180

TABLE 31

Work in Hospitals and Dispensaries.

UNIT		Beds	Inpatient Admissions as patients	Operations	Total Outpatient Attendances
Wad Medani ..	Hospital	355	5,833	814	192,593
Dispensaries ..	.. ..	—	—	—	312,519
Abu Usher ..	Hospital	182	2,927	511	28,361
Dispensaries ..	.. ..	—	—	—	502,519
Sennar ..	Hospital	156	1,549	252	61,806
Dispensaries ..	.. ..	—	—	—	158,259
Singa	Hospital	110	1,536	343	32,982
Dispensaries ..	.. ..	—	—	—	105,907
Roseires ..	Hospital	102	1,233	273	23,344
Dispensaries ..	.. ..	69	532	46	74,963
Kosti	Hospital	138	2,543	363	91,104
Dispensaries ..	.. ..	—	—	—	228,261
Dueim	Hospital	67	1,797	382	67,001
Dispensaries ..	.. ..	—	—	—	162,786
	TOTALS	1,179	17,950	2,984	2,042,405

Rain grown crops were poor on account of light and badly spaced rains. Water supplies for vast undeveloped agricultural areas are being improved by the excavation of hafirs (reservoirs) in the neighbourhood of rocky hills providing suitable catchment areas.

The number of cases of relapsing fever again showed a reduction, only 28 cases being reported compared with 462 in 1946 and 4,698 in 1945.

No major epidemics occurred during the year.

As regards endemic disease, the effects of the high Nile flood of 1946 continued to produce a high incidence of malaria early in the year but this incidence declined sharply in the latter part.

On the other hand the figures from the White Nile have shown a marked improvement over those for 1946.

Bilharzia continues to be widespread in the Gezira Irrigated Area.

More treatment teams have been put in the field, those carry out treatment of infected persons directly. They have been diagnosed by the laboratory teams carrying out the survey. Snail control measures continue, and the problem of a clean water supply for Gezira villages is still being tackled.

The question of improved housing for Medical Assistants in the Gezira is under consideration.

TABLE 32

Schistosomiasis in the Indigenous Population

Gezira Irrigated Area : Percentage Incidence Annually 1944-47

(*Figures from routine examinations of natives*)

YEAR	GROUPS.								
	Children			Adults			All Ages		
	No.	Inf.	%	No.	Inf.	%	No.	Inf.	%
S. haematobium									
1944	29,966	940	3.17	57,196	511	0.89	—	—	—
1945	12,133	672	5.5	22,681	448	1.9	—	—	—
1946	18,728	567	3.02	35,870	430	1.2	—	—	—
1947	11,203	351	3.1	17,830	374	2.0	—	—	—
S. mansoni									
1944	—	—	—	—	—	—	—	—	—
1945	3,926	249	6.3	9,546	183	1.9	—	—	—
1946	8,369	151	1.8	24,155	336	1.4	—	—	—
1947	3,367	166	4.9	9,763	300	3.0	—	—	—

(b) DARFUR PROVINCE.

Area	138,150 sq.m.	Population	876,036
Beds	321	Per 10,000 population ..	4
Inpatient admissions ..	13,428	,, ,, ,, ..	153
Outpatient attendances ..	467,892	,, ,, ,, ..	5,341
Vaccinations	25,637	,, ,, ,, ..	293

TABLE 33.

Medical and Health Staff

CATEGORY	British	Sudanese	Total
Doctor	1	3	4
Nursing Sister	—	—	—
Medical Assistant	—	25	25
Hospital Attendant	—	135	135
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	2	2
Mosquito man	—	71	71

TABLE 34.

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions as Patients	Operations	Outpatient Attendances
Fasher Hospital	159	1,596	466	147,834
Geneina Hospital	52	2,374	193	30,281
Nyala Hospital	54	919	310	45,706
Dispensaries	56	8,437	—	244,071
TOTALS	321	13,326	969	467,892

The rains were scanty and widely spaced but crops were good and there were no marked examples of deficiency diseases.

The water position at Fasher was far from satisfactory as the fula failed to fill.

Bores were sunk in an effort to avert a critical situation in the early summer.

The dam at Mellit was completed during the year and has proved to be a success adequate measures against pollution, and the prevention of mosquito breeding were taken.

There were no major epidemics but a minor epidemic of Relapsing Fever occurred in the Northern District, there were 75 cases with 8 deaths, these out of a total of 294 cases and 58 deaths for the whole province.

Siamese Twins were born to a woman in the Rezeigat, there were two heads and arms and two pairs of legs.

The incidence of endemic disease showed no significant change, and the health of the school children remained satisfactory.

(c) EQUATORIA PROVINCE.

Area	159,025 sq.m.	Population ..	1,327,325
Beds	2,076	Per 10,000 population ..	15
Inpatient admissions ..	44,313	„ „ „ ..	334
Outpatient attendances ..	1,167,544	„ „ „ ..	8,709
Vaccinations	215,236	„ „ „ ..	1,621

TABLE 35.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	5	13	18
Nursing Sister	2	—	2
Medical Assistant	—	46	46
Hospital Attendant	—	353	353
Public Health Inspector	1	—	1
Public Health Officer	—	1	1
Sanitary Overseer	—	15	15
Mosquito man	—	77	77

TABLE 36.

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions as patients	Operations	TOTAL Outpatient Attendances
Li Rangu Hospital .. .. (incl. Quarantines)	90	1,315	369	19,037
Dispensary	105	2,384	—	75,002
Meridi Hospital	100	920	140	28,327
Dispensary	112	945	—	22,656
Yei Hospital (including Kajo Kaji) ..	107	2,710	156	84,274
Dispensary..	22	1,262	—	118,831
Rumbek Hospital	176	1,604	169	36,332
Dispensary	152	2,210	22	63,823
Juba Hospital (incl. Quarantines)	349	6,019	962	77,551
Dispensary	40	1,620	—	40,924
S. Yubu Hospital	76	968	161	12,602
Dispensary	108	1,982	18	23,562
Wau Hospital	231	3,784	432	32,319
Dispensary	88	3,604	—	142,982
Kapoeta Hospital	46	1,190	178	17,594
Dispensary	36	1,014	—	39,509
Torit Hospital	88	3,334	203	41,456
Dispensary	48	1,612	—	139,976
C.M.S. Lui Hospital	42	499	226	19,507
Dispensary	—	974	—	131,280
TOTALS	2,076	39,950	3,036	1,167,544

Rains in 1947 were unsatisfactory, the first falls were early but there was very little rain after September; early crops of an early maturing character did well but crops sown later, and especially late maturing durra, did badly. As a result the Province generally did not produce adequate supplies of durra and similar crops.

A dietary survey was begun in the Zande district, and was still being carried out at the end of the year.

One of the interesting facts which became apparent in the early stages of the survey was that amongst certain classes of people cassava flour was, unfortunately, gaining in popularity over elusine because of its much greater ease of preparation.

As regards epidemic disease, cases of Alastrim, 57 which occurred in 1946, continued to occur in the Lakes District, in addition cases of Variola Major began to appear so that at one time, cases of Alastrim, Variola Major and Variola Major (modified by vaccination) were to be seen.

279 cases were diagnosed in the whole province as Variola Major and of these 87 died.

An outbreak of Bacillary Dysentery occurred in an isolated part of the Source Yubu District, 151 cases were seen and treated, of these 14 died. It is however believed that 94 deaths occurred altogether (confirmed by Sleeping Sickness inspections) the majority of these deaths occurring before the disease was reported.

No other major epidemics occurred.

As regards Endemic Disease some interesting facts have come to light following the Village Sanitation Experiment to test the value of pit latrines as a method of control of Ankylostomiasis.

The experiment was begun in 1946. A census was made, and all persons were examined in the villages with latrines and in the villages without latrines.

The re-examination of all persons has not yet been completed but the figures showing the percentages infected in two sections with pit latrine are of interest.

	1946	1947
	per cent	per cent
Section VI Ankylostoma	37.3	4
Bilharzia	4.7	1
Section VII Ankylostoma	45.2	9.2
Bilharzia	3.3	0.7

It is hoped that more comprehensive figures, including those of the control villages, will be available by the end of 1948.

In general over the whole province the incidence of Schistosomiasis, Dracontiasis, remained unchanged, measures against these diseases were continued.

26 cases of Kala-Azar and 54 cases of Hydatid Disease were admitted to Hospital all the cases of Hydatid Disease and the majority of the cases of Kala-Azar occurring in the Eastern District of the province.

47 new cases of Sleeping Sickness were found during the year.

The work on the establishing of Village Leper Settlements continues.

(d) KASSALA PROVINCE.

Area	134,450 sq.m.	Population ..	678,740
Beds	838	Per 10,000 Population ..	12
Inpatient admissions ..	12,370	,, ,, ,, ..	182
Outpatient attendances ..	1,013,409	,, ,, ,, ..	14,930
Vaccinations	114,658	,, ,, ,, ..	1,689

TABLE 37.

Medical and Health Staff.

CATEGORY.	British	Sudanese	Total
Doctor	3	8	11
Nursing Sister	2	—	2
Medical Assistant	—	31	31
Hospital Attendant	—	227	227
Public Health Inspector	1	—	1
Public Health Officer	—	2	2
Sanitary Overseer	—	9	9
Mosquito man	—	107	107

TABLE 38.

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions as Patients	Operations	Total Outpatient Attendances
SOUTHERN AREA				
Kassala Hospital (inc. Quarantine and Prison)	212	3,741	522	131,300
Dispensaries	40	600	—	204,519
Gedaref Hospitals(2) (including Quarantine and Prison)	226	3,079	410	163,879
Dispensaries	35	299	—	186,910
NORTHERN AREA.				
Port Sudan Hospital	212	3,952	471	113,326
Dispensary	35	465	2	194,668
Port Sudan Cent. Prison	37	154	—	15,790
Suakin Quarantine	41	80	—	3,017
TOTAL ...	838	12,370	1,405	1,013,409

There was no marked change in the general health of the Province. The Gash flood was poor and rains light but there was no shortage of grain and no apparent change in the standard of nutrition of the people.

There was an epidemic of smallpox in the area near Kassala with 193 cases and 16 deaths. Of these all but 30 cases and 1 death occurred in Kassala Town. In addition 4 cases occurred in Port Sudan and 102 cases in Gedaref district with 35 deaths. In Kassala, a large number of the cases were among the Haussa who were not co-operative and concealed their sick.

Of the endemic diseases in the Southern Area malaria decreased considerably. In 1942 malaria cases represented about 3rd of admissions but in 1947 only 1-7th. In spite of this admissions to hospitals and dispensaries increased. The decrease in malaria can be attributed to the poor Gash flood, light rains and improved mosquito control. Only 158 breedings of anopheline mosquito were found in Kassala Town compared with 417 in 1946.

The incidence of fly borne diseases showed no improvement. In Kassala Town fly breeding is difficult to control owing to the large numbers of cattle which are stabled inside the town boundaries.

Tuberculosis.

Both pulmonary and non-pulmonary tuberculosis figures increased this year. In the Southern Area pulmonary cases seen increased from 70 in 1946 to 111 in 1947 while non-pulmonary increased from 46 to 53.

In the Northern Area pulmonary cases increased from 141 in 1946 to 195 in 1947 while non-pulmonary cases increased from 121 to 170, most of these came from Port Sudan and the Tokar Delta.

Two cases of Anthrax were successfully treated in the Southern Area.

In the Northern Area Port Sudan Hospital and the dispensaries had a busy year with increased admissions and outpatient attendances. Activity in the port increased by some 40 per cent over the previous year. There were no cases of quarantine diseases.

The pilgrimage was the largest on record, over 12,000 pilgrims leaving for Jeddah. Additional quarantine restrictions owing to the presence of cholera in Egypt caused great congestion at Suakin. This was aggravated by the fact that as usual a great many of the pilgrims arrived late and so increased the shipping difficulties.

Ante natal clinics are doing good work. Four are working in Port Sudan and one Kassala. They are popular and well attended.

(e) KHARTOUM PROVINCE.

Area	5,700 sq.m.	Population ..	371,059
Beds	890	Per 10,000 population ..	24
Inpatient admissions ..	15,273	,, ,, ,, ..	412
Outpatient attendances ..	1,339,943	,, ,, ,, ..	36,111
Vaccinations	38,204	,, ,, ,, ..	1,029

TABLE 39.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	9	18	27
Nursing Sister	16	—	16
Medical Assistant	—	22	22
Hospital Attendant	—	216	216
Public Health Inspector	1	2	3
Public Health Officer	—	2	2
Sanitary Overseer	—	11	11
Mosquito man	—	101	101

TABLE 40.

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions as Patients	Operations	Total Outpatient Attendances
Khartoum Civil Hospital	323	4,538	621	147,988
Omdurman Civil Hospital	235	4,305	1,243	213,749
Khartoum Eye Hospital	110	1,372	2,421	97,352
Khartoum North Hospital (including Central Prison)	70	852	65	77,182
Church Missionary Society Hospital Omdurman	70	1,532	177	46,315
Omdurman Isolation Hospital	70	248	—	—
Province Dispensaries	12	231	—	757,357
TOTALS	890	13,078	4,527	1,339,943

The year was hotter and drier than normal and for much of the year Khartoum was very uncomfortable. The scanty rainfall of 2.68 inches fell in a few heavy storms and grazing was very poor.

The population increased by 42,046 largely due to immigration, for the increase in adults was much greater than in children.

Births rates for Khartoum and Omdurman were 24.5 and 23.6 per 1000 population. Deaths were 14.6 and 11.4 per 1000.

Infant mortality rates for Khartoum and Omdurman were 73 and 46 per 1000 live births as compared with 61 and 57 in 1946. There has been a steady fall in the infant mortality rate and it is hoped that it can be maintained.

Maternal mortality for Khartoum and Omdurman were 9.8 and 1.9 per 1000 live births. This compares with 10.1 and 3.2 in 1946. The figures for Omdurman are remarkably low but can be considered reasonably accurate for out of 2911 births registered 2849 were attended by qualified midwives under the aegis of the midwives training school.

Epidemic diseases.

Diphtheria has persisted in the Three Towns and 148 cases were admitted to hospital. In general the disease was mild in character though there were 9 deaths. An unusual feature was its occurrence in a large number of small children under two years of age—in some cases only a few months old.

There was an outbreak of food poisoning in September which affected many resident members of the Sudan Club and some families who obtained their milk from the same source. The poisoning was of the toxic type and was traced to an infected goat.

One death from food poisoning occurred in a cheese seller who ate some of his own cheese after complaints had been made about its quality.

Special quarantine measures were imposed on travellers from Egypt during the latter part of the year owing to the epidemic of cholera there.

Endemic diseases.

Fly-borne diseases are still too common. There were 299 admissions for amoebic dysentery in the Three Towns, 127 for bacillary dysentery and 25 for enteric fever.

In spite of wide spread malaria control measures there is still a considerable amount of Malaria in the Rural District. Primary cases in the towns are comparatively uncommon but there were 1173 admissions to hospitals for malaria during the year. By far the greatest incidence is during the first six months of the year when the Nile is low.

Animal rabies occurred in all parts of the province and 14 positive cases were notified. There was one case of human rabies.

Pulmonary Tuberculosis showed a local decrease but a number of cases came from other parts of the Sudan for treatment. In most cases they do not report until the disease is too far advanced for treatment to be of any use. A total of 182 cases were admitted to hospital but many had to be discharged shortly afterwards when found to be incurable.

148 cases of non-pulmonary tuberculosis were admitted.

A follow-up scheme is working by which discharged cases of Pulmonary Tuberculosis and their contacts are examined periodically.

Welfare Work.

12 ante-natal clinics in the province saw 6217 new cases as compared with 3234 in 1946 and total attendances rose from 8733 in 1946 to 16,870 in 1947.

There are 10 child welfare centres run by the Sudan Medical Service. At these 1895 new children attended and 4190 old cases were seen. In addition 6012 house visits were made. Child Welfare Centres run by the Church Missionary Society reported 5753 visits to the Centres and 4735 home visits. This welfare work is becoming increasingly popular with the people.

(f) KORDOFAN PROVINCE.

Area	146,930 sq.m.	Population ..	1,563,176
Beds	1,043	Per 10,000 population ..	7
Inpatient admissions ..	19,044	,, ,, ,, ..	122
Outpatient attendances ..	1,540,328	,, ,, ,, ..	9,820
Vaccinations	171,958	,, ,, ,, ..	1,100

TABLE 41.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	2	8	10
Nursing Sister	2	—	2
Medical Assistant	—	41	41
Hospital Attendant	—	260	260
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	9	9
Mosquito man	—	69	69

TABLE 42.

Work in Hospitals and Dispensaries

UNIT.	Beds	Inpatient Admissions as Patients	Operations	Outpatient Attendances
El Obeid Hospital	263	4,101	552	368,903
Dispensary (incl. Qur. and Prison)	144	2,998	—	402,440
Nahud Hospital	96	1,902	200	168,204
Dispensary	116	1,499	—	192,364
Kadugli Hospital	100	1,460	406	44,317
Dispensary	176	2,832	—	232,113
Dilling Hospital	88	1,622	333	63,223
Talodi Hospital	60	986	87	32,920
MISSIONS.				
C.M.S. Dispensary	—	506	—	21,821
S.U.M. Dispensary	—	238	—	14,023
TOTALS ..	1,043	18,144	1,578	1,540,328

The rains were well spread and the incidence of malaria decreased considerably being slightly more than half the incidence of 1946. This made experiments with Paludrine prophylaxis rather abortive though it was effective when applied to Government servants. Food crops in general were rather less than in the previous year while in Western Kordofan loss of cattle due to disease may affect the well-being of the Messeria tribe.

There was a reduction of some 2,000 in admissions which may be attributed in part to the decrease of malaria. Outpatient attendances were only slightly reduced.

The only epidemic of importance was one of smallpox which broke out in El Obeid in April and spread to Rahad in particular among the Fellata there. A total of 90 cases occurred with 19 deaths.

Relapsing fever was again much less only 38 cases being recorded.

Of the endemic diseases there is little to note though a survey of the province for leprosy produced 1205 cases from the Nuba Area of these only 90 are at present in Government settlements.

Venereal diseases are wide spread especially Syphilis. In Dilling Area a number of cases of Gonorrhoea were reported as being resistant to treatment with Sulfa Drugs. It is thought that this strain may have been introduced by troops who had been inadequately treated with these drugs. That risk is however always present when Sulfa Drugs can be obtained on the black market and be used in inadequate doses by inexperienced people.

Two British Nursing Sisters were appointed.

A Child Welfare Centre was opened in El Obeid which is operated by the Sudanese Health Visitor who also holds a clinic once a month at Um Ruaba.

(g) NORTHERN PROVINCE.

Area	236,200 sq.m.	Population ..	666,863
Beds	637	Per 10,000 population ..	9
Inpatient Admissions ..	10,360	„ „ „ ..	155
Outpatient Attendances ..	1,252,260	„ „ „ ..	18,778
Vaccinations	18,755	„ „ „ ..	281

TABLE 43

Medical and Health Staff

CATEGORY	British	Sudanese	Total
Doctor	2	8	10
Nursing Sister	2	—	2
Medical Assistant	—	49	49
Hospital Attendant	—	154	154
Public Health Inspector	—	1	1
Public Health Officer	—	2	2
Sanitary Overseer	—	17	17
Mosquitoman	—	140	140

TABLE 44.

Work in Hospitals and Dispensaries

UNIT	Beds	Impatient Admissions as Patients	Operations	Outpatient Attendances
Atbara Hospital	232	3,866	676	164,596
Dispensary	—	—	—	313,692
Halfa Hospital	194	3,149	440	121,241
Dispensary	—	—	—	192,934
Merowe Hospital	71	1,478	225	35,724
Dispensary	—	—	—	129,333
Dongola Hospital	62	831	191	56,786
Dispensary	7	–	—	163,528
Shendi Hospital	71	928	132	74,426
TOTALS	637	10,252	1,664	1,252,260

There is not much change to report in the Northern Province although certain of the endemic diseases appear to be on the increase.

There were no outbreaks of epidemic diseases of any importance. The quarantine at Wadi Halfa was kept very busy in the latter part of the year on account of the quarantine restrictions imposed on travellers from Egypt *during* the cholera epidemic in that country. 5442 passengers passed through the Quarantine during the year. No cases of Cholera occurred.

Of the endemic diseases Bilharziasis continues to cause concern. 3464 cases were reported in 1947 as compared with 2213 in 1946.

There is considerable difficulty in providing treatment for these cases which are spread over a very wide area. The patients find it difficult to leave their homes for sufficient time to take a full course of treatment while visiting staff cannot profitably spend sufficient time in an area with a scattered population to provide treatment for those needing it. Efforts will have to be intensified on the preventive side.

There was an outbreak of Phlebotomus fever, mainly in the Wadi Halfa area but with some cases as well in Dongola area, over 1400 cases were recorded.

There were a number of outbreaks of malaria along the river. 1404 cases were admitted to hospitals but a total of 21,172 cases were reported from all sources. The control of anopholine mosquitoes in Wadi Halfa area remained excellent. Only 9 anopheline infections were found during the year. No Anopheles gambiae were found. At Faras the infections were A. multicolor and at Gimai A. pharoensis. There were no Aedes infections.

In 1945 the first case of cutaneous leishmaniasis was diagnosed in Atbara. In 1947 no less than 30 cases were discovered among British residents.

The cases recorded of Pulmonary and non-Pulmonary Tuberculosis remain much the same. Cases are reported in servants returning to their homes after working in Egypt.

An outbreak of cattle plague in Dongola area which killed off a large number of cattle was a sad blow to the nutrition of the people there.

Welfare. Ante-natal clinics in various parts of the province are increasing in popularity while the annual Baby Show at Wadi Halfa continues to be a great success.

(h) UPPER NILE PROVINCE

Area	92,270 sq m.	Population	728,864
Beds	403	Per 10,000 population	6
Inpatient Admissions	7,183	,, ,, ,,	96
Outpatient Attendances	422,331	,, ,, ,,	5,794
Vaccinations ..	43,328	,, ,, ,,	594

TABLE 45.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	2	2	4
Nursing Sister	2	—	2
Medical Assistant	—	20	20
Hospital Attendant	—	76	76
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	2	2
Mosquito man	—	35	35

TABLE 46

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions as Patients	Operations	Outpatient Attendances
Malakal Hospital	244	3,471	700	84,034
Dispensaries	159	3,712	—	264,862
MISSIONS:				
C.M.S.	—	—	—	11,184
American Mission	—	—	—	62,251
TOTALS	403	7,183	700	422,331

The rains were good and excellent crops were obtained all over the Province with the exception of the Central Nuer Area around Waat.

The epidemic of cattle trypanosomiasis died down to some extent.

An outbreak of Variola Minor occurred in Bor District figures of cases and deaths were unreliable but twenty cases definitely occurred, the figures for deaths due to the disease are quite unreliable as deaths from any and every disease in the locality were reported as being to the variola minor. 43,328 vaccinations were done throughout the Province.

Only 228 cases of relapsing fever were diagnosed, compared with 840 in 1946 and 7747 in 1945.

Delousing with D.D.T. powder continued. As regards endemic disease, Paludrine demonstrated its value as a prophylactic against Malaria, although in the active treatment it does not appear to possess any advantages over Mepacrine.

There is little to report concerning other endemic diseases. Some cases of yaws were treated with Penicillin and lesions appeared to heal more quickly than if treated with Bisoxyl or one of the arsenical preparations.

Aedes prevention work during the year covered 60198 houses, 6073 public buildings, 10719 shops and stores, 17702 tree holes, 39225 drums and tins, 311 steamers, 323 native boats. 1078 aircraft passing through Malakal were also inspected.

Two British Nursing Sisters were posted permanently to Malakal Hospital in October.

Two new dispensaries were opened one at Wankai on the Bahr El Ghazal and one in the Malakia of Malakal.

CHAPTER VI.

THE PILGRIMAGE FROM THE SUDAN.

Introduction

The pilgrimage, from Suakin and to a lesser extent from Port Sudan, was a large one, being the largest on record.

The proportion of Sudanese was small (see Table 47). The majority of pilgrims were as usual West Africans. Their main route is via Chad, Fort Lamy, Abesher and Adri to Geneina in Dar Masalit and thence via Fasher to railhead at El Obeid. Such transit pilgrims are mainly of the races, Bornu, Hausa and Fulani coming from Nigeria and Borgu coming from French Equatorial Africa.

The pilgrimage was clean, there being no quarantine diseases reported. The use of D.D.T. blower applicators as a means of delousing was employed with success. The usual S.M.S. Medical Mission accompanied the pilgrimage and though primarily intended for those from the Sudan, gave treatment to all seeking it.

Composition of the Pilgrimage

Table 47 shows the composition of the outgoing Pilgrimage over the last five years and Table 48 similarly that of the returning Pilgrimage.

TABLE 47.

Outgoing Pilgrimage from the Sudan : 1947/48

NATIONALITY	1943/44	1944/45	1945/46	1946/47	1947/48
Sudanese	1,312	1,434	610	1,409	2,210
West Africans and others	6,505	5,565	5,604	6,995	8,810
TOTALS..	7,818	6,999	6,214	8,404	12,020

TABLE 48.

Returning Pilgrimage to the Sudan 1946/47.

NATIONALITY	1943/44	1944/45	1945/46	1946/47	1947/48
Sudanese	1,289	1,441	624	1,409	2,555
West Africans and others	5,241	5,295	5,730	6,662	8,185
TOTALS	6,530	6,736	6,354	8,071	10,740

The first of seventeen outward sailings was on 27.9.47 and the last on 19.10.47 and the first of the fifteen return sailings was on 3.11.47 the last being on 11.1.1948.

Preventive Medicine

The 1947-48 Pilgrimage was clear of the five quarantine diseases. All outgoing pilgrims were vaccinated against smallpox, inoculated against cholera and deloused with D.D.T. No pilgrim was allowed to embark unless in possession of a valid yellow fever inoculation certificate or a location certificate certifying that he had not been in the yellow fever endemic area within the last six days. On return they were deloused again and spent a minimum of five days in quarantine. Those not showing signs of recent successful vaccination were again vaccinated.

At Suakin there were 68 admissions to hospital with 7 deaths. Table 49 shows the nature of the infections.

TABLE 49.

Admissions and Deaths in Suakin Quarantine 1947-48 Pilgrimage

DISEASES	ADMISSIONS			Total	Deaths
	Men	Women	Children		
Influenza	1	1	—	2	—
Chicken Pox	16	2	—	18	—
Mumps	1	—	—	1	—
Rheumatism	1	—	—	1	—
Wounds and Injuries	6	—	1	7	—
A. Dysentery	1	—	—	1	—
B. Dysentery	2	3	—	5	1
Malaria	1	2	—	3	—
Tropical Ulcer	1	—	—	1	—
Pneumonia	3	—	—	3	—
Circulatory System	2	1	—	3	1
Alimentary System	8	3	1	12	4
Respiratory System	2	—	—	2	—
Genito-Urinary System	2	1	—	3	1
Nervous System	1	1	—	2	—
Diabetes	1	—	—	1	—
P.U.O.	—	2	—	2	—
Confinements	—	1	—	1	—
TOTALS	49	17	2	68	7

THE S.M.S. MEDICAL MISSION.

As in the past four years, a medical mission was sent by the Sudan Medical Service to accompany the pilgrimage. It was staffed by a Sudanese Medical Inspector, a Sudanese Medical Officer and 14 other S.M.S. Staff. It arrived at Jedda on 27.9.47 and its last representative left there on 11.1.1948.

It functioned as a field hospital in Jeddah and as two dispensaries one in Mecca and the other in Medina, the first travelling with the pilgrimage from Mecca via Muna to Arafat and back to Mecca. Table 50 shows the work done.

TABLE 50

1947-48 *Sudan Pilgrimage: Work of S.M.S. Medical Mission*

(Analysis by Units)

UNIT.	Admissions	Out-Patients
Jeddah Field Hospital	54	2,816
Mecca-Muna/Arafat Dispensary	5	3,345
Medina Dispensary	4	1,461
TOTAL	63	7,622

TABLE 51.

1947-48 *Sudan Pilgrimage. Work of S.M.S. Medical Mission: Diseases*

DISEASES	Admissions	Out-patients.
Tuberculosis Pulmonary	—	16
Tuberculosis non-pulmonary	—	3
Syphilis	—	38
Gonorrhoea	—	22
Trachoma	—	123
All Eye Other diseases	1	585
Ear diseases	—	129
Skin diseases	—	140
Injuries	1	576
Women	—	46
A. Dysentery	5	137
B. Dysentery	5	9

TABLE 51 (CONTD)

DISEASES	Admissions	Out-patients.
Malaria	7	611
Tropical Ulcer	1	20
Chicken Pox	18	19
Gastro enteritis : Children	—	14
Influenza	1	312
Measles	3	4
Pneumonia	14	45
Circulatory System	1	23
Respiratory ,, ...	1	1,122
Almentary ,, ...	2	747
Nervous ,, ...	—	9
Genito-Urinary ,, ...	1	95
Diabetes	—	11
All other diseases	2	2,766
TOTALS	63	7,622

CHAPTER VII.

THE MEDICAL WORK OF MISSIONS

Four missions carry out Medical work. The Church Missionary Society; the Sudan United Mission; the Sudan Interior Mission and the American Mission.

TABLE 52.

Church Missionary Society : Medical Work 1947.

PLACE	UNIT.	Outpat. Attends	Inpat. Adms	Major Oper.	REMARKS.
Omdurman ..	Hospital and Infant welfare centre ..	30,583	1,925	97	Infant welfare consultations 1,732
Abu Rof ..	Dispensary and infant welfare centre	17,872	—	—	Infant welfare consultations 1,581.
Abu Kadog ..	Dispensary and infant welfare centre	6,852	—	—	Infant welfare consultations 4,457.
Wad Nubawi	Infant welfare centre	—	—	—	Infant welfare consultations 1,347.
Bet el Mal ..	Infant welfare centre	—	—	—	Infant welfare consultations 1,376.
Sallara ..	Dispensary ..	12,807	73	—	
Katcha ..	Dispensary ..	9,014	433	—	
Kauda ..	Dispensary ..	—	—	—	
Lui	Hospital	150,787	1,473	226	C. M. S. Gordon Memorial Mission
Zeraf ..	Hospital	10,062	—	—	
Malek ..	Dispensary ..	—	—	—	
Ler	Dispensary ..	1,122	—	—	

TABLE 53.

Sudan United Mission : Medical Work : 1947.

PLACE	UNIT.	Outpat. Attends	Inpat. Adms	Major Opers.	REMARKS
Heiban ..	Dispensary ..	8,606	159	—	
Abri	Dispensary ..	5,417	79	—	
TOTALS ..		14,023	238	—	

TABLE 54

American Mission

PLACE	UNIT.	Outpat. Attends	Inpat Adms	Major Opers.	REMARKS
Doleib Hill ..	Dispensary ..	19,371	—	—	
Nasir ..	Dispensary ..	42,880	—	—	
TOTALS ..		62,251	—	—	

The Sudan Interior Mission have a dispensary at Chali and nuns of the Verona Fathers Mission work in Juba and Wau Hospitals.

CHAPTER VIII.

THE STACK MEDICAL RESEARCH LABORATORIES

DR. E. S. HORGAN

RESEARCH

The principal researches undertaken during the year will be found under the relevant headings. Attention may however be drawn to the following items of some interest; the isolation of a hitherto unsuspected poison from roots and leaves of a widely distributed plant in the Southern Sudan *Courbonia virgata*, the occurrence of an outbreak of staphylococcal food poisoning in Khartoum, the retention of stilbamidine for several years in patients who had received this treatment for kala-azar, cross immunity tests between strains of Sudan and American alastrim virus.

ROUTINE

The total number of examinations 32,610 has remained practically constant for the past three years the figures for 1945 and 1946 being 32,130 and 32,096 respectively.

This desirable result is largely due to the greater number and varieties of examinations now carried out in the various hospital laboratories. For instance the following laboratories now carry out routine Kahn tests; Medani, El Obeid, Port Sudan, Atbara and Fasher.

Staff Charges.

For the first six months of 1947, Dr. Mansour Ali Haseeb was absent on a course of post graduate study in the London School of Tropical Medicine where he was successful in obtaining the Diploma of Bacteriology, London University. During his absence, his place was filled by Dr. Mohd. Hamad Satti and after his return the latter has remained attached to the Stack Laboratories for carrying out field work in the experimental chemotherapy of filariasis.

1 Sudanese laboratory assistant was trained and 1 was invalided leaving the total at 41.

The number of hospital laboratories is 25 as compared to the previous figure of 26. The reduction is due to the closing down of the laboratory in Shendi hospital where the amount of work was insufficient to justify a whole time laboratory assistant and the transfer of the latter to Atbara hospital as a second assistant.

Histology.

The total number of specimens examined was 539 excluding 211 brains for rabies.

Malignant neoplasms—150 were received.

Site.	Carcinoma	Sarcoma	Endothelioma	Melanoma	Mixed Tumours	Total
Scalp	1	—	—	—	—	1
Face	6	—	—	—	—	6
Lip	2	—	—	—	—	2
Mouth	2	1	1	—	—	4
Maxilla	3	1	—	—	—	4
Nose	3	2	—	—	—	5
Eye	6	5	—	—	—	11
Neck	5	3	—	—	—	8
Thyroid	1	—	—	—	—	1
Salivary Glands ..	3	—	—	—	—	3
Parotid..	—	—	—	—	2	2
Spine	1	1	—	—	—	2
Shoulder	—	3	—	—	—	3
Chest	1	2	—	—	—	3
Axilla	2	—	—	—	—	2
Hand	3	—	3	—	—	6
Arm	—	1	—	—	—	1
Leg	3	6	—	—	—	9
Foot	—	—	—	4	—	4
Stomach	—	1	—	—	—	1
Intestine	3	—	—	—	—	3
Rectum and Anal Canal	8	—	—	—	—	8
Abdomen	1	—	1	—	—	2
Liver	2	1	—	—	—	3
Bladder	6	—	—	—	—	6
Groin	1	1	—	—	—	2
Penis	1	—	—	—	—	1
Testis	1	—	—	—	—	1
Ovary	2	—	—	—	—	2
Uterus	9	—	1	—	—	10
Vagina	2	—	—	—	—	2
Breast	25	—	—	—	—	25
Lymphatic Glands	4	2	—	—	—	6
(Skin unspecified) ..	1	—	—	—	—	1
Total	108	30	6	4	2	150

Animal Poxes.

i. Strawberry Foot Rot—A specimen of infective material from a recently discovered sheep virus infection was received from Dr. Selbie, Lecturer in Bacteriology, Middlesex Hospital, London. As far as is known only one naturally infected sheep has yet been found—in the south of England—and from the somewhat florid appearance of the lesions the name Strawberry Foot Rot has been provisionally given to the virus. It undoubtedly belongs to the group of animal pox viruses and the appearance and development of the lesions on sheeps and goats closely resemble those of vaccinia or contagious pustular dermatitis. The take on rabbits is characteristic and consists of honey coloured, heaped up crusts with cracks which reveal numerous minute bleeding points underneath. There is a remarkable tendency for the lesions to spread beyond the area of inoculated (scarified) surface and their evolution in quicker than that of vaccinia of contagious pustular dermatitis, the dried up crusts or scabs falling off in about seven days.

Cross immunity tests on rabbits, sheep and goats have failed to show any immunological relationships with the viruses of vaccinia and contagious pustular dermatitis.

ii. **Variola and Alastrim.**—Previous attempts to infect monkeys with material from cases of alastrim in the Sudan have always failed (Horgan E.S. and Haseeb M.A. J. of Hyg. 1939 Vol. 39 p. 615) but during the year the occurrence of outbreaks in Bor and Juba afforded a fresh opportunity. Pus and scabs sent by Dr. R.B. Usher Somers, Juba, were inoculated on to the scarified skin of monkeys and two strains of the virus were established after several unsuccessful attempts. Cross immunity tests were carried out (on monkeys) with these strains as well as an American strain (St. Louis) used in the 1939 experiments and preserved in a dessicated state *in vacuo*. The two Sudan strains gave complete cross protection against each other and strong against the St. Louis strain. On the contrary, this latter strain gave complete protection against itself and both Sudan strains.

It is reasonable to conclude that while the three strains are immunologically closely related the American strain probably possesses extra antigens and in this sense could be regarded as " master strain ".

Inoculation of the three strains on to the scarified skin of rabbits and white mice (Swiss strain) gave no apparent take and subsequent tests with vaccinia virus showed that all animals were fully susceptible. This result is an interesting contrast to the positive result obtained by Van Breuseghem on rabbits and white mice with a strain of alastrim isolated in Stanleyville (*Ann. Soc. Belge de Med. Trop.*) 1940 Vol 20 p. 383).

iii. **Van Rooyen's Test**—Studies were made during the summer of the diagnostic value of Van Rooyen's test (Brit. M.J. 1944 II. 526) which has been advocated in recent years as a valuable diagnostic adjunct in smallpox. In this test, films are made from skin scrapings taken from the bases of papules or pustules, and after treatment with Loeffler's flagellar mordant, stained by Paschen's method. The elementary bodies of the viruses of variola-vaccinia are larger and present in much greater numbers than those of varicella.

A large number of films was made from 30 cases of varicella, several monkeys with experimental alastrim and a number of sheep and rabbits infected with vaccinia. The results in general bore out Van Rooyen's conclusions but after careful considerations this technique was considered not to fulfil the criteria of a practical diagnostic test for smallpox in the Sudan. The reasons are (1) The slides must be of scrupulous cleanliness as emphasized by Van Rooyen. (2) Considerable experience is needed to judge the correct amount of material to be scraped from the papule or pustule and the subsequent spreading of the slide. (3) Great care is needed in the making of the films and in their subsequent washing with ether and alcohol. If this process is not carefully carried out a finely granular deposit will be precipitated by the tannic acid solution (Loeffler's mordant). (4) This mordant is unstable at the high room temperatures of the northern Sudan and unless kept in a refrigerator will rapidly form a precipitate. (5) The differentiation between the elementary bodies of variola-alastrim and those of varicella demands considerable experience and even in experienced hands mistakes may occur. In the Sudan the technique could only be carried out in the Stack Laboratories. It would be grossly fallacious if carried out by a laboratory assistant in a province hospital laboratory.

Vaccine Lymph. — 40 sheep were used with a total yield of 1932 grms. of pulp the average being 48.3 grms per sheep.

These figures compare with a total of 90 sheep with an average per animal of 49.4 grms. in 1946. A considerable amount of the vaccine lymph prepared in 1946 was available which accounts for the smaller production in 1947.

Issues—887,460 doses were issued.

RABIES.

211 brains were received of which 63 were positive for Negri bodies. The latter included 50 dogs, 8 donkeys, 1 cat, 1 horse, 2 cows and 1 sheep.

Rabies Vaccine — 118,500 ccms. were issued, which constitutes a record. There is reason to believe that a certain amount of the vaccine is wasted and steps have been taken to ensure a stricter control in its issue.

KALA AZAR.

(i) **Neuropathies following treatment with stilbamidine**— a follow up of the records of patients treated in 1940-41 shows that a high proportion developed the neuropathy first described by Napier and Sen Gupta (1942) in India. In some of these cases the neuropathy affects a wider area than the distribution of the trigeminal nerve extending as low as the 3rd and 4th cervical. Examination of the urine from some of these cases has shown the continued excretion of small quantities of the drug five years after the completion of treatment.

This work is still in progress and no conclusion is yet possible as to the relationship between the occurrence of the neuropathy and the retention of the drug.

(ii) **Experiments on transmission by sandflies**—Attempts were made this year to resume experiments on the transmission of Sudan kala azar by feeding specific sandflies on (1) infected hamsters and (2) cases of post kala azar dermal leishmaniasis. The species studied so far have been *P. orientalis*, *P. papatasii*, and *P. clydei*. Infection rates of approximately 7 per cent were found in P. *orientalis* and *P. papatasii* under conditions which were not identical. It was estimated that in the conditions in which *P. orientalis* was used the chances of infection were only about one twentieth of those in the experiments with *P. papatasii*. Moreover, in *P. orientalis* development has been observed to proceed forwards to the head, whereas in *P. papatasii* it has been confined to the stomach or mid-gut in the instances so far observed. The infection rate in *P. clydei* was much lower (1.8. per cent) but one instance of anterior development has been noted in this species. Further and more extensive experiments are necessary to elucidate the role (if any) of *P. clydei* in the transmission of kala azar.

PLANT POISONING.

In connection with a medico-legal case in Yirrol where two girls were said to have died after the administration of an abortifacient prepared from a local plant called " Kordale ", a specimen of fresh root of the suspected plant was received from the District Commissioner, Yirrol. This was a large fibrous tuber or rhizome and pieces of it were extraced in water and administered orally to two rabbits and mice. The rabbits and mice died within 2 minutes with convulsive spasms.

About half the root—approximately 2 lbs. in weight—was sent to the Government Analyst who has carried out a long series of investigations. In response to his request, further specimens were received from Yirrol and as none of the agricultural experts in the Sudan could identify the plant it was sent to Kew.

The report was, that Kordale is *Courbonia virgata* and further enquiries have shown that it is widespread in the Nuba Mountains as well as in Equatoria. According to the Kew authorities the family *Capparidaceae* to which it belongs is distributed over North Eastern Kenya, Northern Uganda, French Equatorial Africa, and Nigeria. No references to its toxic properties were previously known by Kew.

In further investigations, Dr.Henry has been able to extract a poisonous principle, which has been identified by Dr. H. King of the National Inst. for Med. Research, Hampstead as tetramethyl—ammonium hydroxide ("teramine"). Fuller details will be found in the Government Analysts Report, but a few points of great interest may be mentioned here—(1) It is the first occasion that this compound, although well known to chemists for many years, has been isolated from the vegetable kingdom and only once previously from the animal kingdom (2) Although its family is widely distributed in Africa nothing appears to have been recorded of its toxic action (3) the seeds of " Kordale " are commonly used as a food-stuff in the Nuba Mountains and probably other areas of the Sudan. They also contain the poisonous base but during cooking it would appear that most of it is extracted as the local inhabitants do not seem to suffer ill effects. (4) "tetramine" and similar compounds have a powerful curari-like effect in mamals and frogs; convulsions occur in mamals but not in frogs being prevented in the latter by the more powerful curari paralysis.

The respiration is first stimulated later paralyzed, the latter due either to a curari effect on the phorenic nerves or a central action on the respiratory centre in the medulla. (5) There is good reason to believe that " Kordale " is used in certain parts of the Sudan for criminal poisoning.

Dr. Ibrahim Anis—Medical Inspector, Kadugli has given most valuable assistance in providing several growing plants of *C. virgata* as well as much information on its use as a food-stuff in the Nuba Mountains.

CHOLERA.

The outbreak of the epidemic in Egypt (September 1947) necessitated the preparation of reserves of vaccine in case of emergency. 80,000 ccms. were prepared of which 19,800 ccms. were issued for the inoculation of medical, customs, railway, aerodrome and other personnel, in Halfa, Khartoum and a few other places, who might be exposed to risk of infection.

Stools from a few suspects in Halfa quarantine were examined but in no case was *V.Cholerae* isolated and to the end of the year no case has occurred in the country.

BACTERIAL FOOD POISONING.

Three important outbreaks occurred during the year. In Medani 27 persons were taken ill after having eaten the meat of an apparently healthy cow. The meat was eaten on the evening of 8.5.47 and the following day all those partaking of it (27) were taken ill with symptoms of severe acute gastro-enteritis and one died the same day. Specimens of the faeces from five cases and a portion of the cooked meat were sent to the Stack Laboratories and the same salmonella organism was isolated from the meat and from two faeces. As some of the necessary typing sera were not available, the strains were sent to Dr. Joan Taylor, Central Public Health Laboratory, Colindale London. She reported that all were typical *S. dublin*. It is of interest that this is the first time that *S. dublin* has been proved to be a cause of food poisoning in the Sudan and also the first time that it has been isolated from Sudan cattle.

The second outbreak in which 17 persons were involved occurred at Gordon's Tree Dockyard (17.5.47). Symptoms of vomiting and diarrhoea were reported to have occurred a very short time, about one hour, after eating some local cheese.

There was one death within 24 hours. A few grammes of the cheese emulsified in water were administered by mouth to a rabbit, which died in less than two minutes. Several samples of the cheese were cultured on different media and an almost pure growth of *Proteus* was obtained from each. No *Salmonella* nor *Staphylococci* were isolated. Subcultures of the *Proteus* were inoculated into milk and after ten days incubation the culture was filtered through a Seitz membrane and 0.5 ccs. of the filtrate inoculated subcutaneously, was lethal to mice. An emulsion of the cheese in distilled water was passed through filter paper and a Seitz filter and 0.25 ccs. of the filtrate administered by mouth to two mice. Both mice died in about 48 hours.

Outbreaks of food poisoning due to *Proteus* have been occasionally reported in the literature but usually on somewhat slender epidemicological evidence. In the present instance the evidence while not conclusive is strongly suggestive that toxic substances were produced by *Proteus* in the cheese, probably during the manufacture. Whether the bacteria were also capable of multiplying in the intestinal tract (and producing toxins) there is no evidence, as no faeces or vomits of the patients were sent for examination.

The third outbreak—of staphylococcal origin—was the most wide spread yet reported in the Sudan. Goats milk was the vehicle of infection and cases were reported in various parts of Khartoum on the 19th September especially in the Sudan Club where 34 members who partook of breakfast were affected. The total number of cases was 75. The usual symptoms of vomiting and diarrhoea varied considerably in severity but an unusually large proportion of the patients had to be admitted to hospital, some in a state of profound collapse. There were no deaths. From the distribution of the cases milk was suspected and boiled and unboiled samples were sent by the Public Health Authorities to the Laboratories. A portion of the boiled milk was fed to a monkey and produced vomiting and diarrhoea within one hour. The Government Analyst reported that both samples were free from poisonous metals.

Inspection of the herd of goats supplying the milk showed that one animal was suffering from mastitis and samples taken from this animal as well as the original unboiled sample gave growths of *Staph. aureus*. Several colonies were picked off and examined and all were coagulase positive. Filtrates from two were prepared and inoculated intraperitoneally into young kittens but no enterotoxin could be demonstrated. It is however well known that such a negative result is of little significance.

Two strains—one from the unboiled milk and the other from the goat with mastitis—were sent to the Central Public Health Laboratory, Colindale, for typing and Dr. V.D. Allison reported as follows "Both were the same phage type 6/47. Strains of *Staph. pyogenes* giving this phage reaction have been frequently isolated from victims, food poisoning in this country". (Great Britain). There can therefore, be no reasonable doubt that this organism was responsible for the Khartoum outbreak.

Previous outbreaks of staphylococcal food poisoning studied in the Sudan have been associated with cream filled cakes and similar food-stuffs but this is the first occasion on which fresh milk was proved to be the vehicle of infection.

Summary of Routine Examinations

Khan Tests	16,064
Widal Reactions	1,199
Weil-Felix Reactions	5
Heterophile Agglutinations (Paul-Bunnell)	4
Blood Cultures	671
Blood Films	4,607
Blood Counts (Total)	106
Cerebrospinal Fluids	70
Medico-Legal Tests (Blood seminal stains)	40
Biochemical Tests	396
Autogenous Vaccines	4
Pathological Histology (Including brains for rabies)	750
Faeces	2,145
Urines	1,211
Throat and Nasal Swabs: *C. diphtheriae* Positive	255
" " " " " Negative	4,037
Virulence Tests (*C. diphtheriae*)	1
Sputa *Myco. Tuberculosis* Positive	25
" " " Negative	180
Spleen Smears (Kala Azar positive)	4
General Bacteriological Examinations	687
Water Examinations	69
Food Examinations	80
Total Examinations	32,610

Summary of Faeces Examinations.

Bact. dysenteriae Flexner V.Z. series	120
Bact. dysenteriae Sonne	2
Bact. shigae	24
Bact. ambiguum (Schmitz)	8
Bact. typhosum	27
Bact. paratyphosum A.	1
Bact. paratyphosum B.	11
Salmonella "dublin"	3
Entamoeba histolytica	26
Ova present	31
Negative	1,892

Summary of Urine Examinations.

Bact. typhosum	10
Bact. paratyphosum A.	1
Ova present	8
Negative	1,192

Summary of Blood Films.

Malaria:—	
" Benign Tertian	47
" Subtertian	931
Quartan	1
Negative	3,628

Summary of Widal Reactions.

Bact. typhosum	144
Bact. paratyphosum A.	4
Br. melitensis	87
Negative	964

Summary of Blood Cultures.

Bact. typhosum isolated	37
Bact. paratyphosum A isolated	5
Bact. paratyphosum B isolated	1
Br. melitensis isolated	1
Strep. pyogenes isolated	29
Other organisms isolated	18
Negative	580

Summary of Weil-Felix Reactions.

Negative	5

Summary of Hetrophile Agglutination Tests.

Negative	4

Vaccines Issued During 1947.

T.A.B.	8,350 cc.
Anti-rabic	118,500 cc.
Staphylococcal	475 cc.
Cholera	19,800 cc.
Vaccine Lymph	887,460 doses

CHAPTER IX

MEDICAL ENTOMOLOGY

MR. D. J. LEWIS.

The Medical Entomologist made a tour of the Merowe-Wadi Halfa area in February and also visited the Jebel Auliya Reservoir, Kassala and Sennar. Many enquiries about insect control were received, and many specimens arrived for identification.

MOSQUITOES

Close touch was maintained with the Mosquito Control Officer. This official was formerly the Public Health Officer in charge of the Headquarters Aedes Control Unit. Now his duties are the inspection of routine control measures of all mosquitoes. Under the direction of the Chief Public Health Inspector, he tours the provinces and reports to the Province Medical Inspectors.

Returns of Aedes Control were summarised as usual.

The Gezira.

The Section cooperated with the Public Health Department in the DDT larvicide work mentioned in the last report. The results of the work were promising but further improvement will depend on the availability of motor transport.

The Jebel Auliya Reservoir.

Gambusia were liberated in areas protected from predatory fish at Dueim and Kosti and the results encouraged an extension of the method.

Wadi Halfa.

The Medical Entomologist examined the extermination area and continued to advise on methods. At the end of the year 30 months had elapsed since the last individual of *A. gambiae* was found, and the species is now not known to exist north of Ferka, some 120 kms along the Nile from the Egyptian border. Constant vigilance is necessary to prevent any re-infestation. *A. pharoensis* was found for the first time in the Second Cataract.

Kassala.

Recommendations were made on the use of new methods.

The Fung Area.

A. nili was found to be a common man-biter on the Khor Yabus.

SANDFLIES

Work was continued in co-operation with Dr. R. Kirk. Several species new to the Sudan, and two hitherto undescribed, were obtained in the general survey which has now revealed the presence of 41 species several of which bite man. Methods were developed for investigating the infectability of certain species and in December experiments were started at Wad Medani with the object of identifying the main vector of kala azar. *Phlebotomus papatasii* was found to be the common biting species in the Dongola area.

SIMULIIDAE

Northern Province.

Simulium griseicollis is a serious pest in the Dongola area where it appears each year in countless millions, attacking people and domestic animals and often driving cultivators from their fields. A survey was carried out which showed, unexpectedly, that the fly breeds in large numbers on hard mud in the Nile. It was concluded that destruction of the insects would be impracticable or too expensive, but tests showed that dimethyl phythalate was a very effective repellent against *S. griseicollis*. Accordingly arrangements were made by the Controller of Medical Stores for the repellent to be sold to the public in the affected areas at the lowest possible price as an experiment. Owing to restrictions of supplies the experiment has been postponed for a year. *S. damnosum* was also studied and similar conclusions reached with regard to its control.

Darfur.

Three species were found in the Marra Mountains.

OTHER ARTHROPODA

Coleopetra. A case of rectal canthariasis was reported from Heiban, the beetle being *Catharsius sesostris* Dej.

Ceratopogonidae. 42 species are now known in the Sudan.

Drosophilidae Larvae were received for identification which had been found in a milk jar in Juba.

Fleas. Synosternus pallidus was abundant in animal burrows near Wad Medani.

INSECTICIDES

Many insecticides and sprayers were tested and used with the object of (1) advising the Director on Government requirements, (2) training public health staff, and (3) answering enquiries about types and availability of insecticides. Elaborate precautions were found necessary to protect the living insects used in experiments from untimely contamination with minute traces of the new insecticides.

The Medical Entomologist was appointed Liaison Officer of the Sudan Government with the Colonial Insecticides Committee from which valuable information was received about recent developments.

REPELLENTS

The repellent mentioned above in connection with Simuliidae was tested against other insects and is likely to be widely used, when more is available, in many areas of the country where control of biting insects is impossible.

TRAINING

Instruction was given to public health staff in the use of new insecticides for mosquito control.

PUBLICATIONS

The following papers have been published:

Kirk, R. and Lewis, D.J. (1946) Taxonomy of the Ethiopian sandflies (Phlebotomus) II.—Keys for the identification of the Ethiopian species —Ann. Trop. Med. and Parasit, 40, 117-129.

(1947.) Studies in leishmaniasis in the Anglo-Egyptian Sudan IX· Further observations on the sandflies (*Phlebotomus*) of the Sudan. Trans. Roy. Soc. Trop. Med. and Hyg., 40, 869-888.

Lewis, D. J. (1947). General observations on mosquitoes in relation to yellow fever in the Anglo-Egyptian Sudan.— Bull Ent. Res., 37, 543-566.

The following paper not emanating from this section, deals with medical entomology in the Sudan.

Macfie, J.W.S.(1947). Ceratopogonidae from the Anglo-Egyptian Sudan— Proc. Roy. Ent. Soc. Lond., B, 16, 69-78.

CHAPTER X

THE WELLCOME CHEMICAL LABORATORIES

DR. A. J. HENRY.

The re-establishment of these Laboratories in adequate new quarters in Khartoum, which two years ago was confidently expected within year, has now receded completely into the background. In addition we are at the moment sericusly handicapped by shortage of Sudanese Technical Assistants, for resignations having had to be accepted during the past year, while it seems quite impossible to find men with suitable qualifications to fill the gaps. This has involved use of senior staff for elementary (but necessary) analyses on which their experience is wasted. Fortunately the volume of such work during the year has not been as great as usual, but inevitably there has been considerable interference with work of a research or semi-research nature, which could have made more rapid progress had conditions in general been more favourable.

The number of samples examined during the year was 776 as compared with 867 in 1946 and 766 in 1945. A substantial increase in the number of milk samples as compared with 1946 was more than counterbalanced by considerable falls in the numbers of mineralogical and miscellaneous samples. Medico-legal and miscellaneous drug samples have remained at about the same level as last year, and again include many household utensils examined for the presence of lead in the surface coatings. The Medical Service again accounts for more than half of the routine work, while a high proportion of the work of a research or semi-research character has also been of a medical nature. During the year the Table of Analyses of Sudan Foodstuffs, first compiled in 1940, was brought up-to-date and will be published as an appendix to the Report of the Sudan Government Analyst for 1947.

The routine samples received were classified as follows, the corresponding figures for 1946 being also given:

	1947	1946
Waters	62	59
Foodstaffs	210	177
Medicolegal and Miscellaneous Drugs	283	304
Mineralogical	55	85
Miscellaneous	166	242
Total	776	867

During the year four original papers and the Report of the Government Analyst for 1946 were published.

ROUTINE WORK

Waters

Half of the samples were from the Khartoum and Omdurman supplies, to find out how PH and total and suspended solids vary with the season. The remainder were mostly from wells in varicus parts of the country, and presented no special features.

Foodstuffs

Under this heading are included milks, examined for the Public Health Authorities for adulteration; grains and flours, butter and other fats and sugars, examined for suitability for consumption; essences for alcohol content; and a variety of miscellaneous samples.

Medicolegal and Miscellaneous Drugs.

These are subdivided into pathological (24), toxiological (194) and miscellaneous drugs (65). Of the first group seventeen samples were associated with eight separate cases of suspected poisoning, the only positive (probable) finding being *Courbonia virgata* (vide infra). In addition, two urines were examined for sugar content, one faeces for split and unsplit fat and three blood sera for calcium content.

Toxicological samples included one hundred and twenty three household utensils for examination for the presence of lead, of which eighty four contained lead in large quantity in the coatings. Many specimens of plant material connected with cases of suspected poisoning were examined, but all but one (*Courbonia virgata*) were negative. Amongst other samples positive findings were sodium arsenite in locust baits, dettol, opium (1) and hashish (3).

A high proportion of the samples classified as miscellaneous drugs were samples of sodium antimonyl tartrate, neoarsphenamine, chloroform, morphine hydrochloride, castor oil, ergometrine and rectified spirit examined for conformity or otherwise to B.P. standards. Other samples included T.A.B. vaccines, iodised salt, sulphur and calcium carbonate.

Mineralogical.

Included in this category are coals examined for the Railways, mineral oils and various minerals and related materials.

Miscellaneous.

Thirty of these were oil seeds and cake examined for oil content, and grains for dirt content; thirty six were methylated spirits examined for the Customs; twenty six were cases of spoilage; fifteen were cloths for artificial silk content; fifteen were cottonseed oils for suitability for soap making; and others included beeswax, Abavit B, bones, senna, tobacco and perfume.

INVESTIGATIONS

Courbonia Virgata.

Investigation of various aspects of this very interesting plant (*Courbonia virgata*) A. Brongn, a member of the Capparideceae) has absorbed a great deal of the time available for research activities. A specimen of the plant was submitted from Palual, 30 miles south of Shambe. The toxic principle was isolated as the iodide and submitted to Dr. H. King of the National Institute for Medical Research, who identified it as tetramethlammonium iodide. This is the first occasion in which a salt of this base had been found in the vegetable kingdom, and the toxic effects of the plant are in accord with the known physiological properties—essentially a curare-like action—of tetramethylammonium salts. The presence of the toxic principle can be demonstrated, even in very small specimens, by the characteristic rhombic crystals which it forms with a solution of iodine in potassium iodide. The formation of these crystals, a periodide, proved of great help in the isolation of the toxic principle.

There seems little doubt that the toxic properties of *Courbonia virgata* are well known to the natives of the regions in which it occurs (for example, it is reported as being used for poisoning hyenas), and it seems quite probable that the discovery of its toxic nature reveals the secret of one of the mysterious poisons of the Southern Sudan. As *Courbonia virgata* and closely related species occur in other parts of tropical Africa its recognition as a quite highly toxic plant is likely to have wide significance.

In addition to a tetramethylammonium (tetramine) salt, *Courbonia virgata* has been shown also to contain both dimethylamine and trimethylamine in small quantities, while a fourth base, almost certainly another quaternary base, is also present. This last has not yet been identified. Like dimethylamine and trimethylamine it forms globules, which show no tendency to crystallise, with iodine in potassium iodide. These bases are readily separable from tetramine iodide on account of their ready solubility in ethyl alcohol. It has been shown that tetramine occurs in all parts of the plant, to the extent of 0.7-0.9 per cent in the roots, leaves and stems (air dry) and 0.15 per cent in the seeds.

Full chemical analysis of the root and seeds have been carried out. The root is free from starch but contains a high proportion of sucrose and considerable araban. On the other hand the seeds are free from sucrose and reducing sugars but contain 65 per cent of starch. Full details of these analytical results will shortly be submitted for publication.

Stillbamidine.

Further information regarding the instability of this drug in solution has been obtained and submitted for publication. Hydrolysis of the amidine groups has been shown to be controlled mainly by the PH of the solution and by temperature. Under slightly acid conditions, at a low temperature and with rigid exclusion of light a solution of stilbadimine remains virtually unchanged for very long periods.

Examination of the urine of former kala-azar patients treated with stilbamidine shows that even 2-3 years after termination of the course of treatment the drug is still being excreted in small but detectable concentrations. This supports the view that extensive storage in the body occurs and that long periods are required for complete elimination of the stored material. This storage phenomenon is probably closely bound up with the delayed neuropathic symptoms which so frequently follow a course of administration of the compound.

Sudan Seed Oils.

The survey of Sudan Seed oils has been extended by the examination of six new oils, two of which —*Celtis* and *Trema* species of the family Ulmacea—appear to contain the vitamin A precursor.

In addition, the examination of sesame seeds at various stages of pre-ripeness has shown that premature harvesting would lead to significant losses of yield though the composition of the seeds varies little.

Lead in the Coatings of Household Utensils

A satisfactory method has been found for the determination of lead in the coating material of household utensils, which is not permitted to exceed 1 per cent.

CHAPTER XI

THE KITCHENER SCHOOL OF MEDICINE

DR. R. M. BUCHANAN

General.

On the recommendation of Mr. L.E.C. Norbury, O.B.E., F.R.C.S., Visitor from the Royal Colleges for the Professional Examinations held in January 1947 recognition of the School by the Committee of Management was continued for another year from January 1st 1947. On his recommendation it has further been approved that selected graduates of the school will be directly admissible to the Final L.R.C.P., M.R.C.S. examination without the necessity of any further period of practice in the United Kingdom. The privilege of admission of selected graduates to the examinations for the several postgraduate diplomas granted jointly by the Royal Colleges is continued, provided that they comply with the conditions of the respective regulations.

In Mr. Norbury's opinion the Khartoum Civil Hospital warrants recognition as an institution for the training of house surgeons for the Fellowship of the R.C.S.E. This has been referred to the Council of the Royal College of Surgeons, but no ruling has yet been given.

The President and Council of the Royal College of Surgeons of Edinburgh while not giving general recognition of the Diploma of the School, have agreed to consider applications from specially recommended graduates for admission to the examination for Fellowship.

Following on Sir Eardley Holland's recommendation made in 1946 the Council of the Royal College of Obstetricians andGynaecologists, while agreeing in principle, laid down certain conditions which cannot at present be fulfilled, and the appointment of house surgeon at the Khartoum Civil Hospital and Omdurman Civil Hospital is not yet recognised as providing suitable training for the Diploma in Obstetrics Examination. It is however hoped that the R.C.O.G. may yet admit specially selected candidates to the examination for the Diploma. This matter is still under discussion.

During 1947 the following graduates have been engaged in Post Graduate study in the United Kingdom :

Dr. Ali Mohamed Kheir, D.K.S.M. (1929) Post Graduate Course, D.T.M. & H.

Dr. Sayed Abdel Razig, D.K.S.M. (1932) Post Graduate Course, D.T.M.&H. Liverpool.

Dr. Abdel Halim Mohamed, D.K.S.M. (1933) Post Graduate Course, M.R.C.P.

Dr. Tigani El Mahi, D.K.S.M. (1935) Post Graduate Course, D.P.M.

It is with great regret that I have to record the death of Dr. Mukhtar Mohamed Mahmoud, at Merowe, on 13.12.1947. Dr. Mukhtar was a Medical Inspector and one of the senior members of the Sudan Medical Service, which he joined after his graduation from the School in 1929. He was a man of wide interests and sympathies, and will greatly be missed.

During 1947 the course has, as formerly, comprised a premedical period of eighteen months at the School of Science in the study of Biology, Chemistry and

Physics, two preclinical years spent in the Medical School on the study of Anatomy, Physiology, Pharmacology and Parasitology, and finally two and a half years in clinical subjects and hospital practice. After graduation, there is a probationary period of two years, when the graduates hold in rotation resident appointments in the teaching hospitals (Khartoum and Omdurman) covering all aspects of medical and surgical routine. On completion of this period they then leave the supervision of the School to take up posts in the Provinces.

Number of Medical Students:

Entry from School of Science ..	.. 11 (9 males, 2 females).
School of Medicine	7 Senior (Clinical). 5 Junior (Preclinical).

Progress of Classes.

Eleven students entered the School of Medicine in September 1947.

As in former years all clinical students were welcomed at the monthly meeting of the Sudan Branch of the British Medical Association.

Professional Examinations.

PHARMACOLOGY.

Five candidates were examined in Pharmacology. All reached the required standard. The examiner was Dr. J.S. Aldridge, M.R.C.S., L.R.C.P.

ORGANIC CHEMISTRY.

Eleven candidates were examined in Organic Chemistry of whom ten passed and one was referred for three months. The examiner was Dr. A. J. Henry, D.SC., PH.D.

FINAL EXAMINATIONS.

The Final Professional Examinations for the year 1947 were held in January 1948. Seven candidates were examined in Medicine, Surgery, Obstetrics and Gynaecology, and Special Subjects. All were successful. The examiners were:

In Surgery, Brigadier D.C. Monro, C.B., C.B.E., F.R.C.S., ED., Consultant Surgeon to the Middle East Land Forces.

In Medicine, Dr. R.B.U. Somers, M.D., D.T.M. & H.

In Obstetrics and Gynaecology, Dr. J.L.D. Roy, M.B., CH.B.

School Prizes.

The following prizes were awarded:

Pharmacology Prize	Lewis Abdo
Jackson Prize in Medicine	Taha Ahmed Baasher
Waterfield Prize in Surgery	Taha Ahmed Baasher
Jackson Prize in Obstetrics and Gynaecology ..	Yahia Gamal Abu Seiph

Grant of Diplomas.

At a ceremony at the Palace His Excellency the Governor General personally presented diplomas to the following candidates who had been successful in their Final Professional Examinations:

Taha Ahmed Baasher

Yahia Gamal Abu Seiph

Hamadnallah El Amin

Maurice Sidra Hanna

Abdel Gadir Mishaal

Abdel Monim Ibrahim Wasfi

Abdel Gadir Hassan Ishag

The Visitor.

The Visitor from the Royal Colleges of Physicians and Surgeons was Dr. H.E.A. Boldero, M.A.,D.M.,F.R.C.P., Physician to the Middlesex Hospital and Dean of the Middlesex Hospital Medical School, Registrar of the Royal College of Physicians, London, and a Member of the Committee of Management of the Royal College of Physicians (London) and the Royal College of Surgeons (England), has supervised the Final Examinations.

Dr. Boldero attended the clinical and oral examinations in Medicine and was present at the final assessment of the candidates. He will submit his report to the Committee of Management of the Royal Colleges.

Post Graduate Course.

Owing to the numbers of graduates now on or about to proceed on study leave in the United Kingdom, no post graduate classes were arranged for 1947.

Teaching Staff.

The following changes in teaching staff occurred during the year:

Dr. E.S. Horgan resigned from the lectureship in Pathology and Bacteriology and Dr. R. Kirk and Dr. Mansour Ali Hasseb were appointed in his place the former in Pathology and the latter in Bacteriology.

Dr. R. Kirk resigned from the lectureship in Histology and Dr. Mansour Ali Haseeb was appointed in his stead.

Miss P.M. Dickens (Principal Matron, Sudan Medical Service) was appointed Lecturer in Nursing in succession to Miss G.B. Pugsley on the latter's resignation.

Administration.

Mr. J. Smith was appointed a member of the General Board by His Excellency the Governor-General's Council in place of Mr. R.V. Low.

The following changes in the School constitution were approved by H.E. the Governor-General's Council.

(a) The appointment of the Director of Accounts as Honorary Treasurer, and as an ex-officio member of the General Board and of the Executive Committee.

(b) The appointment of the Dean of the School as Honorary Secretary to the General Board and to the Executive Committee in place of the representative of the Civil Secretary. (The Civil Secretary continues to be represented on the Board and on the Committee).

Dr. J.S. Aldridge and Dr. R. Kirk were elected to the School Council by the Executive Committee.

Eighth Report.

The eighth report of the School covering the years 1943-1945 was for the first time printed in Khartoum by Messrs. McCorquodale, printers to Sudan Government.

It is regretted that owing to pressure of work from the Central Government the School Report was unavoidably delayed in the Press. As formerly, the major part of distribution was carried out through Headquarters Sudan Medical Service.

Library.

Forty two new books were added to the Library. 405 volumes were lent out to civil and service practitioners, and students. The Library now contains 1,678 volumes. The gift of £E. 50 donated by El Sayed Sir Ali El Mirghani Pasha, K.C.M.G., K.C.V.O., has been set aside for purchase of the new copy of the Encyclopaedia Britannica on publication.

Pathological Museum.

During the year several new specimens were added to the collection and some of the older ones remounted.

Graphic Museum.

This continues to be of great use and is a general attraction. It is open to the Public. 3921 recorded visits were noted for the year (3799 in 1946). Models, posters and exhibits are sent to health centres and agricultural shows. Dr. E.P. Pratt is the Curator.

Students Hostel.

Two standard lamps were provided for use of students on the lawn.

Health.

The health of the students remains good.

Sports.

Facilities for tennis, football and netball are provided in the School grounds. Table tennis is also available at the Hostel.

THE S.M.S. SCHOOL OF HYGIENE.

The school is accommodated at the S.M.S. Graphic Museum and also has accommodation at the Khartoum Public Health Offices.

The Graphic Museum provides training and demonstration matter, and practical work is carried out in Khartoum City and the Province Rural District. Visits are also paid to the Suakin Quarantine, the Gezira Irrigated Area and the Medical Entomological Section of the Research Division.

The Staff of the School consists of the Principal, who is also Asst. Chief Public Health Inspector, and an assistant to the Principal, who is a Sudanese Public Health Inspector. Four Boards of Studies in association with the School, control the syllabus and curriculum, the selection of candidates, the appointment of teachers and examiners and the examinations in each of the four categories of staff, Public Health Officers (for certificates of the Royal Sanitary Institute), Sanitary Overseers, House-to-House Inspectors and Mosquito men, though these last two groups will continue for the most part to be trained in their own areas on syllabi prepared at the School. The Boards report to the Director, Sudan Medical Service, and in each case the Chairman is the Assistant Director, Public Health and the Secretary, the Principal of the School.

The basis of education on which training is super-imposed is that of the 4th year Intermediate School standard, and the desirable transition is from House-to-House Inspector to Sanitary Overseer. The better educated and more successful Overseers may progress to selection for the course for Public Health Officers for which category also candidates of higher basic education, without previous practical experience in hygiene may be considered.

Mosquito Men.

These men are trained by Sanitary Overseers and Public Health Officers in the localities in which they are employed. All such staff are Sudan Medical Service personnel.

House-to-House Inspectors.

These are, with few exceptions, employees of local government authorities and training is carried out locally by the senior public health official in the area.

The subjects taught are on a curriculum prepared at the School of Hygiene and cover personal hygiene, inspection procedure, housing, food preparation and manufacture, disposal of waste matter, entomology and its applications, prevention of disease, and sanitary law.

Sanitary Overseers.

These are Sudan Medical Service officials, and candidates may be drawn from any category provided the person has an adequate educational qualification.

The training course lasts one year. The curriculum is that of the House-to House Inspector in more detail and extended to include, control of foodstuffs, water supplies, hygiene of schools, communicable diseases, methods of disinfection, village sanitation, office routine.

Public Health Officers.

Students are drawn from selected Sanitary Overseers and others by record of service, examination, and interview. The course is of three years and the qualifying examination is that of the Royal Sanitary Institute.

The curriculum is as follows:- 1st. Year; General Science, arithmetic, geometry and English at the Omdurman Technical School. 2nd. Year; entomology and pest control, helminthology, protozoology, bacteriology, water supplies, disposal of waste matter; and 3rd. Year; foodstuffs, nutrition, meat inspection, milk, food preparation and manufacture, housing, urban and rural planning, communicable disease, school health, prison health, quarantine, air port and seaport control, vital statistics, and sanitary law.

PROGRESS DURING 1947.

Public Health Officers Course.

During the year 10 Public Health Officer students were under training as follows:

1st. Year	4
2nd. Year	2
3rd. Year	4

In January three students who had completed their course of training sat for, and were successful in passing, the final examination of the Royal Sanitary Institute for Sudanese Public Health Officers.

House-to-House Inspectors.

Twenty inspectors from the Three Towns were given a course of training consising of 35 lectures and demonstrations.

Medical Assistants.

Classes from the Medical Assistants course in Omdurman received instruction throughout the year. Lectures and demonstrations numbered 34.

Health Visitors.

Ten lectures on public health subjects were given to 7 Health Visitor Students.

Nursing Staff—Khartoum Hospital.

A course of eight demonstrations was given to 28 of the nursing staff.

Nurses Training School, Omdurman.

Ten students from the school were given a course of twelve lectures.

Police Training School, Omdurman.

Seventy two trainees, in two groups, were given eight lectures on elementary hygiene and sanitation.

School of Administration.

Ten lectures on public health were given to 24 students of the school.

School of Agriculture.

Five students attended six lectures on Public Health subjects.

CHAPTER XIII

THE OMDURMAN MIDWIVES SCHOOL.

The School has trained 512 midwives since 1921 and 388 have actually been in practice in 1947. Of these 388, 355 were practising as district midwives, 26 were also trained nurses working in hopsitals and 7 were health visitors.

During the year 1 midwife died— four were struck off the register, one resigned and three were re-instated after a " refresher " course.

TABLE 55

Distribution Of Trained Midwives : 1947

PROVINCE.	Newly licenced	Licence cancelled	TRANSFERRED to	TRANSFERRED from	Died	TOTAL remaining
Blue Nile	9	1	—	—	1	84
Darfur	—	2	—	—	—	11
Equatoria	—	—	—	—	—	—
Kassala	3	1	—	—	—	35
Khartoum	11	—	2	1	—	103
Kordofan	2	—	1	—	—	48
Northern	10	—	1	—	—	102
Upper Nile	—	—	—	—	—	5
TOTALS	35	4	4	1	1	388

There were 35 pupils in residence in training in December 1947 and 35 were granted certificates after examination.

Six midwives were given a refresher course.

TABLE 56

Omdurman Midwifery Service: 1947.

Cases seen by Midwives School: Deliveries and Complications

DETAIL OF CASES		Number of Cases attended		Total
		By School Staff	By Town Midwives	
Cases delivered at Home		926	1,890	2,816
Abortions		3	73	76
TRANSFERRED TO HOSPITAL				
P.P.H.	2			
Breech and Anaemia	1			
Episiotomy	1			
Pneumonia	1			
Syphilitic lesions on head of baby and one extra finger	1			
Pyrexia of mother	1			
P.P. Eclampsia...	1			
Chicken-Pox	1			
Retained Placenta and PPH.	1			
No record made	24	4	30	34
Cases attended		933	1,993	2,926
TOTAL BIRTHS IN HOMES		926	1,890	2,816
(*a*) Live Births		900	1,847	2,747
(*b*) Still births		26	43	69
Twins (included in the above figures.		3	29	32
Triplets (included in the above figures.		—	1	1
POST-PARTUM COMPLICATIONS		24	—	24
Retained Placenta		5	—	5
P.P.H., Attended by Doctor		4	—	4
P.P.H. Attended by Midwives		10	(No record)	10
Puerperal pyrexia		1	Available)	1
Transferred to Hospital		4	30	34

There are antenatal clinics at the Midwives School and at the Murada Welfare Centre. Expectant mothers are seen twice at each. Figures for the year 1947 were :-

TABLE 57.

CLINICS.	Old Cases		New Cases		TOTAL	
	1946	1947	1946	1947	1946	1947
Midwives' School Clinic	2,443	2,752	3,360	3,862	5,803	6,614
Morada Clinic	839	1,687	2,623	643	3,462	2,330

At the gynaecological clinic held in the Midwives Training School the following cases were seen:-

Years.	Old Cases	New Cases	Total
1946	249	345	594
1947	336	307	643

CHAPTER XIV

OTHER TRAINING.

MEDICAL ASSISTANTS.

There were 18 specially selected hospital attendants in the course for medical assistants in Omdurman Civil Hospital.

The course lasts twelve months and is designed to train medical assistants for the dispensaries of the Northern Sudan.

There were 24 trainees in the School at Juba Civil Hospital. This School trains medical assistants, sanitary overseers and laboratory assistants, for the Southern Sudan.

At the Central Nurses, Training School in Omdurman Civil Hospital, there were 31 nurses under training and 5 completed the course and passed the final examination.

CHAPTER XV

THE S.M.S. GRAPHIC MUSEUM

Dr. E.P. Pratt, Assistant Director (Public Health) took over the duties of Curator of the Museum in the early part of 1947. There were no other changes of staff.

The facilities afforded by the Museum for the training of public health subjects are invaluable to the School of Hygiene and constant use of them is made in the training of Medical Students, Public Health Officer Students, and junior hospital and public health staff.

Students of the Schools of Administration, and Agriculture visited the museum for instruction and the pupils of six intermediate and elementary schools were also given talks and demonstrations on elementary hygiene.

The Graphic Museum annually becomes more popular with the general public and whilst this popularity is not an actual gauge of value it is believed that at least a slight impression of matters relating to public health must be given to the majority of visitors. To increase the value of the Museum as an instrument of propaganda it is hoped in the future to add descriptions of all sections in Arabic. Recorded visits made by the public during 1947 were 3921, this compared with 3799 in 1946 and 3069 in 1945.

Routine, revisionary and maintenance work keep the staff constantly occupied. The programme of work for Rural Health Centres and Dispensaries, entailing the making of many models and exhibits, was almost completed by the end of the year. Three new posters on Maternity and Child Welfare were prepared and after printing 500 copies despatched to hospitals, dispensaries and schools.

Models, posters and leaflets were sent to three stations for exhibition at Agricultual Shows.

Rural Health Centres and Dispensaries.

Material prepared and despatched was as follows :

Exhibits.

Snails—typed and set up in boxes	19

Models.

Incinerators	14
Pit latrines—Southern type	3
,, ,, —Northern type	10
,, ,, —Omdurman type	10

Posters.

Various—framed and glazed	30

Permanent Exhibition.

The following material was added during the year :

Photographs	70
Charts	1
Drawings	3
Models	1
Specimens	3
Descriptive notes	4

The exhibition now comprises :

Photographs	2041
Charts	223
Drawings	104
Descriptive notes	243
Maps	69
Posters	12
Models	162
Specimens	607

The sections of the Museum are :

1. Malaria.
2. Trypanosomiasis.
3. Leishmaniasis.
4. Syphilis.
5. Yaws.
6. Relapsing Fever.
7. Filariasis.
8. Diphtheria.
9. Ancylostomiasis.
10. Schistosomiasis.
11. Madura Disease.
12. Nutrition.
13. Tuberculosis.
14. Gonorrhoea.
15. Cholera.
16. Tetanus.
17. Anthrax.
18. Cerebrospinal Meningitis.
19. Plague.
20. Rabies.
21. Leprosy
22. Measles.
23. Mumps.
24. Yellow Fever.
25. Smallpox.
26. Chickenpox.
27. Vaccinia.
28. Dengue.
29. Typhus
30. Quarantine
31. Phlebotomus Fever.
32. Disinfection.
33. Meteorology.
34. Water.
35. Influenza.
36. Pneumonia
37. Dysentery.
38. Enteric Fever.
39. Maternity and Child Welfare.
40. School Medical Service.
41. Disposal of Waste Matter.
42. Town Planning.
43. Housing.
44. Undulant Fever.
45 Blackwater Fever.
46. Eye Diseases.
47. Medical Entomology.
48. Skin Diseases.
49. Folk Medicine.
50. Venomous Snakes.
51. Historical Medicine.
52. Propaganda.
53. Rural Health.
54. Hydatid Disease.

TABLE 1

STAFF OF SUDAN MEDICAL SERVICE

ESTABLISHMENT OF CLASSIFIED OR CERTIFICATED OFFICIALS

CATEGORY	ESTABLISHMENT		
	British	Sudanese	Others
Headquarters.			
Director	1	—	—
Assistant Director (Public Health)	1	—	—
Assistant Director (Hospitals)	1	—	—
D. A. D. (Quarantine)	—	1	—
Controller of Medical Stores	1	—	—
Principal Matron	1	—	—
Superintendent	1	—	—
Chief Public Health Inspector	1	—	—
A/Chief Public Health Inspector	1	—	—
Head Staff Clerk	—	1	—
Staff Clerk	—	2	—
Clerk	—	24	—
Head Accountant	1	—	—
Accountant	—	2	—
Bookeepers	—	20	—
Superintendent of Stores	1	—	—
Asst. Superintendent of Stores	—	—	1
Storekeepers	—	10	—
Stores Supervisor	—	3	—
Hospitals and Dispensaries.			
Senior Physician	1	—	—
Senior Surgeon	1	—	—
Gynaecologist	1	—	—
Ophthalmologist	1	—	—
Medical Inspector	31	12	—
Dental Officers	1	—	—
Assistant Ophthalmologist	—	1	—
Radiographer	1	—	—
Asst. Surgical Registrar	—	1	—
Asst. Obstetrical Registrar	—	1	—
Medical Officers	—	73	—
Housemen (recent graduates)	—	9	—
Medical Assistants	—	383	—
Matron, Khartoum Civil Hospital	1	—	—
Matron, Nurses' School, Omdurman	1	—	—
Charge Sisters	10	—	—
Nursing Sisters	16	—	—
Charge Nurses	—	5	—
Staff Nurses	—	19	—
Dental Mechanic	1	—	—
Assistant Radiographers	—	9	—
Assistant Radiographer under training	—	1	—
Pharmacists	—	—	2
Dispensers	—	10	—
Dispensers under training	—	5	—
Bookkeepers	—	83	—
Clerks	—	28	—
Hors Cadre Southern Trainees (1/11 Status)	—	5	—
Hors Cadre Tutor (Scale K1 Status)	—	1	—
Storekeepers	—	14	—
Southern Storekeeper	—	7	—
Head Mumarid	—	31	—
Theatre Attendant, male	—	23	—
Quarantine Overseer	—	1	—
Carried forward	77	734	3

Category.	Establishment		
	British	Sudanese	Others
Brought forward ..	77	734	2
Public Health.			
Medical Officer of Health, Khartoum	1	—	—
Assistant Medical Officer of Health Khartoum	—	1	—
A/Medical Officer of Health (Special Duties)	1	—	—
Senior Public Heath Inspector	3	—	—
Public Health Inspector	4	4	—
Public Health Officers	—	20	—
Sanitary Overseers	—	113	—
Principal, Midwives School	1	—	—
Charge Sister	1	—	1
Supervisor of Health Visitors	1	—	—
Clerk	—	5	—
Senior Staff Midwives	—	2	—
Staff Midwife	—	6	—
Staff Health Visitor	—	2	—
Health Visitor	—	9	—
Reseach and Laboratory Service.			
Stack Medical Research Laboratories.			
Assistant Director (Research) S.M.S.	1	—	—
Bacteriologist	1	—	—
Assistant Bacteriologist	—	1	—
Senior Laboratory Assistant	1	—	—
Laboratory Assistant	3	45	—
Head Laboratory Attendant	—	2	—
Clerk	—	3	—
Junior Technical Assistant	—	1	—
Medical Entomology.			
Medical Entomologist	1	—	—
Technical Assistant	—	3	—
Clerk	—	1	—
Aedes Control Officer	—	1	—
Wellcome Chemical Laboratories.			
Chemist	2	—	—
Technical Assistant	—	5	—
Junior Technical Assistant	—	2	—
Clerk	—	1	—
Kitchener School of Medicine.			
Registrar (Dean)	1	—	—
Library Clerk	—	—	1
Assistant Curator	—	1	—
S.M.S. Graphic Museum.			
Museum Attendant	—	3	—
Total	98	1015	4

The unclassified employees number approximately 4,166.

TABLE II. (a)

INCOME AND EXPENDITURE OF THE S.M.S.

OVER THE LAST FOUR YEARS.

ITEMS	1944	1945	1946	1947
	£E.	£E.	£E.	£E.
Revenue	68,313	67,839	70,537	68,775
Expenditure :				
Personnel and Personal Allowances ..	243,969	278,714	285,662	453,703
Services	227,882	198,596	296,451	340,841
Extraordinary	2,612	4,576	7,273	11,846
TOTALS ..	474,463	481,886	589,386	806,390

TABLE II. (b)

ANALYSIS OF THE S.M.S. EXPENDITURE IN 1947.

ITEMS	Personnel	Services	Extraordinary	TOTAL
	£E.	£E.	£E.	£E.
Headquarters	36,443	61,482	219	98,144
Hospitals and Dispensaries	319,481	236,313	10,403	566,197
Hygiene and Public Health	72,679	39,853	1,064	113,596
Research	22,849	3,193	160	26,202
Graphic Museum	515	—	—	515
Seconded Staff	1,736	—	—	1,736
TOTALS ..	453,703	340,841	11,846	806,390

TABLE III

SUDAN 1947

ADMISSION AND DEATHS BY DISEASES

DISEASES	BLUE NILE		DARFUR		EQUATORIA		KASSALA		KHARTOUM		KORDOFAN		NORTHERN		UPPER NILE		TOTAL		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
1. T. B. Pulmonary	174	23	23	6	97	13	222	27	182	44	66	17	123	6	50	9	937	145	1
2. T. B. Non-Pulmonary	143	8	17	3	41	2	107	11	148	12	51	7	85	3	24	1	616	47	2
3. Syphilis	713	6	5,278	18	3,698	1	600	2	175	4	1,923	11	410	8	1,410	4	14,207	54	3
4. Gonorrhoea	812	2	763	1	1,608	—	1,122	—	237	—	1,074	2	345	—	292	—	6,253	5	4
5. Soft Sore	34	—	26	—	48	—	42	—	21	—	44	—	28	—	17	—	260	—	5
6. Trachoma	138	—	76	—	26	—	26	—	30	—	30	—	101	—	26	—	453	—	6
7. All other eye diseases	256	1	199	1	698	—	243	2	1,369	—	226	6	538	—	582	—	4,111	10	7
8. Ear	86	—	32	1	192	—	53	—	48	—	53	—	75	2	18	—	557	3	8
9. Skin	250	2	210	—	1,149	1	141	—	136	1	251	1	202	—	130	1	2,469	6	9
10. Wounds and other injuries	3,503	51	2,814	34	5,860	71	2,353	27	1,576	23	4,922	77	1,652	25	1,086	10	23,775	317	10
11. Tumours Malignant	54	4	11	—	8	—	36	2	62	7	26	12	26	3	10	—	233	28	11
12. Tumours Non-Malignant	68	2	44	—	49	1	40	—	46	1	17	—	46	2	21	—	331	6	12
13. Gynaecological	562	8	57	—	66	3	234	2	506	5	212	5	238	4	60	—	1,935	27	13
14. Confinements	327	12	82	4	124	6	113	1	582	9	152	2	135	6	39	1	1,554	41	14
15. Poisoning	23	7	55	3	9	1	7	1	52	1	18	4	27	3	13	—	204	20	15
16. Ancylostomiasis	10	3	54	4	2,654	24	7	—	2	—	1	1	32	—	14	2	2,774	34	16
17. Bilharziasis	490	10	90	—	1,517	8	58	3	73	—	95	—	158	—	16	—	2,537	21	17
18. Blackwater Fever	—	—	—	—	2	—	—	—	—	—	—	—	2	—	—	—	4	—	18
19. Dysentery, Amoebic	574	16	528	13	447	9	567	3	315	4	559	10	200	1	122	9	3,322	65	19
20. Dysentery, Bacillary	34	3	7	—	172	9	83	1	127	1	70	8	46	1	33	7	572	30	20
21. Filariasis	4	—	—	—	293	—	—	—	—	—	1	—	—	—	—	—	298	—	21
22. Madura disease	132	1	3	—	2	—	11	—	82	—	7	—	48	—	2	—	287	1	22
23. Malaria	3,133	88	592	11	3,733	51	1,255	23	1,213	29	2,131	35	1,404	9	449	7	13,910	253	23
24. Leishmaniasis	69	15	3	—	26	1	222	42	3	—	2	—	—	—	2	2	327	60	24
25. Trypanosomiasis	—	—	—	—	47	2	—	—	—	—	—	—	—	—	—	—	47	2	25
26. Yaws	1	1	—	—	2,858	7	—	—	—	—	—	—	—	—	229	1	3,088	9	26
27. Heat Stroke	—	—	—	—	—	—	18	—	1	—	—	—	1	—	6	—	26	—	27
28. Dracontiasis	22	1	7	—	407	—	51	—	2	—	58	—	—	—	109	—	656	1	28
29. Tropical Ulcer	311	2	139	—	5,519	19	69	—	71	1	1,059	2	8	—	132	—	7,308	24	29
30. Anthrax	—	—	1	1	—	—	2	—	—	—	—	—	—	—	—	—	3	1	30
31. Cerebrospinal Meningitis	18	10	10	7	315	126	2	2	—	—	7	2	—	—	2	2	354	159	31
32. Chickenpox	100	—	68	—	614	2	235	—	69	—	152	2	31	—	16	—	1,285	4	32
33. Dengue	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	33
34. Diphtheria	71	15	7	1	4	—	38	4	148	9	22	3	29	5	—	—	319	37	34
35. Enteric Fever	33	7	3	—	1	—	16	—	25	2	9	—	38	2	19	2	144	13	35
36. Erysipelas	—	—	—	—	—	—	1	—	4	—	—	—	—	—	—	—	5	—	36
37. Gastro Enteritis of Children	24	1	—	—	155	13	9	2	138	19	9	6	112	6	10	—	457	47	37
38. Influenza	9	—	21	—	52	—	76	—	17	—	186	2	92	—	2	—	455	2	38
39. Leprosy	21	1	17	2	43	4	16	10	6	—	6	—	4	—	10	—	123	17	39
40. Undulant Fever	21	—	—	—	10	—	32	1	4	1	—	—	—	—	3	—	70	2	40
41. Measles	81	—	139	—	629	4	146	—	53	2	193	4	22	—	10	—	1273	10	41
42. Mumps	21	—	66	—	136	—	49	—	14	—	50	—	8	—	14	—	358	—	42
43. Pellagra	4	—	—	—	12	—	—	—	1	—	—	—	—	—	—	—	17	—	43
44. Puerperal Fever	12	4	17	1	—	—	6	2	12	1	11	3	14	—	3	—	75	11	44
45. Phlebotomus Fever	118	—	—	—	—	—	—	—	—	—	—	—	211	—	—	—	329	—	45
46. Pneumonia	1,181	82	312	35	1,203	106	615	37	884	39	654	46	431	32	186	6	5,466	383	46
47. Rabies	1	1	—	—	3	3	—	—	1	1	2	2	—	—	1	1	8	8	47
48. Relapsing Fever	18	—	294	58	29	3	—	—	1	—	39	3	—	—	86	3	467	67	48
49. Acute Rheumatism	45	—	2	—	27	—	24	1	34	—	15	1	61	1	8	—	216	3	49
50. Smallpox	19	3	—	—	425	87	296	51	1	—	84	19	—	—	20	—	845	160	50
51. Tetanus	20	14	4	2	5	2	3	—	4	2	8	6	6	2	9	4	59	32	51
52. Whooping Cough	10	1	5	—	23	1	1	—	12	—	25	—	13	—	8	1	97	3	52
53. Circulatory System	284	31	73	12	131	21	163	13	433	50	132	26	290	17	37	7	1,543	177	53
54. Respiratory System	657	20	211	9	999	12	493	8	612	9	823	43	445	14	226	6	4,466	121	54
55. Alimentary System	1,322	77	391	31	2,605	86	1,024	67	1,743	63	990	59	1,041	35	397	11	8,913	429	55
56. Genito-Urinary System	468	35	159	10	157	10	343	14	456	9	381	20	330	18	69	2	2,363	118	56
57. Nervous System	85	7	27	3	53	5	68	3	284	6	126	4	79	4	21	2	743	34	57
58. Scurvy	18	2	1	—	8	2	15	—	5	—	34	—	—	—	2	—	83	6	58
59. Diabetes	20	1	2	1	2	—	32	1	78	1	12	—	53	2	5	—	204	6	59
60. Fever of uncertain origin	339	30	85	12	542	8	444	29	295	7	152	9	396	12	97	9	2,350	116	60
61. All other Diseases	1,091	45	393	10	3,906	53	541	13	955	38	1130	26	681	13	1,030	15	9,712	213	61
TOTAL	18,034	653	13,428	294	42,840	787	12,370	405	13,348	402	18,300	486	10,360	236	7,183	125	135,863	3,388	
MISSIONS					1,473	17			1,925	69	744	—					4,142	86	
RIVER HOSPITAL															—	—	2,289		
Grand Totals	18,034	653	13,428	294	44,313	804	12,370	405	15,273	471	19,044	486	10,360	236	7,183	125	142,294	3,474	

TABLE IV

SUDAN 1947

OUTPATIENTS ; NEW CASES AND TOTAL ATTENDANCES

DISEASE	BLUE NILE	DARFUR	EQUATORIA	KASSALA	KHARTOUM	KORDOFAN	NORTHERN	UPPER NILE	TOTAL	
1. T.B. Pulmonary	360	27	28	341	242	103	308	24	1,433	1
2. T.B. Non-Pulmonary	139	25	33	251	246	65	329	17	1,105	2
3. Syphilis	17,881	17,229	5,360	12,834	5,978	24,081	4,416	13,199	100,978	3
4. Gonorrhoea	4,969	2,150	2,118	4,439	3,705	3,883	1,335	1,183	23,782	4
5. Soft Sore	1,713	534	184	770	936	388	70	72	4,667	5
6. Trachoma	44,649	4,182	1,012	19,225	73,496	5,476	39,659	790	188,489	6
7. All Other Eye Diseases	96,788	12,958	25,180	42,194	65,294	48,066	49,662	11,949	352,091	7
8. Ear	19,765	3,796	5,763	15,210	11,474	11,126	11,504	1,978	80,616	8
9. Skin	18,797	6,186	24,283	7,616	7,197	17,585	5,193	3,110	89,967	9
10. Wounds and other injuries	146,340	32,733	106,802	106,945	77,912	77,648	67,006	16,571	631,957	10
11. Tumours Malignant	227	9	5	57	30	116	59	1	504	11
12. Tumours Non-Malignant	2,275	129	50	241	86	358	293	—	3,432	12
13. Gynaecological	932	96	77	1,018	1,631	946	649	62	5,411	13
14. Confinements	327	82	124	113	582	152	135	39	1,554	14
15. Poisoning	66	66	4	6	—	14	201	52	409	15
16. Ancylostomiasis	39	93	3,944	16	10	7	82	—	4,191	16
17. Bilharziasis	4,218	1,477	1,534	821	611	3,978	3,464	77	16,180	17
18. Blackwater Fever	—	—	2	—	—	—	2	—	4	18
19. Dysentery, Amoebic	11,270	2,179	733	3,797	5,417	4,734	3,892	564	32,586	19
20. Dysentery, Bacillary	524	7	625	758	151	136	101	6	2,308	20
21. Filariasis	4	—	293	—	—	1	—	—	298	21
22. Madura disease	1,115	3	—	16	225	67	43	11	1,480	22
23. Malaria	122,782	6,706	14,018	17,663	14,366	44,092	21,172	10,949	251,688	23
24. Leishmaniasis	69	3	26	222	3	2	—	2	327	24
25. Trypanosomiasis	—	—	47	—	—	—	—	—	47	25
26. Yaws	1	1	27,732	—	—	—	—	—	27,734	26
27. Heat Stroke	1	—	—	18	9	5	3	—	36	27
28. Dracontiasis	35	8	1,554	340	1	585	30	92	2,645	28
29. Tropical Ulcer	3,802	297	19,664	2,003	7	4,601	4	1,585	31,963	29
30. Anthrax	—	1	—	2	—	—	—	—	3	30
31. Cerebrospinal Meningitis	18	10	402	2	—	7	—	4	443	31
32. Chickenpox	1,392	110	732	741	344	626	171	18	4,134	32
33. Dengue	1	—	—	—	—	—	—	—	1	33
34. Diphtheria	57	7	5	44	200	22	29	—	364	34
35. Enteric Fever	33	3	1	16	25	9	38	19	144	35
36. Erysipelas	—	—	6	1	1	—	—	—	8	36
37. Gastro Enteritis of Children	3,133	8	1,262	595	4,641	382	652	783	11,366	37
38. Influenza	4,950	746	443	4,245	2,743	2,571	1,680	28	17,406	38
39. Leprosy	33	21	1,635	55	8	1,205	23	14	2,994	39
40. Undulant Fever	21	—	10	32	4	—	—	3	70	40
41. Measles	1,469	192	771	831	580	953	531	16	5,343	41
42. Mumps	1,178	138	185	583	95	670	171	143	3,163	42
43. Pellagra	4	—	12	—	1	—	—	—	17	43
44. Puerperal Fever	12	17	—	1	12	11	14	3	75	44
45. Phlebotomus Fever	—	—	—	—	—	—	1,406	—	1,406	45
46. Pneumonia	4,777	391	1,359	1,491	2,119	1,727	1,410	350	13,624	46
47. Rabies	1	—	3	—	1	2	—	1	8	47
48. Relapsing Fever	28	294	—	—	—	38	—	228	588	48
49. Acute Rheumatism	602	2	539	293	32	311	1,949	4	3,732	49
50. Smallpox	139	—	425	299	—	90	—	20	973	50
51. Tetanus	5	4	184	7	—	9	8	4	221	51
52. Whooping Cough	866	74	79	180	296	1,186	999	8	3,688	52
53. Circulatory System	7,063	351	338	2,246	6,621	3,341	3,648	327	23,935	53
54. Respiratory System	94,273	15,246	48,384	53,615	61,012	50,971	40,685	10,640	374,826	54
55. Alimentary System	114,966	25,076	34,932	59,849	68,807	66,288	61,757	11,822	443,497	55
56. Genito-Urinary System	9,873	2,846	294	4,898	8,352	5,342	4,899	258	36,762	56
57. Nervous System	3,732	134	51	846	322	741	2,737	116	8,679	57
58. Scurvy	292	1	21	84	8	63	10	2	481	58
59. Diabetes	22	2	3	89	22	21	81	—	240	59
60. Fever of uncertain origin	29,609	1,395	2,014	14,777	25,172	4,835	11,749	7,363	96,914	60
61. All Other Diseases	83,836	9,760	63,350	60,349	46,371	33,570	30,675	12,458	340,411	61
Total New Cases	861,473	147,842	398,634	443,000	497,341	423,206	374,937	106,965	3,253,398	
ATTENDANCES: MEN	861,057	210,253	508,379	526,152	539,701	564,592	396,489	127,231	3,733,854	
WOMEN	433,440	113,639	338,879	169,230	300,450	396,263	286,794	109,342	2,148,037	
CHILDREN	747,908	144,000	169,499	318,027	453,477	543,629	568,977	112,323	3,057,840	
Total Attendances	2,042,405	467,892	1,016,757	1,013,409	1,293,628	1,504,484	1,252,260	348,896	8,939,731	
MISSIONS			150,787		46,315	35,844		73,435	306,381	
RIVER HOSPITAL									7,239	
Grand Totals	2,042,405	467,892	1,167,544	1,013,409	1,339,943	1,540,328	1,252,260	422,331	9,253,351	