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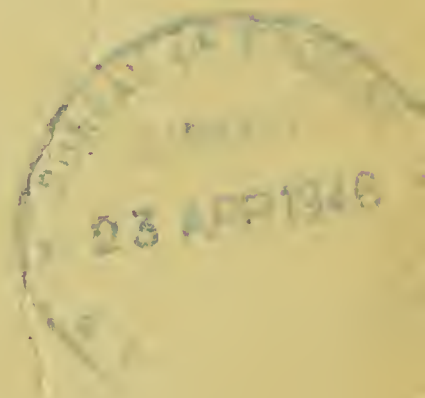
# REPORT

OF THE

# SUDAN MEDICAL SERVICE

FOR THE YEAR

# 1944






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SUDAN MEDICAL SERVICE.  
ANNUAL REPORT 1944.

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# ANNUAL REPORT

## OF THE SUDAN MEDICAL SERVICE

### FOR THE YEAR 1944.

#### GENERAL HEALTH.

The state of public health in the Sudan remained surprisingly satisfactory considering the constant risk throughout the year of introduction of infectious disease from outside the Sudan. Although eleven imported cases of typhus were reported, only two cases were contracted in the Sudan.

Despite the constant introduction of smallpox from outside the Sudan, only one small outbreak was reported which occurred in Dongola although sporadic cases occurred elsewhere. No cases of yellow fever were reported. The only epidemic disease in the Sudan which caused worry was relapsing fever which remained prevalent in the irrigated area of the Gezira and the Central Sudan where its incidence increased considerably although the total mortality did not show a corresponding increase owing to the very low case mortality. An enormous amount of additional work was thrown on the health and curative services in dealing with this disease. Light well spaced rains in the Northern Sudan and an average Nile flood level resulted in a lower incidence of malaria than usual in the Northern Sudan during the second half of the year.

#### 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 ... ..	765	277	2,419	3.16	8.73	1	5
Sudanese ... ..	4,020	1,292	11,820	2.94	9.15	3	20
Egyptian ... ..	368	115	976	2.65	8.49	1	6

The comparative figures for the last six years are as follows:—

	1939	1940	1941	1942	1943	1944
<b>British</b>						
Days sickness	1.95	3.21	4.27	4.39	3.03	3.16
Died ... ..	1	3	4	6	3	1
Invalided ... ..	4	5	5	3	1	5
<b>Sudanese</b>						
Days sickness	1.88	1.95	1.37	3.06	3.63	2.94
Died ... ..	7	5	7	7	5	3
Invalided ... ..	13	20	10	23	21	20
<b>Egyptian</b>						
Days sickness	1.73	1.82	1.79	2.66	2.55	2.65
Died ... ..	5	3	2	2	2	1
Invalided ... ..	3	6	5	4	5	6

## EPIDEMIC DISEASES.

### CEREBROSPINAL MENINGITIS.

2,346 cases were reported with 405 deaths. Of these 1,168 cases were admitted to hospital.

The distribution in 1944 by Provinces was as follows:—

PROVINCE.	Cases.	Deaths.
Blue Nile	20	5
Darfur	57	21
Equatoria	2158	344
Kassala	6	4
Khartoum	9	5
Kordofan	6	2
Northern	21	1
Upper Nile	69	23
	2346	405

The incidence during the last ten years has been as follows:—

YEAR.	Cases.	Deaths.	YEAR.	Cases.	Deaths.
1935	3,249	2,154	1940	4,032	796
1936	13,440	8,906	1941	1,824	459
1937	446	293	1942	2,787	1,027
1938	234	124	1943	3,526	765
1939	2,714	647	1944	2,346	405

### DIPHThERIA.

270 cases were reported with 51 deaths. Of these 252 cases were admitted to hospital.

The distribution in 1944 by Provinces was as follows:—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Deaths.
Blue Nile	37	12	Khartoum	107	16
Darfur	6	1	Kordofan	34	11
Equatoria	4	1	Upper Nile	—	—
Kassala	50	10		270	51

The incidence during last ten years has been as follows:—

YEAR.	Cases.	YEAR.	Cases.
1935	60	1940	114
1936	63	1941	186
1937	36	1942	207
1938	51	1943	309
1939	77	1944	270

### RELAPSING FEVER.

22,672 cases were reported with 310 deaths. Of these 3,740 were admitted to hospital.

Cases were distributed among provinces in 1944 as follows:—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Deaths.
Blue Nile	14,231	68	Khartoum	1,878	30
Darfur	1,055	109	Kordofan	3,616	21
Equatoria	3	—	Northern	11	—
Kassala	841	44	Upper Nile	977	38
				22,672	310



The incidence during the last 10 years has been as follows:—

YEAR	Cases.	Deaths.	YEAR.	Cases.	Deaths.
1935	—	—	1940	1,487	45
1936	22	—	1941	3,028	110
1937	374	48	1942	5,287	559
1938	1,124	116	1943	10,505	638
1939	1,006	92	1944	22,672	310

Despite the considerable increase in incidence during the last few years there has been comparatively little increase in the number of deaths reported from this disease.

It remained widespread in the irrigated area of the Gezira and the Central Sudan throughout the year except during the late summer when only a few sporadic cases were reported.

Extensive measures have had to be taken to deal with the disease and a considerable staff were constantly employed in mobile treatment and delousing units. The accessibility of facilities for early treatment was one factor in keeping the mortality low.

The cost of the special measures required during the year was over £E. 20,000. The disease has been a cause of worry and of an enormous amount of additional work by the public health and dispensary staffs during the war, but it is hoped that as soon as D.D.T. powder is available it will be possible to deal with it much more effectively and easily than at present.

### SMALLPOX.

The Sudan was exposed to threat of invasion by smallpox from Egypt, Arabia, East Africa, Belgian Congo, and French Equatorial Africa during the year and the efficiency of the vaccination state of the population was thoroughly tested

It is considered that over 60 per cent. of the total population is effectively protected against smallpox by vaccination and over 80 per cent. in areas.

242 cases were reported with 51 deaths.

The distribution by Provinces in 1944 was as follows:—

PROVINCE.	Cases.	Deaths.
Blue Nile	73	12
Darfur	3	—
Equatoria	—	—
Kassala	3	—
Khartoum...	1	1
Kordofan	—	—
Northern	160	38
Upper Nile	2	—
	<u>242</u>	<u>51</u>

The incidence during the last 8 years has been as follows:—

YEAR.	Cases.	Deaths.
1937	425	57
1938	527	158
1939	553	103
1940	515	104
1941	46	—
1942	12	—
1943	182	36
1944	242	51

1,274,897 vaccinations were carried out during the year.

Sporadic cases only were reported except in the Morowe and Dongola districts where a small outbreak occurred which really amounted to sporadic cases scattered through many villages.

It is significant that despite repeated introduction of infection from outside during the year in no single inhabited centre did more than a few sporadic cases occur and that at the end of the year the Sudan was entirely free of smallpox.



The number of vaccinations carried out during the last eight years has been as follows:—

YEAR.									
1937	...	...	...	...	...	...	...	...	561,197
1938	...	...	...	...	...	...	...	...	1,348,694
1939	...	...	...	...	...	...	...	...	580,052
1940	...	...	...	...	...	...	...	...	446,155
1941	...	...	...	...	...	...	...	...	302,084
1942	...	...	...	...	...	...	...	...	448,176
1943	...	...	...	...	...	...	...	...	753,125
1944	...	...	...	...	...	...	...	...	1,274,897
								<b>Total</b>	<b>5,714,380</b>

### Wadi Halfa.

Five cases of smallpox were found among passengers of five river steamers on arrival at Wadi Halfa from Egypt and 17 cases developed among contacts from these ships quarantine at Wadi Halfa.

### Dongola and Merowe Area.

The infection was introduced into the area by gipsies from Egypt who wandered up the river from village to village. Some fourteen villages were infected between Dongola and Merowe. Although many of the inhabitants had been recently vaccinated many had neglected this precaution as smallpox had not occurred in this area for many years. The infection was introduced into the fourteen villages at the same time but owing to the partial immunity of the population only a few sporadic cases occurred in each village, and there was no extensive outbreak in any centre of population. It is of interest to note that the reach of the river north of Dongola which was thoroughly vaccinated in 1943 owing to the occurrence of a few cases entirely escaped infection. Drastic measures were taken to deal with the situation and to prevent the spread of infection to other parts of the Sudan. In addition to segregation of infected villages and quarantining of cases and contacts, an extensive vaccination campaign was at once undertaken and to protect other areas no one was allowed to leave by train unless effectively immunised by vaccination. As a result the infection was kept entirely confined to the area where it was first reported. 160,000 vaccinations were carried out among a population of 221,000. In six weeks from the date the first case was reported the disease had died out. There were 160 cases with 30 deaths.

### TYPHUS.

Thirteen cases of typhus fever were reported with one death. Eight occurred in Wadi Halfa area, four in Merowe and one in Khartoum. Eleven of these were imported from Egypt. The Sudan was constantly exposed to risk of spread of this disease from Egypt during the first nine months of the year, and the most stringent precautions were taken in Wadi Halfa quarantine and at Port Sudan as regards civil and military passengers from Egypt. In addition continuous delousing was carried out among the population of the areas of the Sudan most exposed to risk.

It was only by constant effort and by the willing co-operation of the local population that it was possible to prevent the disease from invading the Sudan.

The fact that there were only two locally contracted cases despite the fact that the imported cases occurred on eleven separate occasions is proof of the efficiency of the methods adopted. The delousing measures inevitably caused much inconvenience and discomfort to the population of large areas as D.D.T. powder was unobtainable but the Sudanese people realised their importance and, far from complaining, cooperated in every possible way.

### YELLOW FEVER.

No cases were reported during the year.



# ENDEMIC DISEASES.

## ANCYLOSTOMIASIS.

The incidence of this disease shows no change. It is only of any public health importance in certain parts of Equatoria Province particularly the Rumbek area.

## SCHISTOSOMIASIS.

### BLUE NILE PROVINCE: Gezira Irrigated Area.

The comparative figures for annual surveys and routine examinations of the indigenous inhabitants of the Gezira are as follows:—

### Schistosoma Haematobium.

YEAR.	ADULTS.			CHILDREN.			TOTAL.		
	No. Exmd.	No. Inftd.	%	No. Exmd.	No. Inftd.	%	No. Exmd.	No. Inftd.	%
1935 ....	13,902	8	0.06	2,945	12	0.40	16,847	20	0.12
1936 ....	22,604	10	0.04	5,483	17	0.31	28,087	27	0.09
1937 ....	30,768	26	0.08	10,038	63	0.62	40,806	89	0.22
1938 ....	32,045	50	0.15	16,916	162	0.95	48,961	212	0.43
1939 ....	17,044	30	0.17	10,877	174	1.50	27,921	204	0.73
1940 ....	29,711	64	0.21	12,310	109	0.87	42,021	173	0.41
1941 ...	19,588	17	0.09	14,243	37	0.20	33,831	54	0.16
1942 ....	24,888	90	0.30	10,460	115	1.08	35,348	205	0.50
1943 ....	32,320	321	0.99	11,929	143	1.19	44,249	464	0.05
1944 ....	57,196	511	0.89	29,966	940	3.17	87,162	1,451	0.69

Although the position is not satisfactory as regards urinary schistosomiasis, this disease as a rule is very mild in the Sudan and is at present of little public health importance.

A much more serious development is that there is evidence that the incidence of rectal schistosomiasis is slowly increasing in the Gezira and although the figures are at present not high, the fact that this disease may be becoming more common is most disturbing as rectal schistosomiasis is one of the most serious disease in the Sudan as regards its possible effect on public health. It is most important that the problem should be tackled now while the disease is comparatively uncommon and special attention has been paid to its treatment and prevention during the year. Legislation has been passed making notification and treatment compulsory, and anti-snail measures, and medical examination of persons specially exposed to risk have been intensified.

The Province Board of Public Health has had under consideration rural water supplies and sanitation to break the cycle between man and the snail. Arrangements are being made for very limited surveys of selected inhabited centres. Surveys are of doubtful value unless the examinations are repeated several times in negative cases, and the examinations of faeces is often resented by the people particularly by the women. They have also to be carried out by specially trained laboratory staff. For all these reasons surveys have only a very limited use. It is considered that the protection of the irrigated area of the Gezira from rectal schistosomiasis is the most important, and may prove to be the most difficult health problem which will have to be solved during the next few years.

### White Nile Reservoir—Schistosomiasis Mansoni.

The figures for the White Nile Reservoir were as follows :—

District	Schistosomiasis haematobium		Schistosomiasis mansoni.	
	No. Exmd.	No. Inftd.	No. Exmd.	No. Inftd.
Ducim ... ..	729	134	4,263	47
Kosti ... ..	7,507	849	697	35

### NORTHERN PROVINCE: Dongola and Merowe Districts: Schistosomiasis Haematobium.

Year.	Number examined	Infections found.	Percentage	Year.	Number examined	Infections found.	Percentage
1935	40,950	1,408	3.4	1940	35,205	1,107	3.1
1936	37,334	1,268	3.4	1941	28,982	838	2.9
1937	46,741	1,155	2.5	1942	30,698	1,275	4.1
1938	44,517	891	2.0	1943	17,445	613	3.5
1939	40,194	1,054	2.6	1944	27,309	1,214	4.4

### Halfa: Wadi Halfa District: Schistosomiasis Haematobium.

The results of surveys for the last ten years are as follows :

Year.	Number examined.	Infections found.	Percentage	Year.	Number examined.	Infections found.	Percentage
1935	12,076	2,613	21.6	1940	16,064	2,435	15.1
1936	12,437	1,439	12.9	1941	13,590	2,039	15.0
1937	18,498	2,002	10.8	1942	13,453	1,785	13.3
1938	21,958	2,763	12.5	1943	7,201	1,261	17.5
1939	18,319	2,422	13.1	1944	6,873	1,254	18.2

### BLACKWATER FEVER.

The incidence of this disease during the last ten years has been as follows :—

YEAR	Cases	Deaths	YEAR	Cases	Deaths
1935	18	9	1940	24	9
1936	38	14	1941	28	9
1937	20	5	1942	29	11
1938	29	8	1943	17	3
1939	20	7	1944	11	4

The nationalities affected were :—

	Cases
Sudanese (Arab)	5
Sudanese (Negroid)	3
European	3



The following table shows the incidence by age and sex in the various areas:—

PROVINCE	MALE		FEMALE		AGE GROUPS IN YEARS.					
	Cases	Deaths	Cases	Deaths	5-15	15-25	25-35	35-45	45-65	Age Un-known
Blue Nile ...	4	2	—	—	—	—	2	1	1	—
Equatoria —	3	—	1	—	—	—	3	—	—	1
Kassala ...	1	1	—	—	1	—	—	—	—	—
Kordofan ...	2	1	—	—	1	—	—	—	1	—
TOTAL ...	10	4	1	—	2	—	5	1	2	1

### DRACONTIASIS.

The incidence and distribution of this disease remain unchanged. It is prevalent in the Nuba Mountains, Equatoria Province and the Bor District of Upper Nile Province.

### DYSENTERY.

3,389 cases were admitted to hospital. Of these 527 were diagnosed as bacillary dysentery. Of the remainder many are clinical dysentery in remote areas which was not differentiated. The tendency is to overdiagnose amoebic dysentery owing to the difficulty of confirming a diagnosis of bacillary dysentery in remote areas far from laboratory facilities, and the tendency to identify other exhibits as *entamoeba hystalyti* under the microscope.

Accordingly instructions have now been given for three classifications, bacillary dysentery, amoebic dysentery, and clinical dysentery, and it is hoped that the future figures will show a more accurate picture of the relative incidence of bacillary and amoebic dysentery in the Sudan.

### ENTERIC FEVER.

199 cases were reported with 21 deaths.

The distribution in 1944 by Provinces was as follows:—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Deaths.
Blue Nile ....	48	7	Khartoum ....	68	7
Darfur ....	—	—	Kordofan ....	6	—
Equatoria ....	17	1	Northern ....	41	4
Kassala ....	10	—	Upper Nile ....	9	2

The incidence of this disease during the last ten years has been as follows:—

Year	Cases	Year	Cases
1935	246	1940	336
1936	135	1941	129
1937	165	1942	167
1938	213	1943	145
1939	202	1944	199

## LEISHMANIASIS.

201 cases were reported with 74 deaths. Of these 195 cases were admitted to hospital.

The incidence during the last ten years has been as follows:—

YEAR.						Cases.	YEAR.						Cases.
1935	...	...	...	...	...	171	1940	...	...	...	...	460	
1936	...	...	...	...	...	214	1941	...	...	...	...	494	
1937	...	...	...	...	...	336	1942	...	...	...	...	432	
1938	...	...	...	...	...	296	1943	...	...	...	...	225	
1939	...	...	...	...	...	394	1944	...	...	...	...	201	

### Kala-Azar.

195 cases were reported with 74 deaths. Investigations were continued to discover more effective lines of treatment.

### Espundia.

Two cases were reported from the Blue Nile Province.

### Cutaneous Leishmaniasis.

Four cases were reported, one from the Blue Nile Province and three from Kordofan.

### DISTRIBUTION.

PROVINCE	MALE		FEMALE		AGE GROUPS IN YEARS.						
	Cases	Deaths	Cases	Deaths	0-1	1-5	5-15	15-25	25-35	35-45	45-65
BLUE NILE ...	75	40	10	5	—	2	18	33	25	5	2
DARFUR ...	8	2	3	1	—	—	2	2	7	—	—
EQUATORIA.	12	1	3	—	—	—	7	5	3	—	—
KASSALA. ...	56	13	11	4	—	6	15	25	15	6	—
KHARTOUM. ...	10	5	1	—	—	—	—	2	5	4	—
KORDOFAN ...	8	1	2	—	—	—	1	4	3	2	—
NORTHERN ...	—	—	—	—	—	—	—	—	—	—	—
UPPER NILE ...	2	2	—	—	—	—	1	1	—	—	—
<b>TOTAL</b>	<b>171</b>	<b>64</b>	<b>30</b>	<b>10</b>	<b>—</b>	<b>8</b>	<b>47</b>	<b>72</b>	<b>58</b>	<b>17</b>	<b>2</b>

### RACE.

The races affected were :

Sudanese (Arab) ...	134	Greeks ...	1
Sdanese (Negroid) ...	54	British ...	1
Abyssinian ...	6	West Africans ...	4
Egyptian ...	1		
		Total	201



## RESULTS OF TREATMENT.

			Apparently cured %	Died. %	Still under treatment %	Untreated or lost sight of %.
1939	....	....	42.1	26.4	21.1	10.4
1940	....	....	58.7	18.0	12.2	11.1
1941	....	....	47.4	28.9	11.1	12.6
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

## LEPROSY.

The following table shows the distribution of lepers in the Sudan:—

Province	Under treatment in camps or settlements.	Under observation and treatment as hospital or dispensary outpatients.	Total under treatment.	Under observation but not under treatment.	Total cases.
Blue Nile	33	7	40	54	94
Darfur	34	—	34	2	36
Equatoria	466	1254	1720	1308	3028
Kassala	31	—	34	3	37
Khartoum	8	15	23	2	25
Kordofan	90	9	99	—	99
Northern	—	7	7	28	35
Upper Nile	3	—	3	—	3
<b>TOTAL</b>	<b>668</b>	<b>1292</b>	<b>1960</b>	<b>1397</b>	<b>3357</b>

The incidence of the disease shows little change although it is probably less prevalent than was previously supposed in certain parts of the Southern Sudan.

Considerable attention has been paid to the leprosy problem in the Sudan during the year and plans have been approved for extending the village leper colony organisation in the Moru and Bari areas of Equatoria Province. These colonies are built, maintained and rationed by the Government, the staff and supervision being provided by the C.M.S. Mission. Supervision is all important and the Sudan is indebted to the British Empire Leprosy Relief Association who have supplied a trained lay-worker in leprosy for this area based on Lui.

Arrangements have been made to improve the leper colonies in the Fung area where although the disease is not as common as in the Southern Sudan, it is estimated that there are a hundred or more untreated lepers many of whom would benefit from treatment in a leper settlement.

## LI RANGU.

Dr. H. M. Woodman, Senior Medical Inspector, Li Rangu reports as follows:—

“Details of the lepers living at Li Rangu are as follows:—

Living in Settlement (but not segregated) at the end of 1943	...	...	...	485
Admitted during 1944	...	...	...	3
Deaths during 1944	...	...	...	13
Absentees in December 1944	...	...	...	23
Remaining in December 1944	...	...	...	434
“Cured”	...	...	—	29
Living in Segregation Camp at end of 1943	...	...	...	134
Admitted during 1944	...	...	...	4
Re-admitted during 1944	...	...	...	15
Deserted during 1944	...	...	...	66
Died during 1944	...	...	...	8
Remained in December 1944	...	...	...	131

The 29 lepers classified as "cured" and who have continued without exacerbation in this category for 4—5 years have been discharged as ordinary civilians, subject to poll tax."

### MALARIA.

185,345 cases were reported with 144 deaths. Of these 14,079 cases were admitted to hospital. Favourable weather conditions resulted in a low incidence in the Northern and Central Sudan.

The following table shows the number of admission to hospitals and deaths by provinces :

Province	Admissions	Deaths
Blue Nile	3,612	39
Darfur	499	6
Equatoria	2,512	28
Kassala	2,219	34
Khartoum	647	4
Kordofan	1,952	14
Northern	2,280	16
Upper Nile	358	3
TOTAL	14,079	144

The following table shows the spleen rate of children examined in the intermediate and village schools during the last five years.

Province or District	Percentage Spleen Rate.				
	1940	1941	1942	1943	1944
BLUE NILE PROVINCE					
Gezira Area	14.8	13.5	18.3	26.4	} 23.0
White Nile	17.7	20.0	36.0	25.0	
Fung	35.8	41.4	41.9	27.0	
DARFUR PROVINCE	36.4	38.4	35.9	32.1	29.3
EQUATORIA PROVINCE	23.6	34.4	43.2	18.9	43.0
KASSALA PROVINCE.					
Port Sudan	0.9	—	1.8	2.1	2.4
Kassala	47.2	18.4	20.5	Not Examined	40.0
Gedaref				27.1	50.0
KHARTOUM PROVINCE	3.5	1.5	1.4	1.7	1.1
KORDOFAN PROVINCE	32.7	32.2	24.1	38.7	19.1
NORTHERN PROVINCE	10.0	7.0	7.0	5.5	11.2
UPPER NILE PROVINCE	20.8	21.2	18.8	12.0	11.7



## RABIES.

The number of persons receiving treatment during the past ten years has been as follows :—

YEAR.	Number of persons receiving treatment.	Deaths despite treatment.	Total deaths.
1935	290	4	10
1936	373	1	8
1937	534	6	11
1938	557	1	8
1939	422	8	16
1940	352	1	3
1941	407	7	14
1942	396	1	11
1943	358	—	7
1944	272	—	4

All these treated had been actually bitten.

The following data are available as regards the fatal cases :—

LOCALITY.	Age		Biting	Site of	Severity	No. of days after bite when treatment was begun	No. of injections given	No. of days from bite to fatal termination
KORDOFAN (Moro Hills) ...	Not known	F	Dog	Right leg and forehead	Severe	None	None	60
BLUE NILE Wad Medani ...	25	F	Dog	Foot	Moderate	None	None	152
UPPER NILE (Kongor) ...	23	M	Dog	Multiple Arms & Face	Moderate	None	None	31
EQUATORIA (Yei) ...	22	M	Dog	Leg	Superficial	Nil	Nil	90

## ACUTE RHEUMATISM.

The incidence during the last seven years has been as follows :—

YEAR	Cases	Deaths
1938	292	4
1939	303	4
1940	223	3
1941	356	1
1942	136	—
1943	190	3
1944	281	2

The distribution of cases by Provinces for 1944 was as follows:—

PROVINCE.	Cases.	PROVINCE.	Cases
Blue Nile	17	Khartoum	13
Darfur	3	Kordofan	4
Equatoria	39	Northern	90
Kassala	93	Upper Nile	22

### SCURVY.

501 cases were reported with three deaths. Of these 72 were admitted to hospital.

### SLEEPING SICKNESS.

80 cases were reported in Equatoria Province compared with 81 in 1943. Of these 37 occurred in the eastern part of Zande district, 4 in Meridi district and 35 in Yei Sub-district and 4 in other districts.

The incidence during the past ten years has been as follows:—

YEAR	Yubu	Yambio	Yei	Kajo-Kaji	Meridi	Imported	Other Localities
1935	80	—	1	10	—	—	—
1936	142	—	—	8	—	—	—
1937	63	1	2	23	—	—	—
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

397,083 palpations were carried out during the year and 5,911 gland punctures performed.

#### Zande District.

37 cases were reported compared with 60 in 1943.

Senior Medical Inspector, Zande reports as follows:

“It is interesting that the fly density rate is much higher on the Naam and Eidi rivers of Meridi district viz up to 25.4 as compared with 2.9 and less to the west. Unfortunately the chief nucleus of Meridi Sleeping Sickness has been in the neighbourhood of this high density centre. Nevertheless there has been a diminution in incidence of the disease, and the rod clearings and fly screens there have accounted for 9,769 *glossina palpalis* this year. Another point of interest in that only *glossina palpalis* have been caught there and *g. morsitans* seldom found.



### Meridi District,

4 cases were reported compared with 9 in 1943.

### Yei District.

35 cases were reported compared with 8 in 1943. The infection spread into Yei district from across the frontier.

The fly control has not been as successful as in other areas and arrangements have been made for the Medical Entomologist to investigate and advise the local authorities.

It should be easy to deal with the disease in this restricted area. Here as in other parts of the Sudan Tsetse Fly other than Morsitans does not extend far into the Sudan as the Sudan is very close to its Northern limit.

## VENEREAL DISEASES.

The incidence of venereal disease remains high but shows little change despite the war. It is expected that the situation will not deteriorate as regards the war owing to the careful precautions taken to ensure that infected troops do not return to civil life until cured or free from infection.

## TUBERCULOSIS.

1,428 cases were admitted to hospital of whom 796 were pulmonary and 632 were non-pulmonary.

11 of the pulmonary cases were foreigners.

NATIONALITY.			Pulmonary	NATIONALITY			Pulmonary
European	...	...	1	Abyssinian...	...	...	3
Yemeni	...	...	1	Hedjazian	...	...	3
Egyptians	...	...	2	Somalis	...	...	1

There is evidence that tuberculosis is slowly increasing among the civil population of the Sudan. The incidence among troops serving outside the Sudan is high, and on the experience of African troops in the last war is likely to become an acute problem if they remain in these areas for long.

Already it has been found difficult with existing accommodation to ensure adequate treatment for the relatively large number of cases requiring it.

It is considered that tuberculosis is the most important health problem in the Sudan to be tackled immediately after the war with the possible exception of rectal bilharzia in the irrigated area of the Gezira.

The following table shows the admission for pulmonary and non-pulmonary tuberculosis during the last ten years :—

YEAR.	Pulmonary		Non-Pulmonary		Total
	Admissions		Admissions		Admissions
1935	....	....	501	371	872
1936	....	....	519	349	868
1937	....	....	488	395	883
1938	....	....	623	404	1,027
1939	....	....	685	396	1,081
1940	....	....	579	457	1,036
1941	....	....	631	511	1,142
1942	....	....	671	521	1,192
1943	....	....	593	529	1,122
1944	....	....	796	632	1,428

### AGE INCIDENCE.

The following table shows the incidence of cases and deaths by age from pulmonary tuberculosis.

	AGE GROUPS IN YEARS.																Unknewn	
	0-1		1-5		5-15		15-25		25-35		35-45		45-65		65 and over			
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Northern Sudan ....	-	-	-	-	10	1	171	26	252	36	146	31	72	15	11	2	19	14
Southern Sudan ....	-	-	2	1	7	3	26	8	39	5	17	2	4	2	-	-	24	8

### PULMONARY TUBERCULOSIS.

Comparative table showing the occupation of persons affected with Pulmonary Tuberculosis in the Northern Sudan during the last six years :—

	Prisoners	Cultivators.	Nomads.	Soldiers, Sailors and Police.	Day Labourers.	Townsmen			Indigent and un-employed.	Women not employed	Children.	Unclassified	TOTAL.
						Artisans & Shop-Keepers.	Clerical.	Servants.					
1939 ...	—	164	—	13	72	46	11	28	111	108	10	—	563
1940 ....	—	132	—	15	62	25	14	15	107	100	10	—	480
1941 ...	—	182	10	32	92	28	16	11	80	141	40	—	631
1942 ...	—	239	—	21	61	32	5	17	34	123	8	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

### NON-PULMONARY TUBERCULOSIS.

Admissions for non-pulmonary tuberculosis were classified as follows :—

	Gland	Bone	Joint	Other	TOTAL
Northern Sudan ....	229	133	59	107	528
Southern Sudan ....	37	21	32	14	104

Age groups were as follows :—

	AGE GROUPS IN YEARS.									Un-known
	0-1	1-5	5-15	15-25	25-35	35-45	45-65	65 & over		
Northern Sudan ....	3	16	63	113	179	100	41	5	8	
Southern Sudan ....	2	2	10	27	35	16	4	—	8	

### TUMOURS.

997 cases were admitted, classified as follows :—

Malignant ...	{	Carcinoma ...	...	...	128
		Sarcoma ...	...	...	26
		Unclassified	...	...	83
Benign ...		...	...	...	...
					237
					760
					997



The following table shows the admissions for malignant and non-malignant growths for the last six years :—

YEAR.						Malignant	Non-Malignant	TOTAL
-------	--	--	--	--	--	-----------	---------------	-------

NORTHERN SUDAN.

1939	...	...	...	...	...	219	411	630
1940	...	...	...	...	...	205	259	464
1941	...	...	...	...	...	221	264	485
1942	...	...	...	...	...	164	205	369
1943	...	...	...	...	...	291	457	748
1944	...	...	...	...	...	217	664	881

SOUTHERN SUDAN.

1939	...	...	...	...	...	17	82	99
1940	...	...	...	...	...	15	66	81
1941	...	...	...	...	...	34	61	95
1942	...	...	...	...	...	11	62	73
1943	...	...	...	...	...	6	34	40
1944	...	...	...	...	...	20	96	116

**UNDULANT FEVER.**

66 cases with 3 deaths were reported. The incidence during the last 10 years has been as follows :—

Year.						Cases.	Year						Cases.
1935	...	...	...	...	...	28	1940	...	...	...	...	...	43
1936	...	...	...	...	...	58	1941	...	...	...	...	...	31
1937	...	...	...	...	...	33	1942	...	...	...	...	...	17
1938	...	...	...	...	...	28	1943	...	...	...	...	...	55
1939	...	...	...	...	...	29	1944	...	...	...	...	...	66

# PUBLIC HEALTH AND HYGIENE.

BY DR. A. E. LORENZEN, M.R.C.S., L.R.C.P., D.P.H.

## GENERAL REMARKS.

There was an average and well-spaced rainfall; food crops were generally satisfactory except in some areas where locusts caused considerable damage. There was little or no unemployment and money was plentiful.

The state of the public health throughout the year was satisfactory and the country was spared devastating epidemics, although smallpox was prevalent in neighbouring territories and typhus to the north of the Sudan. Cerebrospinal meningitis occurred as sporadic cases throughout the Sudan only reaching epidemic proportions in certain parts of Equatoria. Cases of relapsing fever continued to increase throughout the year; about twice as many were reported and treated as in 1943. Treatment was freely and regularly available and the mortality rate of the disease extremely low, being recorded as 1.4 per cent. The main focus of the disease remained in the irrigated area of the Gezira and seemed largely to be maintained by the constant movement of labourers into, and out of, the area. The presence of relapsing fever in this cotton growing district necessitated a vast amount of work to contain the disease within manageable limits.

Anti-malarial work, both of a permanent nature and for temporary control of mosquito breeding, was extended further throughout the Sudan. Malaria remained one of the major public health problems although there was on the whole a slightly lower incidence of the disease than in 1943.

There was some evidence to suggest that Schistosomiasis was increasing in the Gezira Irrigated Area where for many years immigrant labourers, known to harbour the disease, have come both to cultivate and pick cotton.

Further progress was made in maternity and child welfare work throughout the Sudan; several clinics were opened in provincial towns and a British Health Visitor was appointed to organise this service in Khartoum, its suburbs, and the neighbouring villages and the attendances at clinics were highly satisfactory. The first district health centres were opened, the medical assistants staffing them having undergone a comprehensive course in public health work as applicable to rural areas. The course of training for village midwives was extended by two months so as to include some teaching in the elements of infant and child welfare work.

Improvements continued to be made in the organisation of the sanitary services particularly in the larger towns.

## STAFF.

Courses for the training of sanitary overseers were held throughout the year and twelve passed the qualifying examination.

The anti-mosquito staff of the country, now controlled by the Public Health Service, was augmented and reorganised to meet local conditions as required.



## YELLOW FEVER CONTROL.

No case of yellow fever was reported during the year.

The campaign against aedes mosquitoes is now an important part of the work of the Public Health Service everywhere but particularly on lines of communication and close attention was paid to the systematic destruction of aedes mosquitoes in phases of their development.

Control of aircraft included disinsectisation and the collection and identification of all mosquitoes found in them.

The following numbers of known inspections were made:

Khartoum	...	...	...	...	...	...	...	599
Malakal	...	...	...	...	...	...	...	2,906
Juba	...	...	...	...	...	...	...	2,213

In all these only eight mosquitoes were found ; of which seven were culicin and one anopheline.

# THE HEALTH AND SANITATION OF PROVINCES

## KHARTOUM PROVINCE.

Area, 5,700 sq. miles—Population 294,286

The rainfall was low and the incidence of malaria also low, only 23 locally contracted cases were reported in Khartoum itself; crops and particularly grazing for animals were however, poor.

There were only 50 cases of the Enteric fevers notified in the Three Towns (Khartoum, Omdurman and Khartoum North) which is a low average. In 1940, 201 cases were notified and, despite the marked difference in incidence, it has not yet been possible to decide what the determining factors may be.

The number of dysentery cases, both amoebic and bacillary, notified was also of average proportions.

There was no definite evidence of increase in tuberculosis, although returning soldiers showed an unusually high number of cases among them.

There were 102 cases of diphtheria, about the same number as in 1943, but there has been an increase in the disease during the last few years.

Only two sporadic cases of cerebrospinal meningitis were seen.

There was an increase in relapsing fever throughout the year but more particularly in April; in all some 1,539 cases were treated, being nearly three times as many as in 1943. The cases were generally distributed over the province as a whole among the nomadic and semi-nomadic people.

One case of smallpox was reported and a vaccination campaign, over and above the ordinary routine vaccination of infants, was undertaken and in all a quarter of a million persons were vaccinated.

There was no change in the incidence of the venereal diseases.

Public health work was carried out to its usual high standards and the customary measures were successfully undertaken to control mosquito breeding, the communicable diseases, and the supply of articles of food and drink. 599 aircraft were dis-insectised without finding in them a single mosquito.

The School Medical Service continued its work and in all 10,532 school children were examined and 4,406 boys attending village kuraan schools. Trachoma remained as heretofore, the disease of first importance among school children in Khartoum.

A close census of the population was made, more particularly in Omdurman, for rationing and the following figures were obtained:

Khartoum	...	...	...	...	...	...	...	55,933
Omdurman	...	...	...	...	...	...	...	104,573
Khartoum North	...	...	...	...	...	...	...	24,738
Rural District	...	...	...	...	...	...	...	109,102
								<hr/> 294,286 <hr/>



With these figures birth and death rates have been more exactly calculated and give the following figures :

	Birth Rate	Death Rate
Khartoum ... ..	22.68	14.21
Omdurman ... ..	23.36	13.11
Khartoum North ... ..	26.87	11.15

Conditions in the central prison remained unchanged ; the compound for detention of "criminal lunatics" remained full throughout the year.

A British Health Visitor was appointed to take charge of maternity and child welfare work in Khartoum, Khartoum North and the neighbouring villages. A rapid expansion of this important work took place and the service was much appreciated by the people.

### NORTHERN PROVINCE.

Area 236,200 Sq.M.—Population 618,666.

The general health of the Province was satisfactory throughout the year. There was no major epidemic and no evidence was found to suggest a real increase in the incidence of the endemic diseases. There was a good average rainfall but the Nile flood was slightly lower than normal ; crops on the whole were good but damage was done by locusts. Wages remained at a high level and there was no unemployment.

There was some increase in the incidence of malaria throughout the Province in the first three months of the year, particularly in and about Atbara and some pump scheme areas. Three cases of blackwater fever were reported in the Shendi area. Relapsing fever was imported into Atbara but there were only a few cases as an energetic delousing campaign quickly stopped the spread of the disease. Although relapsing fever is common in the middle zone of the Sudan it has not so far established itself in the Northern Province.

The quarantine at Wadi Halfa was active throughout the year on account of the presence of both smallpox and typhus fever in Egypt. In all 187 cases of smallpox occurred with 36 deaths, the disease having been imported from Egypt into one area by wandering tinkers. Twelve cases of typhus fever were reported. It was due to the satisfactory vaccination state of the people of the province that so few cases of smallpox occurred and to the delousing and surveillance of incoming passengers from Egypt that typhus was limited to so few cases. Whilst typhus was present in the neighbouring villages across the Egyptian border, mass delousing of the Wadi Halfa villages was carried out for some months. Thirty-three cases of Diphtheria were treated with ten deaths. Diphtheria is commonly more prevalent in this province than in other parts of the Sudan. The annual survey figures suggest a very slight increase in the incidence of vesical schistosomiasis in the Merowe—Dongola reach of the Nile.

The incidence of trachoma throughout the province continued to be high, particularly in the Halfa area, but severe complications of the disease were not commonly seen. Extensive routine treatment of the disease in its early stages was carried out in all dispensaries and hospitals and among the school children.

Control of the breeding of gambiae mosquitoes was extended in the highly successful barrier scheme set up in the cataract area just south of Wadi Halfa.

The new layout of the Ishash areas in Atbara was completed during the year and this native lodging area designed for some 3,000 people now provides them with all the elementary amenities of native life.



## BLUE NILE (GEZIRA) PROVINCE.

Area 54,775 Sq. M.—Population—1,430,531.

Except for the continued presence of and, indeed, increase in cases of relapsing fever in the province, the condition of the public health was satisfactory. The rains were up to average and crops good but they suffered damage by locusts in places.

The incidence of malaria throughout the province was slightly lower, except in the White Nile district where occurred the highest number of cases yet recorded; this increase in the number reporting for treatment may, however, be to some extent due to the greater number of dispensaries now open and working in this district. Conditions, due to the filling of the reservoir above the Jebel Auliya Dam, are favourable to mosquito breeding but not necessarily of those known to be the chief malaria carriers in the Sudan. The same close control of mosquito breeding was exercised throughout the irrigated area of the Gezira.

As in other years, relapsing fever, which had begun to increase in October, 1943, showed a markedly higher incidence during the months of January, February, March and April; thereafter the cases began to fall off until a second rise occurred in September. In all 14,231 cases were treated with 68 deaths (mortality rate 0.5%). Most of these cases were found within the Gezira or along its fringes. Among the ordinary measures taken to control the disease, 10 mobile units toured the area to treat cases and delouse contacts. The new T.O.T. field disinfectors proved valuable in use and were much appreciated by the people since little damage was caused to clothing disinfected in them.

There is some evidence to show that schistosomiasis, both of the intestinal and of the vesical type, is increasing in the irrigated area of the Gezira. A large number of immigrant labourers, many of whom come from endemic foci of the disease, yearly invade the Gezira passing from place to place seeking work; it has then so far not been easy to get a clear picture of the actual incidence among Blue Nile residents, as opposed to immigrants, except by means of the annual survey made over a large number of years. Figures for the comparative table of routine examinations for schistosomiasis haemotabium of Blue Nile residents in the Gezira show:—

YEAR.	ADULTS			CHILDREN			TOTAL		
	No. Examined	No. Infected	%	No. Examined	No. Infected	%	No. Examined	No. Infected	%
1943 ... ..	32,320	321	0.99	11,929	143	1.19	44,249	464	1.00
1944 ... ..	57,196	511	0.89	29,966	940	3.17	87,162	1,451	1.60

Measures have been taken for many years to prevent, as far as possible, the spread of the disease among the local people. These measures have included an annual survey (carried out on the same lines from year to year); the treatment of cases thus discovered; the disinfection of canals in close proximity to villages, known to harbour locally contracted cases, in order to destroy infected snails; the siting of new villages away from canals and the gradual removal of villages to a safe distance from canals; the drying out for long periods of as many canals as possible to destroy snails; the elimination of "dead ends" to canals wherever possible and the frequent weeding of the whole canal system to check the breeding of snails; the installation of village latrines lying between the villages and canals.



There was no change in the incidence of leishmaniasis which is seen chiefly in the Fung Area of the Province.

The general medical work was well maintained throughout the year and improvements in sanitation were steadily pressed forward; the general sanitation of the canalised area remained at its usual satisfactory level.

The ante-natal clinic in Wad Medani continued to expand and 851 cases were seen in 1944.

### **KASSALA PROVINCE.**

Area 134,450 Sq. M.—Population 535,470.

The rains were not good and the crops suffered damage by locusts.

The state of the public health of the province was on the whole satisfactory and there was no epidemic of the killing diseases. There was a heavy incidence of the venereal diseases both syphilis and gonorrhoea, and it appears probable that new strains of organisms were introduced by Sudan Defence Force soldiers who having served in North Africa and Eritrea, returned to their homes in Kassala.

There were scattered cases of relapsing fever throughout the year but the disease did not at any time assume epidemic proportions.

A considerable vaccination campaign was undertaken, as Kassala is a frontier province, and in all some 23,000 people were vaccinated.

A number of cases of dracontiasis were reported but they were mainly among immigrant labourers from outside the Province.

Schistosomiasis was detected in several villages. In general fewer cases of malaria fever were reported throughout the year and particularly in Kassala itself was there a substantial decrease. Much anti-malarial work, some of a permanent nature, has been undertaken in and around the town by the clearance of many mosquito breeding grounds. Fewer cases of kala-azar were reported (51 as compared with 68 in 1943). The treatment of this disease by stilbamidine and antimony was continued throughout the year.

Some further progress was made in improving the standards of sanitation in the towns and villages.

The general medical work of the province was well maintained and ante-natal clinics in Kassala continued to be well attended (640 attendances made, 207 women).

### **PORT SUDAN.**

The public health of this area remained satisfactory through the year and general medical work was maintained at the normal levels. The rainfall was poor and the scanty crops were mostly devoured by locusts.

Relapsing fever was introduced into the Tokar Delta during the cotton picking season and later spread to Suakin and Port Sudan.

The incidence of the dysenteries showed no change but there was an increase in the number of cases of the venereal diseases reporting for treatment.

A new ante-natal clinic was opened and 260 women attended during the year. The sanitation of the town and of the port was maintained at a high level. The town water supply was ample in quantity and good in quality.



3,752 rats were caught as compared with 5,567 in 1943. Since 1940 there has been a progressive and sharp decline in the number of rats caught annually. In 1944 the highest number of fleas per rat occurred in January (0.7 per rat) and for six months the number stood at 0.6 and for five months at 0.5 per rat. Close control was exercised over the breeding of aedes mosquitoes throughout the town and there was a great and satisfactory diminution in the aedic index.

The port quarantine control worked smoothly throughout the year. Two vessels, having arrived from yellow fever endemic areas, were dealt with under the regulations. Ports in Egypt and Palestine were declared infected with plague during the year.

Pilgrims returned early in the year: there were 1,312 Sudanese, 5,506 of other nationalities making in all 6,818. The pilgrims had been deloused on leaving the Sudan and, as usual, had been vaccinated and been inoculated against cholera. Despite this vaccination on the outward journey and again on the homeward journey, two cases of smallpox occurred, both in persons showing no evidence of successful vaccination.

### **KORDOFAN PROVINCE.**

Area 146,930 Sq. M.—Population 1,274,392.

The general health in the province was reasonably satisfactory throughout 1944; the rains were good and food crops plentiful.

Relapsing fever was widespread and affected more especially the eastern part of the province; there were altogether 3,676 cases of the disease reported with 284 deaths.

A general decrease in the incidence of malaria was shown by the smaller number of cases treated. Between May and September chiefly in the Atoro Hills, there was an outbreak of diarrhoea which in part coincided with an epidemic of measles; however, cases of diarrhoea continued to occur long after the last cases of measles had been seen. At one and the same time there appeared to be measles, post-measles diarrhoea, and diarrhoea all present at the same place. The cases of diarrhoea generally presented blood and mucus in the stools and the course of the disease was long; all ages were affected and, although measles occurred in other parts of the province, diarrhoea associated with it did not do so. In all there were some 400 deaths but, as the outbreak took place in a remote district and among a primitive people, there is no exact information available. Dracontiasis showed its usual incidence in the Nuba Mountains and cases of schistosomiasis, found during routine examination of such groups as school children and government servants were treated, but the native himself does not usually report for this disease.

The venereal diseases still maintained their high incidence and scattered cases of infective hepatitis occurred but they were generally mild.

Water supplies, particularly in rural areas continue to be one of the major problems of the province and, for some parts of the year and in many places, water is so short that there is little hope yet of raising the standard of personal hygiene of the people. Improvements and extensions were made in sanitation of towns and aedes control work received great attention. There was a satisfactory decrease in the aedic index, the Nuba area as before showed the highest index and this occurred in the months of August, September and October.



## DARFUR PROVINCE.

Area 138,150 Sq. M.—Population 733,939.

The rainfall was above average and the crops good ; the health of the province remained satisfactory throughout the year 1944.

The only epidemic disease to cause trouble was relapsing fever ; outbreaks appeared over wide areas but were generally scattered in their nature. Altogether 1,055 cases were reported with 109 deaths. Three cases of smallpox occurred, one being definitely imported from the French Equatorial Africa where the disease was known to exist. In all some 140,000 people were vaccinated; the results were good showing a high percentage of "takes."

The Venereal diseases, and more particularly syphilis, continued to show a high incidence ; there were 15,000 new cases of syphilis reported but the treatment of the disease was generally disappointing as patients usually did not complete a full course. There were a few cases of cerebrospinal meningitis chiefly in the Maidob Hills where 75 cases with 21 deaths were reported. A small outbreak of measles occurred in Buram, the disease was of a severe form causing four deaths in twenty three cases. There was no change reported in the endemic diseases ; schistosomiasis was found in the course of routine examinations only, few patients complain of this disease.

General medical work throughout the province was well maintained at its normal level.

Yellow Fever control worked smoothly, close attention was given to the prevention of aedes breeding and the general aedic index was considerably lower than in previous years. Further measures were taken to reduce malaria in the district headquarters towns : the number of mosquito men was increased, their work was more closely supervised and gambusia fish were introduced in El Fasher, Nyala and El Geneina to assist in the control of mosquito breeding.

## UPPER NILE PROVINCE.

Area 92,270 Sq. M.—Population 605,238.

The rains in the province were as a whole good as were also the food crops of the people.

In October the first cases of relapsing fever were recognised in the Kodok and Detwok areas of the province. The disease has been present for some years to the north and probably also to the west and east and seems to have spread by direct extension into the northern part of the Upper Nile Province. The distribution of the cases suggests that the disease had been present for some time before the first cases were seen. In all about 1,000 cases had been discovered and treated by the end of the year among people who habitually wander freely over vast swampy areas with few recognisable foot paths and who take great and peculiar pride in their hairdress. The control and delousing of contacts was in these circumstances a special and difficult problem. Thirty eight deaths were due to the disease.

Two cases of smallpox occurred in the province ; one was imported by the post boat into Malakal and the other was seen at Kongor. In each instance isolation of the case and a vigorous vaccination campaign were fortunately sufficient to prevent the occurrence of other cases. Cerebrospinal meningitis occurred chiefly in the southern part of the province and about 70 cases in all were found and treated. It was reported that some people had died of hydrophobia in the Pibor area but no case was seen by any member of the medical staff serving the district.



Work to improve the standards of sanitation in Malakal went steadily forward and the town markets in particular were given special attention. Aedes control was undertaken throughout the province and a satisfactorily low aedic index was maintained during the year in Malakal.

## EQUATORIA PROVINCE.

Area 159,025 Sq. M.—Population 1,269,507.

The total recorded medical work in the hospitals and dispensaries of this province reached about the same level as in 1943. There was no marked change in the general condition of the people. Rains were generally good over the whole province and only in the Madi area were the crops poor.

Cerebrospinal meningitis was present in the province: 2,158 cases were reported with 344 deaths, giving a mortality rate of about 16 per cent. Cases occurred chiefly in the western district and there was a well marked peak in the number reported for the month of March.

Three cases of relapsing fever were imported into the province but firm quarantine measures were immediately imposed and extensive delousing of the population at risk undertaken and there did not occur a single locally contracted case. Epidemic jaundice appeared in the Central and Lakes districts but the cases were relatively mild and scattered both in time and place. Advantage was taken of sleeping sickness inspections to carry out mass vaccination and in all about 100,000 people were vaccinated in the province during the year. There is no change to record in the endemic diseases schistosomiasis and anchylostomiasis and, although severe cases present themselves for treatment, few measures can be taken at present to limit the incidence of these diseases except in district headquarter towns. There was no change in the incidence of sleeping sickness in the Zande district where 42 new cases were recognised, but 35 cases were found during the year in the Yei district where the disease, except for an occasional case, has been silent for some years. The pass system for natives crossing over the international frontier was overhauled and made more effective; its main limitation is the great length of frontier to control, for attendance at any one of the few inspection posts that can be set up may be a matter of some inconvenience to the natives. Dracontiasis continued to be troublesome in some areas and still caused much suffering and disability but the nature of the ground in these parts is such that wells cannot be sunk to tap a satisfactory and safe water supply.

The venereal diseases showed the same incidence in the western parts of the province but do not appear to have extended their range. Tropical ulcers remained one of the main causes of disability although early treatment, made available by chiefs' dressers, has possibly helped to reduce the incidence to some slight extent.

Fewer cases of kala azar were reported in the Kapoeta district where there has been an endemic focus for many years and where the disease is well known to the local people.

Influenza and measles occurred in local outbreaks but did not assume proportions or virulence of significance.

Some improvements were made in the sanitation of the various district headquarters and better standards for school buildings were set up.

Yellow fever control was continued throughout the province by the inoculation of certain classes or groups in the community and by close inspection and elimination



of known aedes breeding places. At Juba eight mosquitoes were found in the course of routine disinsectisation and inspection of 2,230 aircraft. Of these eight mosquitoes seven were culicines and only one was anopheline. Six of the culicines were found in aircraft that had stopped the night at Juba and the other two mosquitoes were found in machines that had come from the south.

### MATERNITY AND CHILD WELFARE.

This most important work was considerably increased in 1944. A British health visitor was appointed to take charge of clinics in and around Khartoum and several new ante-natal clinics were opened in provincial towns. The course for pupil midwives was extended by two months so that they might be taught to practise the elements of infant and child welfare work in their villages. Midwives were taken from the villages, in which had been set up district health centres, and were given a special short course in infant and child welfare work at the Omdurman Midwives Training School so that they could start this work in their villages in conjunction with the district health officers (medical assistants). In teaching these women infant welfare work special emphasis was laid on the methods and diets and time of choice for weaning infants.

15 midwives completed the course, passed the qualifying examination and returned to their villages in 1944. By re-arrangement of the school terms and by giving pupil midwives greater practical experience on the district by boarding them out with chosen practising midwives in Omdurman, it was possible not only to take in a greater number of pupils for training in December, 1944 but they will also benefit from greater practical experience during training.

(a) Total number of midwives trained since 1921 (when the Midwives Training School was first opened) ... ..	431
(b) Total number practising ... ..	332
(c) District midwives... ..	305
(d) Mumaridat (trained nurses) and midwives ... ..	25
(e) Health Visitors with trained nurses' and midwives' certificates	2

The distribution of midwives by provinces is as follows :—

Khartoum ... ..	83	Kordofan ... ..	41
Blue Nile ... ..	69	Darfur ... ..	9
Northern ... ..	95	Upper Nile ... ..	6
Kassala ... ..	29	... ..	...

In those parts of the Sudan, where practised untrained midwives licensing or listing was undertaken to a small extent.

The midwives of Omdurman attended 2,564 cases, of which 2,550 were classified as normal 14 as abnormal and 15 were transferred to hospital. The total births numbered 2,582 of which 2,531 were live births, 72 were still births and twin births were 51. One set of triplets were born. 51 cases of abortion (*i.e.* of under seven months) were treated by the midwives and eight transferred to hospital.

Cases of Puerperal Haemorrhage needing medical aid were nine, one case of ante-partum haemorrhage and thirteen cases of post-partum haemorrhage were treated by midwives. There were two cases of eclampsia.

2,892 new cases attended the ante-natal clinics and attendances in all numbered 4,016.

The maternal mortality rate per 1,000 notified live and still births was :

	Births	Maternal Deaths	Rate per 1000
Khartoum ... ..	1,332	13	9.7
Omdurman ... ..	2,578	8	3.1

The difference in these rates is probably explained by the small number of cases. The causes of 21 maternal deaths (Khartoum 13 and Omdurman 8) were :

	Cases.
(a) Acute yellow atrophy of liver ... ..	5
(b) Shock forceps and prolonged labour ... ..	1
(c) Septicæmia ... ..	5
(d) Haemorrhage and Septicæmia ... ..	1
(e) Haemorrhage ... ..	4
(f) Shock—multiple causes ... ..	2
(g) Ruptured Ectopic gestation ... ..	1
(h) Hyperemesis gravidarum ... ..	1
(i) Anaemia of pregnancy ... ..	1
	21

### Ante-Natal Clinics.

This work was greatly extended on the appointment of a British Health Visitor and in Khartoum Province the following attendances were made :

PLACE.	New Cases		Old Cases		TOTAL	
	1943	1944	1943	1944	1943	1944
Omdurman ... ..	2,576	2,892	4,114	4,016	669	6,908
Khartoum Deims ... ..	—	931	—	811	—	1742
Khartoum North ... ..	—	999	—	1084	—	2083
Burri ... ..	—	101	—	114	—	215
Shambat ... ..	—	81	—	53	—	134
Tuti ... ..	—	99	—	197	—	296
	2576	5103	4115	6275	6690	11378

Attendances in the Province were as follows :—

	Attendances	New Cases
Kassala ... ..	640	207
Northern ... ..	—	1227
Kordofan ... ..	2354	643
Medani ... ..	—	851
Port Sudan ... ..	—	260

### CHILD WELFARE WORK.

The Child Welfare Centre at Omdurman was well attended and in all 499 new cases and 1,786 old cases were seen making total of 2,285 attendances ; 2 924 home visits were made by the Health Visitor. The woman vaccinator attached to this centre vaccinated at home or at the centre 2,398 children. One afternoon a week was devoted to " Women's Institute " work when mothers were taught sewing, knitting and cooking.



The new Khartoum Deims welfare centre opened in August and 521 new cases and 546 old cases were seen whilst 918 women attended for special classes. 758 homes were visited. Other welfare centres were opened at Khartoum North, Shambat, Burri and Tuti island ; they all made a good start, the attendances being :

								Mothers	Children
Khartoum North	...	...	...	...	...	...	...	236	245
Shambat	...	...	...	...	...	...	...	—	185
Burri	...	...	...	...	...	...	...	—	70
Tuti Island	...	...	...	...	...	...	...	—	106
								236	606

Cases referred from these clinics were seen by the British woman doctor.

### SCHOOL MEDICAL SERVICE.

51,655 school children were examined in 420 schools as compared with 48,065 pupils in approximately 300 schools in 1943. There has been some change in the number of medical examinations made on any child during his school career ; as far as possible, examination is made at least on entry to school and then not less often than every four years thereafter , but those found to have some defect are re-examined annually or more often as the case may require. Throughout the provinces the Medical Inspectors with their staff carry out these examinations together with inspection of school premises ; in Khartoum, however, there is an Assistant Medical Officer of Health whose main duties are those of school medical officer. In 1944 a British Lady doctor was also appointed and, included among her duties, were those of school medical officer to the girls' schools. Treatment of cases found is carried out in the nearest suitable medical centre : in villages, this may be the local dispensary run by a medical assistant ; in the smaller towns, it is the outpatient department of the local hospital and, in some of the large towns, there are specially appointed and trained dressers (men and women) who carry on such routine treatment as that of trachoma by visiting the schools themselves, their work being supervised by the Medical Inspector or the school medical officer. The results of early detection and continued treatment upon trachoma is well seen in the progressive diminution of the active disease in school children of intermediate and secondary schools as compared with those of elementary schools. The disease, however, is largely a social one and the highest incidence and the severest cases are generally found among pupils in the native kuraanic schools (Khalwas).

The following figures are given for the incidence of active trachoma in Khartoum schools :

(i) Higher schools	...	...	...	...	...	...	...	5	%
(ii) Secondary schools	...	...	...	...	...	...	...	9	%
(iii) Intermediate schools	...	...	...	...	...	...	...	19	%
(iv) Elementary schools	...	...	...	...	...	...	...	33	%
(v) Khalwas	...	...	...	...	...	...	...	40	%

In Khartoum municipality a school dental officer undertakes the care and conservative treatment of those cases referred to him, whilst the Government Ophthalmic Surgeon advised on treatment of eye diseases generally and undertakes that of special cases.

Apart from dental defects, few other diseases are found in this group of children; in the provinces, however, cases of enlarged spleen and of schistosomiasis are more frequently found.

A good deal of attention was paid to accommodation in schools, both in day and boarding schools, and the general standards are now on the whole satisfactory ; the diet in boarding schools was also reviewed and necessary local adjustments and improvements were made.

The following table shows the results of the medical examinations :—

Province and District.	No. Exam.	% Trachoma	% Bilharzia	% Spleen	% Pulm. T.B.	% Ancylost.
<b>Blue Nile Province :—</b>						
GEZIRA AREA.						
3 Intermediate schools (boys) ...	495	30.3	1.4	14.0	—	—
1 " " (girls) ...	90	18.8	—	1.1	—	—
11 Elementary schools (boys) ...	1502	41.6	1.8	14.9	—	—
8 " " (girls) ...	861	37.3	—	9.0	—	—
46 Village Schools ...	2783	22.5	1.0	29.1	—	—
WHITE NILE AREA.						
Bakht El Ruda school ...	112	23.2	4.0	4.0	—	—
Dueim Rural school ...	81	11.1	13.6	17.3	—	—
8 Element. schools (boys) ...	1431	34.7	3.7	32.3	—	—
6 " " (girls) ...	673	29.5	.9	24.3	—	—
14 village schools ...	852	33.8	6.1	19.9	—	—
FUNG AREA :						
Element. school (boys) ...	751	24.4	.3	21.7	—	—
" " (girls) ...	241	20.8	—	21.5	—	—
Village schools ...	224	24.1	10.3	56.7	—	—
<b>Darfur Province :</b>						
FASHER DISTRICT.						
Element. School (boys) ...	302	69.5	32.8	14.6	—	—
" " (girls) ...	115	66.9	11.3	20.8	—	—
Khalwas ...	233	77.2	36.5	16.3	—	—
NYALA DISTRICT.						
Element. School (boys) ...	164	48.7	32.9	31.7	—	—
" " (girls) ...	59	74.6	15.3	28.8	—	—
Sub-Grade school ...	158	57.0	22.8	57.6	—	—
ZALINGI DISTRICT.						
Elementary school ...	249	44.2	4.8	42.2	—	—
Sub-Grade school ...	27	29.6	3.7	44.4	—	—
GENEINA AREA.						
Elementary School ...	94	73.4	11.7	69.2	—	—
<b>Equatoria Province :</b>						
WAU AREA.						
Elementary School ...	972	4.7	10.5	72.8	—	27.0
Intermediate school ...	93	3.2	9.7	64.5	—	8.6
Trade School ...	39	—	5.1	61.7	—	10.3
LAKES DISTRICT.						
Central School ...	135	—	—	49.6	—	34.0
SOURCE YUBU DISTRICT.						
Elementary School ...	358	1.4	11.2	24.3	—	9.5
YAMBIO DISTRICT.						
Elementary school ...	322	—	12.1	31.7	—	20.5
Intermediate school ...	97	18.5	9.3	20.6	—	13.4
TORIT DISTRICT.						
Elementary school ...	520	14.2	1.0	17.7	—	16.1
Intermediate School ...	110	11.8	2.7	2.7	—	4.5
CENTRAL DISTRICT.						
Elementary school ...	165	5.5	1.8	50.9	—	18.2
KAPOETA DISTRICT.						
Elementary Schools ...	66	28.8	60.6	1.5	—	—



Province and District.	No. Exam.	% Tracho- ma	% Bilhar- zia	% Spleen	% Pulm. T.B.	% Ancy- lost.
<b>MERIDI DISTRICT.</b>						
Elementary Schools ... ..	88	3.4	48.9	28.4	1.1	20.5
<b>YEI DISTRICT.</b>						
Elementary school ... ..	227	26.0	15.0	44.0	—	28.6
<b>Upper Nile Province.</b>						
Elementary schools ... ..	377	0.5	—	7.9	—	—
Intermediate Schools ... ..	20	—	—	20.0	—	—
<b>Northern Province.</b>						
<b>WADI HALFA DISTRICT.</b>						
Intermediate Schools ... ..	72	83.3	5.6	2.8	—	—
Elementary schools ... ..	1231	64.2	29.9	17.8	—	—
Village Schools ... ..	1538	60.7	21.7	24.6	—	—
Girls' Schools ... ..	224	78.8	3.5	1.3	—	—
<b>MEROWI-DONGOLA DISTRICT.</b>						
Elementary Schools ... ..	1894	20.9	11.0	4.2	—	—
Village Schools ... ..	2250	18.5	6.8	5.7	—	—
Girls Schools ... ..	191	35.0	1.6	2.1	—	—
<b>ATBARA DISTRICT.</b>						
Intermediate Schools ... ..	230	23.5	2.2	1.7	—	—
Elementary Schools ... ..	2096	31.4	6.7	15.2	—	—
Village Schools ... ..	2274	34.5	2.4	13.3	—	—
Girls schools ... ..	189	36.5	—	1.0	—	—
<b>SHENDI DISTRICT.</b>						
Elementary Schools ... ..	557	9.8	1.3	2.2	—	—
Village Schools ... ..	243	9.9	1.6	1.6	—	—
Girls schools ... ..	133	9.8	1.5	2.3	—	—
<b>Kordofan Province.</b>						
<b>CENTRAL DISTRICT.</b>						
Intermediate Schools ... ..	252	7.1	14.6	15.5	—	—
Ahlia " " ... ..	85	7.0	4.7	18.8	—	—
Elementary " " ... ..	370	17.0	9.2	8.9	—	—
Nahda Schools ... ..	112	11.6	5.3	12.5	—	—
Sub-Grade Schools ... ..	279	6.0	4.6	4.6	—	—
<b>EASTERN KORDOFAN.</b>						
Elementary Schools ... ..	326	12.8	18.6	13.1	—	—
Girls Schools ... ..	154	8.4	11.8	5.8	—	—
Sub-Grade Schools ... ..	167	14.3	5.9	17.4	—	—
<b>NORTHERN KORDOFAN.</b>						
Elementary School ... ..	164	14.6	1.8	5.4	—	—
Girls School ... ..	80	6.2	—	6.2	—	—
Sub-Grade Schools ... ..	78	15.0	2.5	—	—	—
<b>WESTERN KORDOFAN.</b>						
Elementary Schools ... ..	644	51.2	29.0	43.6	—	—
Girls Schools ... ..	116	75.8	0.8	6.0	—	—
Sub-Grade Schools ... ..	406	40.8	6.1	32.7	—	—
<b>WESTERN JEBELS.</b>						
Elementary Schools ... ..	534	—	41.9	15.3	—	—
Sub-Grade Schools ... ..	215	24.1	44.6	44.6	—	—
<b>EASTERN JEBELS.</b>						
Elementary Schools ... ..	523	3.1	17.3	32.8	—	—
Girls Schools ... ..	63	1.5	23.1	23.1	—	—
Sub-Grade Schools ... ..	201	5.9	14.9	75.1	—	—

Province and District.	No. Exam.	% Trachoma	% Bilharzia	% Spleen	% Pulm. T.B.	% Anoy-lost.
<b>Khartoum Province.</b>						
Higher Schools ... ..	63	5	—	—	—	—
Secondary Schools ... ..	790	9	0.1	1.0	—	—
Intermediate Schools ... ..	1348	19	—	0.5	—	—
Elementary Schools ... ..	4613	33	0.8	3.0	—	—
Khalwas ... ..	4406	40	0.7	1.7	—	—
Maahad Ulema ... ..	157	31	—	3.0	—	—
Technical Schools ... ..	102	35	—	1.0	—	—
Girls Unity Schools ... ..	76	23	—	—	—	—
„ Intermediate „ ... ..	622	31	—	0.6	—	—
„ Elementary „ ... ..	2560	42	—	0.6	—	—
Mixed Interm. schools ... ..	195	15	—	1.0	—	—
<b>Kassala Province.</b>						
<b>PORT SUDAN.</b>						
Intermediate Schools ... ..	149	1.9	1.3	2.0	—	—
Elementary Schools ... ..	1656	32.6	0.2	2.4	—	—
<b>GEDAREF.</b>						
Elementary schools (boys) ... ..	333	69.0	—	21.0	—	—
„ „ (girls) ... ..	137	53.3	—	23.3	—	—
Village Schools ... ..	1471	32.0	8.5	31.3	—	—



## SUDAN MEDICAL MISSION WITH THE SUDANESE PILGRIMS TO MECCA AND MEDINA.

In 1942 and 1943 a Sudanese doctor with a medical assistant and orderlies accompanied the Sudanese pilgrims to Saudi Arabia and the experiment was so successful and the facilities provided were so much appreciated by the pilgrims that it was decided to extend the scope of the medical mission. Accordingly two doctors, a medical assistant, a sanitary overseer, a storekeeper, head hospital orderly and male and female orderlies, and a cook together with two lorries fitted with stretcher gear with drivers were sent with the 1944 pilgrimage from Suakin.

A tented hospital of 30 beds was opened on the Mecca road two miles from Jedda and arrangements made to evacuate from the hospital by sea to Suakin. One doctor with an orderly was posted at Medina in a five bedded dispensary, the medical assistant at Mecca, and the second doctor with the remainder of the staff ran the hospital at Jedda and was responsible for the medical and sanitary supervision of the pilgrims when at Jedda and Mecca and for their medical inspection before their departure for Suakin. Medical facilities were thus provided for the pilgrims at all stages of their journey in Arabia. Hospital cases were concentrated at Jedda and evacuated by steamer to Suakin if necessary. Considerable importance is attached to the medical and sanitary supervision and the medical treatment of Sudanese pilgrims throughout the pilgrimage in the interest of the health of the pilgrims themselves, and also of the public health of the Sudan in order to reduce the risk of the introduction of quarantines diseases particularly smallpox into the Sudan.

The pilgrimage from Suakin includes pilgrims from territories across Africa as far as the west coast and as they are often seen by the health authorities for the first time at Suakin it is impossible to make certain that they are all immunised against smallpox on arrival at Jedda although of course they are vaccinated at Suakin.

As the number of West African pilgrims from Suakin is usually higher than the number of Sudanese, the Sudan Medical Mission also provides facilities for pilgrims from other territories along the African pilgrim route.

The cost of the medical mission to the Government this pilgrim season is estimated at £E. 5,000.

The pilgrims from the Sudan who numbered 6,939 were most appreciative and enthusiastic about the work of the mission in providing adequate medical facilities for them at all stages of their journey and in protecting their health by sanitary precautions particularly at Muna and other places where there is most danger of epidemic disease. Although inpatient treatment was restricted to Sudan pilgrims, outpatient treatment was given to all who asked for it.

The attendances at the hospitals and dispensaries totalled 12,875 made up as follows :

HOSPITAL OR DISPENSARY.	Men	Women	Children	Total	Sudanese	Others
Muna—Araft travelling disp. ...	1,008	559	183	1,750	750	1,000
Jedda ... ..	474	185	90	749	269	480
Jedda—Mecca ... ..	1,761	342	189	2,292	927	1,365
Medina ... ..	1,311	627	285	2,223	937	1,286
Mecca—Jedda ... ..	3,970	1,137	754	5,861	1,748	4,113
TOTAL ... ..	8,524	2,850	1,501	12,875	4,631	8,244



## GENERAL IMPROVEMENT IN STATE OF PUBLIC HEALTH IN THE SUDAN DURING THE LAST 48 YEARS.

It may be of interest and instructive to consider the state of public health at present and the improvements which have taken place since the present administration was formed.

Up to 1898 the whole of the Sudan was notoriously unhealthy and even the towns in the north such as Khartoum were ravaged by epidemics of malaria, dysentery, dengue fever, smallpox and cerebrospinal meningitis. Khartoum in Gordon's day was a hotbed of disease. The control of endemic disease in the towns was taken in hand as soon as the condominium government was formed and Khartoum rapidly acquired fame owing to the efficient antimalarial organisation which was then formed.

As a result of the public health measures taken and the curative facilities established in the Northern Sudan endemic disease has been brought under adequate control in most areas, and epidemic disease effectively dealt with when it occurs. At the present time malaria is comparatively rare in Khartoum and the towns of the Northern Sudan, and it has been possible to prevent the waves of epidemic malaria which used to sweep the Northern Sudan with an appalling mortality. Endemic malaria still occurs of course but the mortality is comparatively very low.

Cerebrospinal Meningitis although still liable to occur in extensive epidemics in the South and Central Sudan only occurs in sporadic form in the North.

Smallpox which was a terrible scourge and the cause of a heavy mortality and blindness in the past is now rare, and at the present moment is non-existent in the Sudan although prevalent in neighbouring countries.

The public health services have extended their scope until they now cover the whole Sudan.

It has been possible to do much against epidemic disease to which the Sudan from its position is particularly liable.

As regards endemic disease a large scale campaign proved most successful against sleeping sickness which was threatening a large part of the Southern Sudan during the last war and before, and the incidence is now very low, under 100 cases a year in the whole Sudan with very few deaths.

Yaws which used to be extremely prevalent in the Southern Sudan and the cause of an enormous amount of deformity and morbidity is now rare and only found in remote areas as a result of the extensive campaigns which have been undertaken against it. Efforts have been made to deal with leprosy and there is no indication that it is spreading; in fact it is probably decreasing in certain areas. Vesical Bilharzia has been vigorously dealt with, and the incidence reduced in many areas in the Northern Sudan. Rectal Bilharzia on the other hand is still a difficult problem and a menace to public health in some areas.

It can thus be said that the state of public health has steadily improved during the last forty years and that the Sudanese as a whole are now a comparatively healthy people, although there are still districts in the Southern Sudan where the inhabitants despite a healthy care free appearance are widely afflicted with several endemic diseases.

A midwifery service, school medical services, and health centres try to safeguard the health of the citizens of the Sudan through life.



Although there is every cause for satisfaction with the results of British medicine during the last forty-eight years, there is no room for complacency. Much remains to be done. Tuberculosis although not very common at present must be more adequately dealt with if it is to be kept in check with the advent of civilisation and better contact with the outside-world. Housing, diet, and social medicine require more attention. The treatment of mental disease requires improvement and extension.

The Sudan Medical Service budget is now nearly £E. 500,000 a year, nearly 10 per cent. of the budget of the Sudan, so it is unlikely that the country will be able to afford to spend much more directly on medical work.

Fortunately the direct expenditure required to develop social medicines should be comparatively small, and it should be possible with the funds available to progress on the lines indicated.

# OPHTHALMIC REPORT.

BY DR. A. R. MCKELVIE.

The Eye Department at Khartoum contains 66 beds for male patients and 44 beds for female patients.

The following figures summarise the work carried out during the past five years:

				1940	1941	1942	1943	1944
Inpatients ...	...	...	...	694	753	882	1,200	1,147
Outpatients	...	...	...	84,334	109,326	82,531	82,226	73,133
New Cases	...	...	...	21,499	24,724	14,033	34,660	13,503
Major Operations	...	...	...	498	677	827	897	1,082
Minor Operations	...	...	...	322	610	421	471	718



# REPORT ON THE STACK MEDICAL RESEARCH LABORATORIES FOR THE YEAR 1944.

BY DR. E. S. HORGAN.

## RESEARCH.

The results of the investigations on the excretion of 4:4 diamidino stilbene (Stilbamidine) in Kala Azar patients mentioned in last year's report have been published. (Kirk and Henry. Ann. Tro. Med. and Parasit. 1944 Vol. 38 p. 99).

In the chemotherapy of this disease a preliminary trial was made of a new organic antimony preparation and a note of the results will be found under the appropriate heading.

Other research activities during the year included trials of alcoholized T.A.B. vaccine, further work on selective media for dysentery bacilli and preparation of anti precipitin sera for medico-legal use. Field work was curtailed owing to the absence of members of the staff on home leave.

## ROUTINE AND EDUCATIONAL ACTIVITIES.

A summary of the routine work and examinations is appended to this report; the total number of examinations was 28,641 which is practically the same as last year's figure (27,835).

Owing to the gradual return to peace time conditions in the Sudan, the number of army examinations has fallen off considerably but the reduction is more than balanced by an increase in general routine work from the civil hospitals.

There has been nothing of particular interest to report during the year.

### Staff Changes.

Two Sudanese Laboratory Assistants were trained bringing the total to 38 and one, demobilized from the Sudan Defence Force, was taken on the permanent staff.

The number of hospital laboratories (26) remains the same.

## ROUTINE.

### PATHOLOGICAL SPECIMENS.

The total was 523 (excluding brains for rabies).

### POST MORTEMS.

29 were carried out in Khartoum Hospital of which 9 were medico-legal.

### NEOPLASMS.

192 were received, of which 118 were malignant. The following table is a brief summary:—

SITE.	Carcinoma	Sarcoma	Endothelioma	Melanoma	Mixed.	Total
Skull ... ..	—	1	—	—	—	1
Scalp ... ..	2	3	—	—	—	5
Face ... ..	4	1	—	—	—	5
Lip ... ..	2	—	—	—	1	3
Mouth ... ..	—	—	—	—	2	2
Tonsil ... ..	—	—	—	—	1	1
Salivary Glands ...	4	—	—	—	9	13
Jaw ... ..	2	—	—	—	—	2
Eye ... ..	7	3	—	—	—	10
Nose ... ..	—	—	1	—	—	1
Neck ... ..	3	1	1	—	—	5
Thyroid Gland ...	1	—	—	—	—	1
Hand ... ..	—	1	1	—	—	2
Arm ... ..	—	1	—	—	—	1
Leg ... ..	7	2	—	—	—	9
Foot ... ..	1	—	—	3	—	4
Liver ... ..	1	—	—	—	—	1
Omentum ... ..	—	—	1	—	—	1
Anal Canal ... ..	3	—	—	—	—	3
Kidney ... ..	—	—	—	—	1 (Teratoma)	—
Bladder ... ..	1	—	—	—	—	1
Prostate ... ..	1	—	—	—	—	1
Penis ... ..	3	—	—	—	—	3
Ovary ... ..	1	—	—	—	—	1
Uterus ... ..	2	—	—	—	—	2
Cervix ... ..	2	—	—	—	—	2
Broad Ligament ...	—	1	—	—	—	1
Vagina ... ..	1	—	—	—	—	1
Vulva ... ..	1	—	—	—	—	1
Breast ... ..	10	—	—	—	—	10
Inguinal Region ...	—	3	—	2	—	5
Lymphatic glands						
Lymphatic glands site not stated ...	5	5	—	—	—	10
Skin site not stated ...	4	—	1	1	—	6
Site not stated ...	3	—	—	—	—	3
<b>TOTAL ...</b>	<b>71</b>	<b>22</b>	<b>5</b>	<b>6</b>	<b>14</b>	<b>118</b>

### Comments.

The melanomata included three from the usual situation (the foot) found in the Sudan and one the site of which was not stated but which was probably the foot also.

The two from the inguinal lymphatic glands were secondary deposits; the source of the primary tumours was not stated.

### Jaw.

One of these tumours was a malignant adamantinoma of the maxilla of the type resembling a squamous carcinoma.

Another was a fungating squamous carcinoma involving the mandible but there was insufficient evidence to determine whether it arose from the skin or the oral mucous membrane.

### Liver.

The specimen was a multiple primary carcinoma (carcino-matous cirrhosis).



### Salivary gland.

"Mixed celled tumours."—The total 13 is unusually large; of these seven were from the parotid, one from the submaxillary gland. The rarer sites were, one from the tonsil; two from the oral mucous membrane and one from the upper lip.

### RABIES.

161 brains were received of which 7 were decomposed and useless for section. 44 were positive for Negri bodies including 36 dogs, 1 goat, 5 donkeys and 2 camels.

Rabies Vaccine. 97,150 c.cs. were issued.

### MEDICO LEGAL.

#### Precipitin tests for origin of blood.

In the past it had been the practice to send all blood stains for identification of the species to the Medico-legal Institute, Cairo, but this procedure has always been very unsatisfactory owing to the long delay—six to eight weeks—between the despatch of the specimen and receipt of the report. In addition, in recent years, the legal or police official investigating the case has not infrequently asked for the blood group if the stain turned out to be of human origin and this test is apparently not carried out in the Institute in Cairo.

Attempts were made on more than one occasion in the past to prepare rabbit anti precipitin sera but all were unsuccessful, the animals usually dying during the course of immunization. The war brought these experiments to a stand still. Early in 1944 a request was received from the Medical Entomologist for anti-precipitin sera of various kinds, in connection with his work on the blood meals of certain Anophelines in the Gezira. Owing to the falling off of war demands, it was found possible to institute further experiments on preparation of sera, the method used being the recently described one of Proom (*J. of Path. and Bac.* 1943. Vol. 55 p. 419) using alum precipitated sera as the antigens.

The results have been most successful and a battery of high titre sera has been prepared including human, camel, sheep goat, donkey and chicken and these sera have been frozen, dried and stored *in vacuo* at 4°C.

In consequence, it has been found possible to undertake (since April, 1944) the identification of blood stains for medico-legal purposes and as the results can now be reported in a few days from receipt of the specimen, the advantage to the Legal Authorities is considerable.

**Technique**—As a matter of interest, the technique found to be most useful and which has been adopted as routine is the micro-precipitin test of Colles (*Forensic Chemistry and Scientific Criminal Investigation.* Lucas. 3rd edition. London).

**Blood grouping of stains.** In several specimens where there was a sufficient amount of blood stain of human origin grouping has been carried out; after various trials the method adopted has been that of Martley (*Recent Advances in Forensic Medicine.* Smith and Glaister 1931.—London).

### FILARIASIS.

**Filaria bancrofti**—in the Nuba Mountains.

Although the existence of occasional cases of elephantiasis in the Nuba Mountains has been known for years nothing definite appears to have been known of the



causative filaria. During the year a series of slides from a number of patients was received from the Medical Officer, Kadugli who reported that the filariae present were *F. bancrofti*. His diagnosis was confirmed and blood films taken at intervals throughout the 24 hours exhibited the classical nocturnal periodicity of the species.

It is perhaps a slight exaggeration to remark that "out of Nuba always something new" but to the writer at least the finding was a surprise for the accepted view has been that throughout the Sudan *F. bancrofti* was extremely rare. It is true that some years ago the diagnosis of the Senior Medical Inspector, Li Rangu (Dr. Woodman) of a few cases of *F. bancrofti* in Li Rangu area was confirmed but these were generally assumed to be exceptional.

The above finding, however, indicates a need for similar surveys in other areas where clinical filariasis exists and until their results are known an attitude of scepticism towards the traditional view might well be adopted.

### BACILLARY DYSENTERY.

**Culture Media.** The work mentioned in last year's report on the examination of various batches of sodium desoxycholate locally isolated from ox bile was continued. No further light was thrown on the difference in the selective action of various batches as these most recently prepared gave quite satisfactory results throughout the year.

Further trials were made with Leifson's citrate agar for the isolation of dysentery bacilli. The author's statement that certain dysentery types especially Shiga were inhibited was confirmed. *B. Shigae* was isolated in a few instances but only from faeces containing the organisms in large numbers.

A series of tests indicated that the medium could be modified to meet local conditions and excellent results have been obtained during the past year using the following modification:—

To a meat infusion base (ox heart) the following solutions are added in the proportions of 5 cc. each to 100 c.c. of medium.

#### SOLUTION "A."

Lectose	...	...	...	...	...	...	...	...	...	20 grms.
Sodium Citrate AR	...	...	...	...	...	...	...	...	...	50 "
Sodium Thiosulphate AR	...	...	...	...	...	...	...	...	...	10 "
Ferric Citrate (Scales)	...	...	...	...	...	...	...	...	...	2 "
Distilled Water	...	...	...	...	...	...	...	...	...	100 cc.

#### SOLUTION "B."

Sodium Desoxycholate	...	...	...	...	...	...	...	...	...	2 grms.
Distilled Water	...	...	...	...	...	...	...	...	...	100 cc.

Titrate to pH. 7.2 and add Neutral Red 1 in 25,000.

This modification has slightly impaired the selectivity of the medium in that certain strains of coliform organisms are not inhibited but luxuriant growths of all dysentery types have been obtained after 18 hours incubation.

It was further found that a medium highly selective for the Flexner group only could be prepared by increasing the percentage of sodium citrate and using half the quantity of sodium desoxycholate advocated by Leifson, thus effecting a considerable saving of the sodium salt. This medium should be very useful in any country where the Flexner group is the preponderating cause of bacillary dysentery.



A small quantity of Difco S.S. Agar has been obtained from the U.S. Army Medical Corps but the few trials so far carried out indicate that this medium also shares the disadvantage of Leifson's namely an inhibitory action on *B. shigae*.

## TYPHOID PROPHYLAXIS.

### Comparative studies on different vaccines.

Felix and others have recently emphasized the value of alcoholized T.A.B. vaccines and in view of their assertions that the protection conferred is greater than that of the standard phenolized vaccines a trial was made of their comparative values in both man and experimental animals. Through the co-operation of the A.D.M.S. Headquarters Troops, Sudan, Colonel N. Mcleod, the human trials were carried out on recruits of the Northern Training Depot, Omdurman.

200 recruits from the Nuba Mountains area, none of whom had any history of previous inoculation with T.A.B. vaccine were divided into two batches of which one was given the standard phenolized T.A.B. and the other given an alcoholized T.A.B. vaccine prepared according to Felix's technique. Samples of blood were taken from all before inoculation and again a fortnight after the second dose. The doses were administered at weekly intervals and were so arranged that the troops had the benefit of the weekly holiday (Friday) on the day following inoculation.

The following is a brief summary of the results:—

**Reactions**—The men were instructed to report if the symptoms interfered with their ordinary duties but only one who had received the phenolized vaccine did so. However, all inoculated with this vaccine complained of the usual fever and malaise while those inoculated with the alcoholized vaccine, had no complaints apart from a transitory stinging sensation immediately following inoculation.

#### AGGLUTINATION TITRES. (i) BEFORE INOCULATION.

		T			Para A	Para B
		H.	O.	Vi	0	0
1—12.5	...	—	—	7	—	—
1—25	...	8	7	2	—	—
1—50	...	8	6	—	—	—
1—125	...	8	—	—	—	—

#### (ii) AFTER INOCULATIONS.

		PHENOLIZED					ALCOHOLIZED.				
		T		Para A	Para B	T		Para A	Para B		
		H	O	Vi	0	0	H	O	Vi	0	0
Neg.	...	—	—	29	36	—	—	—	—	30	—
1:12.5	...	—	—	27	—	—	—	—	—	—	—
1:25	...	—	—	22	55	—	—	—	2	54	—
1:50	...	—	—	14	5	—	—	—	14	8	—
1:125	...	—	36	3	—	11	9	7	45	—	—
1:250	...	—	53	4	—	82	14	55	26	—	—
1:1500	...	2	7	—	—	3	25	23	5	—	84
1:1250	...	2	—	—	—	—	22	7	—	—	8
1:2500	...	92	—	—	—	—	22	—	—	—	—

4 of this batch did not receive a 2nd injection owing to illness or having deserted.

8 of this batch did not receive a 2nd injection owing to illness or having deserted.



**Comments**—The chief difference observed is the marked response of Vi agglutinins in the case of the alcoholized vaccine as compared with the poor response of the phenolized vaccine.

There were no significant differences in the response of the other agglutinins. A feature of some interest is the very poor response of Para. A (O) agglutinins to either vaccine. **ANIMAL EXPERIMENTS.** A—**MICE**—60 mice were divided into two equal batches, inoculated with the alcoholized and the phenolized vaccines respectively. Inoculations were by the subcutaneous route, two doses of vaccine being given at intervals of a week and the protective effects tested ten days after the second dose with virulent cultures of each organism. An equal number (60) of controls received the test doses.

The results were clear cut; no difference could be detected between the protective powers of the vaccines against *BACT. TYPHOSUM* and *BACT. PARATYPHOSUM B.*

Thus each afforded complete protection against 2 M.L.D. almost complete against 5 M.L.D. and partial against 10 M.L.D. of each organism.

The strains used were of high virulence the M.L.D. being *BACT TYPHOSUM* (Ty 2)=40 millions and *BACT. PARATYPHOSUM B.* (a locally isolated strain) 20 millions.

The results with *BACT. PARATYPHOSUM A* were unsatisfactory owing to the extremely low virulence of the test strain. B—**RABBITS**—12 animals were immunized with two standard doses of each vaccine—six being inoculated subcutaneously and six intravenously and all were bled at intervals of 7, 14 and 21 days following the second dose.

The results showed no differences in the titres of the H and O agglutinins but while there was a very poor response of typhoid Vi agglutinin to the phenolized vaccine, half of the animals being negative, all animals receiving the alcoholized vaccine showed appreciable titres.

**Conclusions**—The contentions of Felix and others that with the alcoholized vaccine the reactions are less and the Vi agglutinin response is much better, are borne out in the present experiments.

Judged however from the mouse protection experiments there is no evidence of any superiority of the alcoholized over the standard phenolized T.A.B.

## **PRESERVATION OF STOCK CULTURES.**

Since 1938, it has been the practice in the Stock Laboratories to preserve stock cultures in a dried state *IN VACUO* at 4°C (Drysdale, monthly Bulletin 1941 Vo. 7: p. 49).

In 1941 a number of dried cultures was put aside with the view of determining through what period they would retain their viability. They included species of *SALMONELLA*, *B. DISENTERINE*, *PAST PESTIS*, *TR. PYOGENES*, *BR. MELITENSIS* and *BR. ABORTUS*. In December, 1944 the tubes were opened and subcultured and in all cases growth took place. The result strikingly illustrates the value of this method

In the case of *V. CHOLERA* the method as used in Kassuli, has given satisfactory results. The 18 hours cultures in peptone water 1 percent., are diluted to 0.25 percent., the tubes sealed in a flame and stored in the refrigerator. The organisms retain viability for about six months.

## **KALA AZAR.**

### **Chemotherapy.**

Sodium antimony gluconate is a new British preparation which in experimental animals behaves in the same way as solustibosan. Clinical tests of this drug in cases



of Kala Azar were carried out during the year, at the request of Dr. C. M. Wenyon, F.R.C., 12 cases have been treated under strictly controlled conditions, and late as well as immediate results are now available, from which it can be stated that the drug is efficacious, and will cure a high proportion of cases. The drug can be used as a ready-made solution. It appears to be stable, non-toxic, and in use is certainly the most convenient preparation known to us for the treatment of Kala Azar. The only disadvantage seems to be that it apparently fails to influence the infection in a small proportion of cases. This has been noted with every preparation of antimony in Sudan Kala Azar.

Certain physicians in Spain have recently reported favourably on the use of a specially concentrated solution of sodium antimony gluconate by means of which a more intensive form of treatment can be undertaken. Preliminary observations in the Sudan suggest that this is a hopeful line of investigation but the final results are not yet available.

## **VACCINIA.**

### **ROUTINE PREPARATION OF VACCINE LYMPH.**

141 sheep were used : the total yield of pulp was 7,411 grms. the average being 52.5 grms. per sheep. These figures are the highest yet obtained comparing with an average of 50 grms. in 1943, and indicate the high susceptibility of the local sheep as vaccinifers.

**DOSES ISSUED—1,396,500**

The high total was chiefly due to intensive vaccination campaigns in the Northern Sudan following many local outbreaks of small pox introduced from Egypt.





*Summary of Weil Felix Reactions (OX 19)*

Positive	...	...	...	...	...	...	...	...	11
Negative	...	...	...	...	...	...	...	...	47

*Vaccines Issued during 1944.*

T.A.B.	...	...	...	...	...	...	...	26,400 c.cs.
Anti-Rabic	...	...	...	...	...	...	...	97 150 c.cs.
Cholera ...	...	...	...	...	...	...	...	9 700 c.cs.
Staphylococcus	...	...	...	...	...	...	...	175 c.cs.
Vaccine Lymph	...	...	...	...	...	...	...	1,632.180 units

# REPORT ON MEDICAL ENTOMOLOGY FOR 1944

## GENERAL.

Collections received for identification numbered 89. They came from various parts of the Sudan and from Arabia, Eritrea, Ethiopia, the Gold Coast, Kamaran Island and Kenya. Several species of mosquitoes previously unknown in the Sudan were received from Dr. P. H. Abbott in Darfur. The number of forms of Culicidae now known in the Sudan is 136, comprising 127 species, three subspecies and six varieties. A paper on the taxonomy and distribution of Culicidae in the Sudan has been prepared and accepted for publication.

Training was given to a number of public health personnel.

Insecticides were tested on *Aedes aegypti*.

Visits were made to Port Sudan, the Jebel Auliya Reservoir, Singa, Suki and Wadi Halfa.

The flies which have been most commonly found breeding in pit latrines in the Khartoum area and some other parts of the Northern Sudan have been identified at the British Museum as *Diploneura cornuta* Big. (Phoridae), *Eumerus obligues* F. (Syrphidae) and *Milichia pubescens* Beck. (Milichidae.) The common species in the South is *Chrysomya putoria*. The first three appear to be harmless and the last-named much less dangerous than the house-fly.

In the climate of the Northern Sudan it is difficult to find a suitable cement for ringing gum-choral microscopic mounts of insects. Several of the substances usually recommended are useless and lead to considerable loss of time and material by deterioration months after application. At the suggestion of Dr. I. M. Puri, Du Noyer's lanoline rosin cement (Langeron, *Precis de Microscopie*) was used and appears to be almost ideal if it stands the test of time.

## CIMICIDAE.

The general distribution of the two species of bed bug in the Sudan is now well known.

The temperate bug, *Cimex lectularius* is prevalent in the northern Sudan west of the Red Sea Hills. The tropical bed bug, *C. hemiptera*, occurs along the coastal plain and in the far south. Both species are found near Malakal, in the Nuba Mountains and in Equatoria. In these areas *C. hemiptera* is often common in native villages whereas *C. lectularius*, which is apparently advancing from the north, tends to occur in the towns and large villages.

## ANOPHELINE MOSQUITOES.

Observations on *Anopheles gambiae* in the Gezira irrigated area were continued.

On the Jebel Auliya Reservoir *Anopheles rufipes* was found to frequent houses in the Kawa area.

It was found that the floating properties of different makes of Paris green differed greatly. At the Gezira Research Farm the dluent used during the year was half river silt and half sand from the Maringan sand hill. This was found suitable for field channels because the poison attached to the sand grains fell rapidly.



Further observations on *GAMBUSIE HOLBROOKI* in the Sennar Reservoir strengthened the conclusion that this fish is of little value for mosquito control in large bodies of water containing Nile fish. A consignment of 3,000 was sent to Nahud and the fish are reported to have bred profusely and been of great value. The Faras basin near Wadi Halfa is now stocked annually.

### CULICINE MOSQUITOES.

*Aedes (Stegomyia) unilineatus* has been found to bite man at Erkowit.

The Medical Entomologist continued to arrange the work of the Headquarters Aedes Control Unit and the Blue Nile Province Unit.

### CHIRONOMIDAE.

Non-biting midges are a serious nuisance each year at Khartoum and Wadi Halfa, where they fly in clouds at certain seasons. At Khartoum in December larvae and pupae of several species were found in mud beneath several feet of water in the Blue Nile.

### SIMULIIDAE.

In April pupae of *Simulium damnosum* and *S. griseicolle* were found in the Second Cataract near Wadi Halfa. Several adults of the former species, of which this appears to be the most northerly record on the Nile, were seen biting people.

### MUSICIDAE.

House flies were again found breeding in wet cotton seed used as fuel.

### PUBLICATIONS.

The following papers dealing with Medical Entomology have been published since those noted in the last report.

Lewis, D.J. (1943), The Culicine Mosquitoes of Eritrea. Bull. Ent. Res., 34, 279-285.

(1944), A new subspecies of *Aedes lesoni* Edwards (Dipt., Culicidae) from the Sudan. Proc. Royl. Ent. Soc. Lond., B, 13, 27-29.

# REPORT ON THE WORK OF WELLCOME CHEMICAL LABORATORIES FOR THE YEAR 1944

The work of the laboratories has been maintained at high pressure throughout the year, all routine demands have been met and in addition a substantial amount of work of a research nature has been carried out. The Laboratories are still accommodated in temporary quarters in Shambat, but every effort is being made to obtain satisfactory new laboratories in Khartoum at the earliest opportunity. No programme of work arising out of postwar expansion can be undertaken until adequate accommodation and staff become available.

The number of routine samples examined during the year was 923 as compared with 703 in 1943. This number does not include some 300 samples of urine examined for mepacrine and still bamidine in connection with research on these compounds to which reference is made later. There have been considerable increases in the numbers of milks, methylated spirits and miscellaneous foodstuffs, but otherwise the nature and volume of the work have remained approximately constant. The samples received were classified as follows, the corresponding figures for 1943 being also given :—

	1944	1943
Waters ... ..	83	81
Foodstuffs ... ..	279	157
Medico-legal and Miscellaneous Drugs	147	133
Mineralogical ... ..	115	112
Miscellaneous Drugs ... ..	279	220

## WATERS.

Seventy six of those received were classed as potable waters. Of these about half were from Tokar, principally from a number of new bores which have been opened up at Krembit. Nearly all of the remainder were miscellaneous samples from various parts of the country.

## FOODSTUFFS.

The substantial increase in this category is due partly to the recommencement of the control of milk supplies and partly to a large increase in the number of samples of Dura flour submitted by Sudan Defence Force Supplies. Included also are forty two samples of sesame seed which are being examined for the Department of Agriculture in connection with reaping trials.

## MEDICO-LEGAL AND MISCELLANEOUS DRUGS.

These are subdivided into pathological (71), toxicological (32) and miscellaneous drugs (44). Of the first group 42 were associated with twelve separate cases of suspected poisoning, but in only one (a goat) was a definite positive result (arsenic) obtained. In two cases small quantities of zinc were reported. Nine samples of blood serum for calcium and chloride, and seven samples of faeces for split and unsplit fat were also received.



Amongst the toxicological samples were six specimens containing *Datura metel*, two containing arsenic and one hashish. The miscellaneous drugs included nineteen samples of various drugs for conformity or otherwise to B.P. standards.

### **MINERALOGICAL.**

This category includes coals and cokes examined for the Railways, mineral oils and various minerals and related materials.

### **MISCELLANEOUS.**

Sixty two of these were cottonseeds, castor seeds and cakes examined for oil content and grain for dirt content ; 55 were methylated spirits ; 46 were soaps from various local sources ; 35 were charcoal briquettes ; while other samples cover a wide variety of materials.

### **INVESTIGATIONS.**

The work of a research nature has been concerned principally with the chemotherapeutic agents stilbamidine, propamidine and mepacrine. A simple method of handling bromine solutions with fair accuracy has been devised and has been extensively used for following the action of bromine on propamidine and for investigating the kinetics of the photochemical decomposition of stilbamidine. It has been shown that with propamidine a slow substitution occurs, two atoms of bromine going (probably) into the benzene rings. The examination of the kinetics of the photochemical decomposition of stilbamidine is still not complete, but all the information obtained so far supports the view expressed in *Nature* (152,690) that dimerisation and cis-trans isomerism are the principal reactions taking place. It has been found that the amidines can form complexes with free bromine and iodine, presumably involving in the first place the imino-hydrogen atom of the amidine group.

The absorption-fluorescence method of estimating stilbamidine has been improved and modified so as to be suitable for the estimation of mepacrine in body fluids. A case of malaria treated with mepacrine was examined in detail and the results of this work have been submitted for publication.

The seed oils of seven Sudan mimosaceae have been characterised and the results submitted for publication. An interesting feature of these oils is the presence in them of a proportion of higher saturated acids of the arachidic type, the bringing them into line with the papilionatae, a parallel subfamily of the Leguminosae.

During the early months of the year some 300 lbs. of solid camphor of good quality were prepared from the leaves of *Ocimum Kilimandscharicum* for use by the Sudan Medical Service.

## PROGRESS OF WORK.

### CURATIVE MEDICINE.

The following figures show the number of inpatients, outpatients attendances and operations performed during the last twelve years:—

YEAR.	Inpatients.	Outpatient Attendances.	Operations Performed.
1933	70,315	5,092,999	8,609
1934	85,990	6,039,197	10,082
1935	89,093	6,112,303	11,124
1936	96,081	6,500,441	11,229
1937	101,088	6,675,989	12,063
1938	104,366	6,989,990	11,438
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	7,093,781	13,796

The work at hospitals and dispensaries is more or less stabilised. The number of available beds is well over 1 per 1,000 of the population. Considerable attention is being paid to the improvement of existing facilities and much has been done in this respect despite war conditions. Complete new hospitals are under construction at Khartoum North and Shendi to replace old buildings, and throughout the country hospital and dispensary accommodation has been considerably improved during the last few years. Financial approval was given this year for all 3rd class hospital treatment to be free which is of considerable benefit to the community, and to this fact the increase in the number of inpatients is largely due.

Hospital diets have been greatly improved. The rates of pay of hospital orderlies have been raised and put on a regular basis with fixed scales and higher paid posts at an additional cost to the Government of about £E. 30,000 a year. It should now be possible to produce a more highly trained Sudanese male or female nurse and every effort is being made to ensure that full value is obtained in improved nursing facilities for the additional expenditure. A tribute should be paid to the very efficient medical stores department which ensured that at no time during the war was there any serious shortage of drugs, and that there was at all times an adequate supply of all essential drugs. The organisation of the Khartoum and Omdurman Civil Hospitals is being continually improved, and preliminary steps have been taken for the construction of a modern 500 bedded hospital at Khartoum which with the Eye Hospital, and Omdurman and Khartoum Military Hospitals will provide about 1,000 hospital beds for Khartoum Province with a population of approximately 286,000.

The constant increase in the number of medical officers as men qualify from the Kitchener School of Medicine will enable a more adequate qualified medical staff to be provided for certain hospitals which are at present understaffed.

### PREVENTIVE MEDICINE.

The School of Hygiene has been reorganised during the year and now has a British Senior Public Health Inspector in charge with a Sudanese Public Health Officer to assist him. The public health officers' course which is of three years duration is being revised.



Special efforts have been made throughout the year to train an adequate cadre of subordinate public health officials. The Graphic Museum is now complete but requires continual revision.

The school medical and dental service were all maintained. The Midwives Training School continues to expand its activities. A British Lady Doctor now examines the girls schools in Khartoum and a British Health Visitor has been appointed to organise health visiting and welfare work in the Sudan particularly in Khartoum. The appointment of a whole-time British Dental Officer has been approved.

Anti-malarial work has been extended in many parts of the Sudan, and anti-aedes measures have been extended and improved.

## **RESEARCH.**

Investigations were carried out on kala-azar, yellow fever and calf lymph.

The Medical Entomologist continued his investigations on anopheles mosquitoes in the irrigated area of the Gezira and White Nile, and Wadi Halfa, and on Bilharzial snails in the Gezira. He is now studying certain tsetse fly problems in Southern Sudan.

## **GENERAL.**

The Sudan Medical Service as a whole has developed very rapidly and steadily during the last twenty years. Between 1932 and 1944 alone the annual expenditure increased from £E. 230,000 to £E. 450,000 excluding war allowance and it will be approximately £E. 500,000 in 1945.

This represents a considerable percentage of the total budget of under £E. 6,000,000 much of which has to be earmarked for loan interest and military and other war expenditure.

The limited additional funds which will be available in the future will have to be spent with great care to ensure the best value for money.

## **FUTURE DEVELOPMENT.**

As regards the development of the Sudan Medical Service the curative services are now in general as extensive as the country is likely to be able to afford, and with few exceptions the hospital and dispensary buildings are adequate. Included in the exceptions however is the new 500 bedded central teaching hospital for Khartoum whose construction has been interrupted by the war.

The public health services are also well organised and practically complete. The chief expansion of medical work in the future is likely to be in the homes of the people rather than in the hospitals or in the public health services. Social medicine, propaganda, health visiting, ante-natal, midwifery, and child-welfare services, school medical services, diets, housing, etc., are the lines on which most expansion is likely to take place. Connected with these, better facilities will be required for the treatment of tuberculosis and mental disease. There is also still much to be done to improve the quality of existing curative and preventive medical facilities.

# TRAINING

Training was carried of the following categories of staff :

<i>Hospitals.</i>	<i>Public Health.</i>	<i>Laboratories.</i>
Medical Officers	Public Health Officers	Laboratory Assistants,
Dispensers	Sanitary overseers	
Asst. Radiographers	House to house Inspectors	
Medical Assistants	Mosquito men	
Hospital Orderlies	Midwives	
Female Nurses		

## **MEDICAL OFFICERS.**

Medical Officers are trained at the Kitchener School of Medicine and School of Science where they undergo a six year course followed by two years as house physicians and house surgeons at the teaching hospitals of Khartoum and Omdurman.

## **DISPENSERS.**

5 students were under training during the year.

## **MEDICAL ASSISTANTS.**

17 students completed the course and were successful in the passing out examination. The examinations consist of a written paper and a clinical viva. Special emphasis is laid on preventive and social medicine and the early detection of epidemic disease.

## **NURSES TRAINING SCHOOL.**

The training of both female and male orderlies has been reorganised and improved in conjunction with the considerable improvement in their pay and prospects which was approved during the year.

## **LABORATORY ASSISTANTS.**

3 Sudanese Laboratory Assistants were trained during the year making a total of 39.

## **PUBLIC HEALTH OFFICERS.**

None qualified this year owing to the reorganisation of the course.

## **SANITARY OVERSEERS.**

Courses were held throughout the year. 12 candidates qualified in Khartoum. Arrangements were made to train Arabian sanitary overseers for the Government of Saudi Arabia.

## **MIDWIVES.**

15 midwives passed the qualifying examination and were licenced to practice in the Sudan.

431 midwives have been trained since the school opened of whom 332 are still in practice.



10 trained midwives attended refresher courses. The distribution of midwives by provinces was as follows :—

PROVINCE.	Cases.	PROVINCE.	Cases.
Khartoum ... ..	83	Kordofan ... ..	41
Blue Nile ... ..	69	Darfur ... ..	9
Northern ... ..	95	Upper Nile ... ..	6
Kassala ... ..	29		

# KITCHENER SCHOOL OF MEDICINE.

## GENERAL.

With the holding of the professional examinations at the end of the 1944 academic year the School completes its first twenty one years. During this time eighty six doctors have been trained and granted the diploma of the School. The course which was four years in 1924 was lengthened to five years for those students who entered in 1934 and again lengthened to six years commencing January, 1939. This present course consists of eighteen months at the School of Science studying Biology, Chemistry and Physics, then two years at the Medical School for Anatomy, Physiology Pharmacology and Parasitology and the remaining two and a half years in clinical subjects and hospital practice. Following this course there is a probationary period of two years when the graduates hold resident appointments before leaving the supervision of the School to take up posts in the provinces.

### Number of Medical Students :

SCHOOL OF SCIENCE	...	...	...	...	...	...	8
SCHOOL OF MEDICINE :	Preclinical	...	...	...	...	...	8
	Junior Clinical		...	...	...	...	9
	Senior Clinical		...	...	...	...	4
TOTAL							29

## PROGRESS OF CLASSES.

Clinical Surgical and Medical Pathology Courses were added to the syllabus and were given for the first time this year.

A special course on Children's Diseases was given by Dr. Alice Muir Leach.

Demonstrations in Venereal Diseases were held at the Sudan Defence Force special treatment centre.

Clinical evenings and reading of papers by the School Society took place during the year at monthly meetings and students attended as guests at all the British Medical Association meetings.

## PROFESSIONAL EXAMINATIONS HELD.

School of Science. Nil.

School of Medicine.

March           Organic Chemistry.

May             Special Examination in Public Health and Pathology.

December      Anatomy and Physiology.  
                   Pathology and Public Health.  
                   Medicine, Surgery, Obstetrics and Gynaecology and Special  
                   Subjects.

March Special Examination in Organic Chemistry.

One Student was re-examined in Organic Chemistry and reached the required standard.

Dr. A. J. Henry, P.H.D., was the examiner.



### **May Special Examination in Public Health.**

One student was re-examined in Public Health and reached the required standard. Dr. H. A. Crouch, O.B.E., M.C., D.P.H., was the examiner.

### **May Special Examination in Pathology.**

One student was re-examined in Pathology and reached the required standard. Dr. E. S. Horgan, M.D., was the examiner.

### **December—January Anatomy and Physiology Examinations.**

Eight students were examined of whom seven reached the required standard and these will proceed to the clinical courses.

The examiners were :—

Anatomy ... .. F. Bartholomew, F.R.C.S.E.  
Physiology ... Dr. R. Kirk, M.D., F.R.F.P.S.G., D.P.H.

### **December—January Pathology and Public Health Examinations.**

Nine students were examined and all reached the required standard.

The examiners were :—

Pathology ... .. Dr. R. Kirk, M.D., F.R.F.P.S.G., D.P.H.  
Public Health ... Dr. N. L. Corkill, MM., M.D.

### **December—January Final Examinations in Medicine, Surgery, Midwifery and Gynaecology and Special Subjects.**

Four candidates presented themselves for the final examinations and reached the required standard. The School Diploma was then presented to :

Girgis Ayad Iskander.  
Mohamed Osman Abdel Nabi.  
Mahmoud Abdel Rahman Ziada.  
Mohamed Mahmoud.

The examiners were :—

Medicine ... .. Dr. R. M. Buchanan, M.D.  
Surgery ... .. Mr. F. Bartholomew, F.R.C.S.E.  
Midwifery and Gynaecology ... Dr. Dorothy Ramsden, M.B., B.S.,  
D.R.C.O.G.

The examination was carried out under the supervision of a Visitor appointed by the Royal Colleges of Physicians and Surgeons who this year was Mr. C. Max-Page, C.B., D.S.O., M.S., F.R.C.S.

### **SCHOOL PRIZES.**

The following prizes were awarded :

The Anatomy Prize—Taha Baasher.  
The Physiology Prize—Abdel Moneim Wasif.  
The Balfour Prize in Public Health—Taha Osman Balleya.  
The Jackson Prize in Pathology—Mohd. El Hasan Abu Bakr.  
The King Farouk Prize in Ophthalmology—Not awarded.  
The Jackson Prize in Medicine—Not awarded.  
The Waterfield Prize in Surgery—Girgis Ayad Iskander.  
The Jackson Prize in Midwifery and Gynaecology—Mohamed Osman Abdel Nabi.

Sir Robert Archibald, C.M.G., D.S.O. M.D. has donated £E. 100 the interest of which is to be awarded as a prize in Preventive Medicine. This has not yet been awarded.

## **POST GRADUATE COURSE.**

No post graduate course was held during the year.

## **TEACHING STAFF.**

During this year the School lost the services of three lecturers all on retirement.

Dr. R. M. Humphreys, O.B.E., M.D., Lecturer in Medicine, since 1930.

Mr. F. S. Mayne, F.R.C.S.E., Lecturer in Surgery, since 1933.

Dr. H. A. Crouch, O.B.E., M.C., D.P.H., Lecturer in Public Health, since 1933.

The following were elected :—

Dr. A. Cruickshank, O.B.E., M.D., Lecturer in Medicine.

Mr. E. W. T. Morris, F.R.C.S., Lecturer in Surgery.

Dr. A. E. Lorenzen, D.P.H., Lecturer in Public Health.

## **LIBRARY.**

Fifty two new books were added to the library, which now contains 1,552 volumes. During the year 470 books were lent to civil and army practitioners and students.

## **STUDENTS' HOSTEL.**

The hostel in which all students are in residence, has been improved by tree planting and general upgrading of amenities. It is proposed later to build a new one north of the School when the new hospital has been completed and to this end land is being allotted.

## **HEALTH.**

The students are examined annually and X-rayed on commencing clinical work. No serious illness was encountered during the year.

## **GAMES.**

Facilities for tennis, football and netball are provided in the School grounds.



## GRAPHIC MUSUEM.

This museum was completed at the end of 1944. It contains about 3,500 exhibits including photographs, pictures, graphs, tables and models of various kinds and sizes.

It deals with the following subjects :

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. Phlebotomous 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 etc.
51. Historical medicine.

In addition an exhibition of rural sanitation has been organised in the Grounds. Work was commenced on models and photographs in 1935 and the building was completed in 1936 so it has taken ten years to complete the museum. The work was carried out by the medical, public health, and entomological staff of the Sudan Medical Service in their spare time assisted by a Sudanese Assistant Curator and three assistants.

The Sudan is now in possession of a first class museum which should be of considerable value for teaching and propaganda, and which will fit into the post war developments of the service admirably.

So many persons have contributed with their spare time and skill that it is impossible to mention all their names but the museum is particularly indebted to Dr. Crouch who acted as Curator during practically the whole period and to Dr. Corkill, Dr. Buchanan, Mr. Lewis the Medical Entomologist and Mr. Glass of the Public Health Department.

Work has already started on revision and it is obvious that only by constant supervision and much hard work will it be possible to keep this museum up to date.

The establishment and the maintaining of an up to date medical Graphic Museum have proved to be far more exacting and difficult than was anticipated when it was decided to undertake the work.

The results however well justify the effort and the Sudanese citizens are under a considerable obligation to those who by their efforts have provided a most valuable addition to public health organisation of the Sudan,

# MISSIONS.

The following table shows the work carried out by Medical Missions :—

	Inpatients.	Outpatient Attendances	Operations.
<b>CHURCH MISSIONARY SOCIETY.</b>			
Lui (Equatoria) ... ..	978	127,988	167
Juaibor { (U.N.P.) ... }	—	12,814	157
Ler { " ... }	77	2,219	42
Paguir { " ... }	—	2,629	35
Barkonye { " ... }	—	43	—
Salara (Nuba Mountains) ...	—	11,725	—
Katcha " " ...	691	15,307	30
Omdurman (Khtm. Prov.) ...	2,234	71,129	130
 <b>SUDAN UNITED MISSION.</b>			
Heiban (U.N.P.) ... ..	200	8,656	—
 <b>AMERICAN MISSION.</b>			
Nasir (U.N.P.) ... ..	—	8,261	—
Doleib Hill (U.N.P.) ... ..	—	8,273	—
Khartoum North (Khtm. Province) ... ..	—	6,818	—
 <b>SUDAN INTERIOR MISSION.</b>			
Melut } Abaiyat }	} Figures not available from Mission		



# S T A F F .

## SUDAN MEDICAL SERVICE 1944

### APPROVED BUDGETARY ESTABLISHMENT OF CLASSIFIED OFFICIALS

Appointment.	Establishment
<b>Headquarters.</b>	
Director ... ..	1
Assistant Director (Public Health) ... ..	1
Assistant Director (Hospitals) ... ..	1
Controller of Medical Stores ... ..	1
Principal Matron .. ..	1
Head Staff Clerk ... ..	1
Staff Clerk ... ..	1
Clerks ... ..	22
Head Accountant ... ..	1
Accountant ... ..	1
Book-keepers ... ..	13
Chief Storekeeper ... ..	1
Storekeepers... ..	11
<b>Hospitals.</b>	
Senior Physician ... ..	1
Senior Surgeon ... ..	1
Gynaecologist ... ..	1
Ophthalmologist ... ..	1
Senior Medical Inspectors ... ..	33
Lady Doctor ... ..	1
Dental Officer ... ..	1
Assistant Ophthalmologist ... ..	1
Medical Inspectors ... ..	10
Surgical Registrar ... ..	1
Obstetrical Registrar ... ..	1
Medical Officers ... ..	63
Medical Assistants ... ..	316
Matron, Khartoum Civil Hospital ... ..	1
Matron, Nurses Training School: Omdurman ... ..	1
Charge Sisters ... ..	10
Nursing Sisters ... ..	16
Dental Mechanic ... ..	1
Radiographer ... ..	1
Assistant Radiographers ... ..	9
Pharmacists ... ..	2
Dispensers ... ..	9
Dispensers under training ... ..	5
Book-keepers ... ..	64
Clerks ... ..	5
Southern Storekeepers ... ..	3
Head Hospital Orderlies ... ..	31
Theatre Attendants ... ..	23
<i>Carried forward</i> ... ..	668

Appointment						Establishment
<i>Brought forward</i> ... ..						668
<b>Public Health.</b>						
Medical Officer of Health	...	...	...	...	...	1
Assistant Medical Officer of Health	...	...	...	...	...	1
Chief Public Health Inspector	...	...	...	...	...	1
Assistant Chief Public Health Inspector	...	...	...	...	...	1
Senior Public Health Inspectors...	...	...	...	...	...	9
Public Health Officers	...	...	...	...	...	19
Public Health Overseers	...	...	...	...	...	92
Principal, Midwives Training School	...	...	...	...	...	1
Charge Sister	...	...	...	...	...	1
Child Welfare Workers	...	...	...	...	...	2
Clerks	...	...	...	...	...	3
Staff Midwives	...	...	...	...	...	2
Staff Nurse	...	...	...	...	...	1
Staff Health Visitor	...	...	...	...	...	1
Health Visitors	...	...	...	...	...	3
<b>Research.</b>						
<b>Stack Medical Research Laboratories.</b>						
Assistant Director (Research) and Senior Medical Research Officer	...	...	...	...	...	1
Bacteriologist	...	...	...	...	...	1
Assistant Bacteriologist	...	...	...	...	...	1
Laboratory Assistants (British)	...	...	...	...	...	4
Laboratory Assistants (Sudanese)	...	...	...	...	...	39
Head Laboratory Attendants	...	...	...	...	...	2
Clerks	...	...	...	...	...	3
<b>Medical Entomology.</b>						
Medical Entomologist	...	...	...	...	...	1
Technical Assistants	...	...	...	...	...	4
Clerk	...	...	...	...	...	1
<b>Wellcome Chemical Laboratories.</b>						
Government Analyst	...	...	...	...	...	1
Chemist	...	...	...	...	...	1
Technical Assistants	...	...	...	...	...	5
Junior Technical Assistants	...	...	...	...	...	2
Clerk	...	...	...	...	...	1
<b>Kitchener School of Medicine.</b>						
Dean	...	...	...	...	...	1
Library Clerk	...	...	...	...	...	1
<b>Graphic Museum.</b>						
Assistant Curator	...	...	...	...	...	1
Museum Attendants	...	...	...	...	...	2
<b>TOTAL</b> ... ..						<b>878</b>
Total Classified Staff = 878						
Total unclassified Staff ... = 3,500						



## FINANCIAL.

The following figures show the actual Revenue and Expenditure of the Sudan Medical Service for the last three years :—

		1942	1943	1944
		£L.	£E.	£E.
1. Revenue	....	80,951	72,569	68,313
2. Expenditure :				
Chapter 1. Personnel and Personal Allowances	... ..	182,682	213,946	243,969
Chapter 2. Services	....	136,887	146,066	227,882
Chapter 3. Extraordinary Expenditure	....	2,813	1,901	2,612
TOTAL		322,382	361,913	474,46

CHAPTER 1

The first part of the book is devoted to the study of the properties of the function  $f(x)$  defined by the equation  $f(x) = x^2 + 1$ . It is shown that  $f(x)$  is an even function and that its graph is a parabola opening upwards with its vertex at the origin.

It is also shown that  $f(x)$  is strictly increasing on the interval  $(0, \infty)$  and strictly decreasing on the interval  $(-\infty, 0)$ . The range of  $f(x)$  is  $[1, \infty)$ .

The second part of the book is devoted to the study of the properties of the function  $g(x)$  defined by the equation  $g(x) = x^3 - 1$ . It is shown that  $g(x)$  is an odd function and that its graph is a cubic curve passing through the origin.

It is also shown that  $g(x)$  is strictly increasing on the entire real line. The range of  $g(x)$  is  $(-\infty, \infty)$ .

The third part of the book is devoted to the study of the properties of the function  $h(x)$  defined by the equation  $h(x) = x^2 - 2x + 1$ . It is shown that  $h(x)$  is an even function and that its graph is a parabola opening upwards with its vertex at  $(1, 0)$ .

It is also shown that  $h(x)$  is strictly decreasing on the interval  $(-\infty, 1)$  and strictly increasing on the interval  $(1, \infty)$ . The range of  $h(x)$  is  $[0, \infty)$ .



TABLE I,  
ADMISSIONS AND DEATHS BY 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 ...	176	35	13	5	82	16	117	15	225	41	77	20	93	9	13	1	976	142
2. T. B. Non-Pulmonary ...	180	13	6	—	49	4	81	5	204	8	38	6	58	3	16	2	632	41
3. Syphilis ...	903	5	4,260	9	3,595	1	524	4	170	1	4,489	10	506	3	970	—	14,917	33
4. Gonorrhoea ...	751	—	478	—	798	—	594	—	163	—	1,375	—	328	—	296	—	4,783	—
5. Soft Sore ...	153	—	41	—	65	—	44	1	77	—	86	—	6	—	21	—	493	1
6. Trachoma ...	86	—	15	—	48	—	69	—	62	—	91	—	205	—	16	—	733	—
7. All other eye diseases ...	269	—	265	—	544	1	123	—	1,120	2	496	2	510	—	372	—	3,699	5
8. Ear ...	79	4	24	—	137	—	29	—	59	1	116	1	72	—	8	1	524	7
9. Skin ...	209	2	105	—	588	—	68	—	98	1	460	3	115	—	33	—	1,676	6
10. Wounds and other injuries ...	2,859	52	2,314	23	5,255	66	2,435	23	1,388	17	3,634	37	1,471	12	811	10	20,167	240
11. Tumours Malignant ...	47	6	5	—	14	2	20	2	82	17	63	7	14	1	2	1	247	36
12. Tumours Non-Malignant ...	97	—	26	—	83	—	58	—	134	6	63	2	25	1	—	—	486	9
13. Gynaecological ...	365	9	17	—	65	1	156	2	316	3	208	3	141	1	19	—	1,287	19
14. Confinements ...	174	15	34	—	103	2	71	1	477	4	123	3	75	5	8	—	1,065	30
15. Poisoning ...	46	4	8	—	20	1	13	1	11	—	22	5	6	2	—	—	1,26	13
16. Ancylostomiasis ...	11	3	2	—	1,884	20	12	—	11	—	8	—	34	—	9	—	1,971	23
17. Bilharziasis ...	425	13	15	—	510	8	26	1	51	—	143	—	116	2	23	—	1,309	24
18. Blackwater Fever ...	4	3	—	—	4	—	1	—	—	—	—	—	—	—	—	—	9	3
19. Dysentery, Amoebic ...	558	10	482	3	150	3	507	20	194	2	647	25	262	2	62	2	2,862	67
20. Dysentery, Bacillary ...	80	2	—	—	194	9	49	1	83	6	81	6	38	—	2	—	527	24
21. Filariasis ...	3	—	3	—	7	—	7	—	1	—	16	—	—	—	—	—	37	—
22. Madura disease ...	147	2	9	—	1	—	24	—	92	—	28	—	52	—	—	—	353	2
23. Malaria ...	3,612	39	499	6	2,512	28	2,219	34	647	4	1,952	14	2,280	16	358	3	14,079	144
24. Leishmaniasis ...	85	45	4	3	15	1	68	17	11	5	10	1	—	—	2	2	195	74
25. Trypanosomiasis ...	—	—	—	—	484	7	—	—	—	—	—	—	—	—	—	—	484	7
26. Yaws ...	—	—	1	—	2,431	2	—	—	—	—	—	—	—	—	2	—	2,434	2
27. Heat Stroke ...	—	—	—	—	—	—	12	—	—	—	—	—	1	—	—	—	13	—
28. Dracontiasis ...	17	—	10	—	406	—	23	—	7	—	145	—	1	—	17	—	626	—
29. Tropical Ulcer ...	880	4	122	1	3,178	—	200	8	61	—	762	—	23	—	117	—	5,343	13
30. Anthrax ...	1	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	3	—
31. Cerebrospinal Meningitis ...	20	5	1	—	1,059	344	6	4	9	5	3	2	1	1	69	23	1,168	384
32. Chickenpox ...	54	—	72	—	23	—	133	—	67	—	74	—	42	—	1	—	466	—
33. Dengue ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—
34. Diphtheria ...	37	12	5	1	4	1	46	10	104	16	24	11	32	10	—	—	252	61
35. Enteric Fever ...	48	7	—	—	17	1	10	—	68	7	5	—	41	4	9	2	198	21
36. Erysipelas ...	1	—	—	—	1	—	3	1	1	—	2	—	—	—	—	—	8	1
37. Gastro Enteritis of Children ...	69	10	—	—	52	3	24	4	219	16	30	3	5	2	1	—	400	38
38. Influenza ...	36	1	23	—	294	—	145	1	72	—	115	—	41	1	3	—	729	3
39. Leprosy ...	14	—	5	3	48	5	11	—	2	—	18	2	7	—	3	—	108	10
40. Undulant Fever ...	24	1	—	—	11	—	9	1	4	—	13	—	—	—	5	—	66	2
41. Measles ...	53	2	166	5	69	6	79	—	32	—	464	8	23	—	—	—	886	21
42. Mumps ...	179	—	35	—	24	—	91	—	89	—	169	—	98	—	2	—	687	—
43. Pellagra ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—
44. Puerperal Fever ...	12	1	5	—	—	—	7	3	6	—	5	1	6	1	—	—	41	6
45. Phlebotomus Fever ...	17	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	19	—
46. Pneumonia ...	684	66	108	10	778	73	273	38	723	35	386	45	258	23	114	10	3,324	300
47. Rabies ...	1	1	—	—	1	1	—	—	—	—	1	1	1	1	1	1	5	5
48. Relapsing Fever ...	1,492	68	31	2	3	—	721	44	1,083	29	398	21	11	—	1	1	3,740	165
49. Acute Rheumatism ...	17	—	3	—	39	—	93	—	13	—	4	2	90	—	22	—	281	2
50. Smallpox ...	1	—	3	—	—	—	3	—	1	—	—	—	26	—	1	—	35	—
51. Tetanus ...	18	12	—	—	22	10	6	4	15	3	6	5	2	—	4	—	73	34
52. Whooping Cough ...	38	1	—	—	33	3	5	—	4	—	31	3	1	—	4	—	116	7
53. Circulatory System ...	250	32	29	5	94	21	170	14	402	40	175	26	274	12	32	2	1,426	152
54. Respiratory System ...	662	17	97	2	999	17	453	16	627	8	1,018	45	494	8	206	6	4,556	119
55. Alimentary System ...	1,521	65	195	10	1,825	63	759	42	1,640	42	1,171	75	1,107	30	423	8	8,641	335
56. Genito-Urinary Sytem ...	425	19	94	6	237	7	233	7	378	22	411	17	329	15	34	1	2,071	94
57. Nervous System ...	108	7	17	—	62	4	68	4	110	13	80	6	63	1	12	1	520	36
58. Scurvy ...	14	—	1	—	4	—	16	1	16	—	16	1	1	—	4	1	72	3
59. Diabetes ...	32	1	1	—	2	—	18	—	78	6	13	2	28	2	—	—	172	11
60. Fever of uncertain origin ...	569	49	22	1	161	8	221	12	506	6	245	24	651	9	211	7	2,586	116
61. All other diseases ...	884	29	213	1	6,164	102	472	8	2,486	34	1,208	36	531	15	796	11	12,754	206
RIVER HOSPITAL 3,795																		
TOTAL ...	19,503	672	10,027	96	34,748	841	11,625	349	14,429	380	21,220	481	10,595	182	5,135	96	131,077	3,097





TABLE II.  
**OUT-PATIENTS**  
**NEW CASES BY DISEASES**  
 and  
**TOTAL ATTENDANCES.**

Disease	Blue Nile	Darfur	Equatoria	Kassala	Khartoum	Kordofan	Northern	Upper Nile	TOTAL
1. T. B. Pulmonary	236	17	77	148	225	112	175	13	1,003
2. T. B. Non-Pulmonary	180	6	51	125	224	83	12	16	697
3. Syphilis	14,914	15,172	5,256	9,751	5,744	20,581	2,798	7,270	81,786
4. Gonorrhoea	4,403	1,263	1,570	2,061	2,707	3,354	933	1,081	17,372
5. Soft Sore	40,809	227	361	1,216	2,285	515	18	34	5,483
6. Trachoma	77,503	4,417	376	14,488	36,686	4,409	35,238	290	136,743
7. All other Eye diseases	15,765	6,970	14,183	24,701	62,919	36,977	34,085	10,192	267,530
8. Ear	15,012	1,883	2,785	9,704	6,387	7,658	8,961	578	53,721
9. Skin	131,231	3,263	11,717	5,093	4,279	18,046	3,251	585	61,246
10. Wounds and other injuries	117	25,329	60,246	100,540	75,780	64,906	41,781	10,613	510,426
11. Tumours Malignant	3,762	5	17	22	92	64	3	2	322
12. Tumours Non-Malignant	366	83	83	241	157	158	147	—	4,631
13. Gynaecological	206	18	64	473	2,006	615	217	19	3,798
14. Confinements	60	31	94	81	523	123	26	8	1,095
15. Poisoning	29	15	20	15	11	22	21	—	164
16. Ancylostomiasis	3,312	5	5,724	15	34	9	107	11	5,935
17. Bilharziasis	4	2,059	1,874	415	486	3,661	2,175	58	14,040
18. Blackwater Fever	8,456	—	4	1	—	2	—	—	11
19. Dysentery, Amoebic	1,573	1,767	499	4,530	2,278	3,659	3,674	130	24,993
20. Dysentery, Bacillary	4	—	198	331	98	172	262	2	2,736
21. Filariasis	365	9	57	7	1	102	4	—	174
22. Madura disease	99,984	4,860	6,127	14,665	7,698	27,484	19,073	5,454	185,345
23. Malaria	85	11	15	68	13	10	—	2	204
24. Leishmaniasis	—	—	93	—	—	—	—	—	93
25. Trypanosomiasis	—	53	10,908	—	—	—	—	2	10,963
26. Yaws	2	—	—	11	1	—	1	—	15
27. Heat Stroke	799	15	1,219	38	10	477	3	73	2,634
28. Dracontiasis	2,406	817	13,848	1,389	91	3,809	2	1,446	23,808
29. Tropical Ulcer	1	—	—	—	—	2	—	—	3
30. Anthrax	20	56	2,158	6	9	6	21	69	2,345
31. Cerebrospinal Meningitis	480	84	24	204	153	213	166	1	1,325
32. Chickenpox	3	6	4	50	—	—	32	—	276
33. Dengue	37	—	17	10	67	34	41	9	320
34. Diphtheria	48	—	1	4	16	6	—	—	24
35. Enteric Fever	1	—	418	347	5,188	1,042	225	492	10,548
36. Erysipelas	2,828	8	963	1,940	1,973	754	1,027	10	10,442
37. Gastro enteritis of children	2,858	917	125	15	3	57	7	3	243
38. Influenza	27	6	11	9	4	13	—	5	66
39. Leprosy	24	—	82	133	121	1,754	762	—	4,347
40. Undulant Fever	1,291	204	30	407	538	972	598	4	6,468
41. Measles	3,766	153	30	—	—	—	—	—	3
42. Mumps	3	5	—	7	3	6	33	—	67
43. Pellagra	13	5	—	—	1	—	—	—	23
44. Puerperal Fever	17	5	793	463	1,258	726	1,017	201	6,382
45. Plebotomus Fever	1,813	108	1	—	—	—	—	5	24
46. Pneumonia	11	5	3	841	1,878	3,676	11	978	22,673
47. Rabies	14,231*	1,055	1,748	540	59	114	2,563	29	6,062
48. Relapsing Fever	1,006	3	—	3	1	—	96	—	177
49. Acute Rheumatism	73	3	17	5	22	6	1	5	75
50. Smallpox	18	1	154	92	168	384	364	21	3,651
51. Tetanus	2,467	1	267	1,507	13,274	1,336	2,889	440	24,719
52. Whooping Cough	4,719	287	29,877	23,198	34,395	34,055	30,361	7,994	243,756
53. Circulatory System	76,092	7,784	20,370	42,899	47,837	44,471	49,496	7,828	314,787
54. Respiratory System	88,128	13,758	243	3,984	5,287	3,918	5,294	249	25,997
55. Alimentary System	4,449	2,573	71	1,397	226	733	3,346	21	9,406
56. Genito-Urinary System	3,584	28	72	136	17	60	4	15	501
57. Nervous System	195	2	3	55	103	14	23	—	239
58. Scurvy	40	1	5,322	8,465	17,262	5,431	11,990	3,034	77,078
59. Diabetes	25048	526	108,681	21,978	36,409	24,136	38,791	7,919	313,583
60. Fever of uncertain origin	67,130	8,539	—	—	—	—	—	—	—
61. All other diseases	722,931	104,749	308,922	298,853	377,240	320,981	302,124	67,213	2,503,013
<b>Total New Cases</b>	722,931	104,749	308,922	298,853	377,240	320,981	302,124	67,213	2,503,013
<b>ATTENDANCES: MEN</b>	784,045	169,468	Separate figures not available.	413,042	404,957	432,366	332,861	76,599	7,077,919
<b>WOMEN</b>	357,084	89,904	—	135,201	168,192	304,380	229,351	49,991	15,862
<b>CHILDREN</b>	576,875	118,449	—	193,141	358,243	480,906	511,022	53,335	7,093,781
<b>Total Attendances</b>	1,718,004	377,821	822,645	741,384	931,392	1,217,652	1,073,234	179,925	7,077,919
							RIVER HOSPITAL		15,862
									7,093,781

\* Includes those treated by the Mobile and Non-Mobile Relapsing Fever Units.

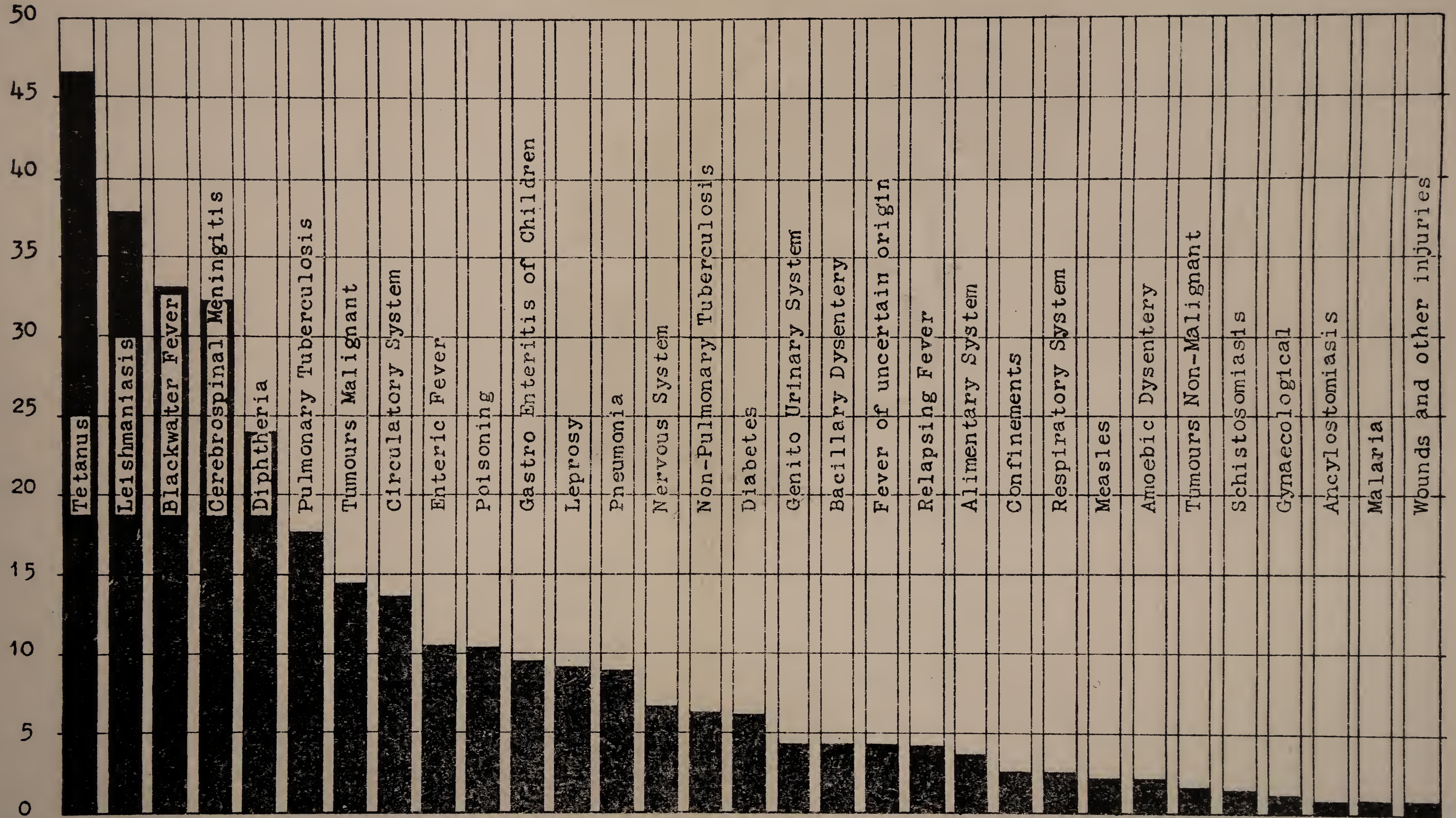




# THE KILLING DISEASES

## FATALITY RATE IN HOSPITALS AND DISPENSARIES BY DISEASES

### PERCENTAGE OF DEATHS TO ADMISSIONS









## THE KILLING DISEASES

TOTAL DEATHS IN HOSPITALS AND DISPENSARIES BY DISEASES

